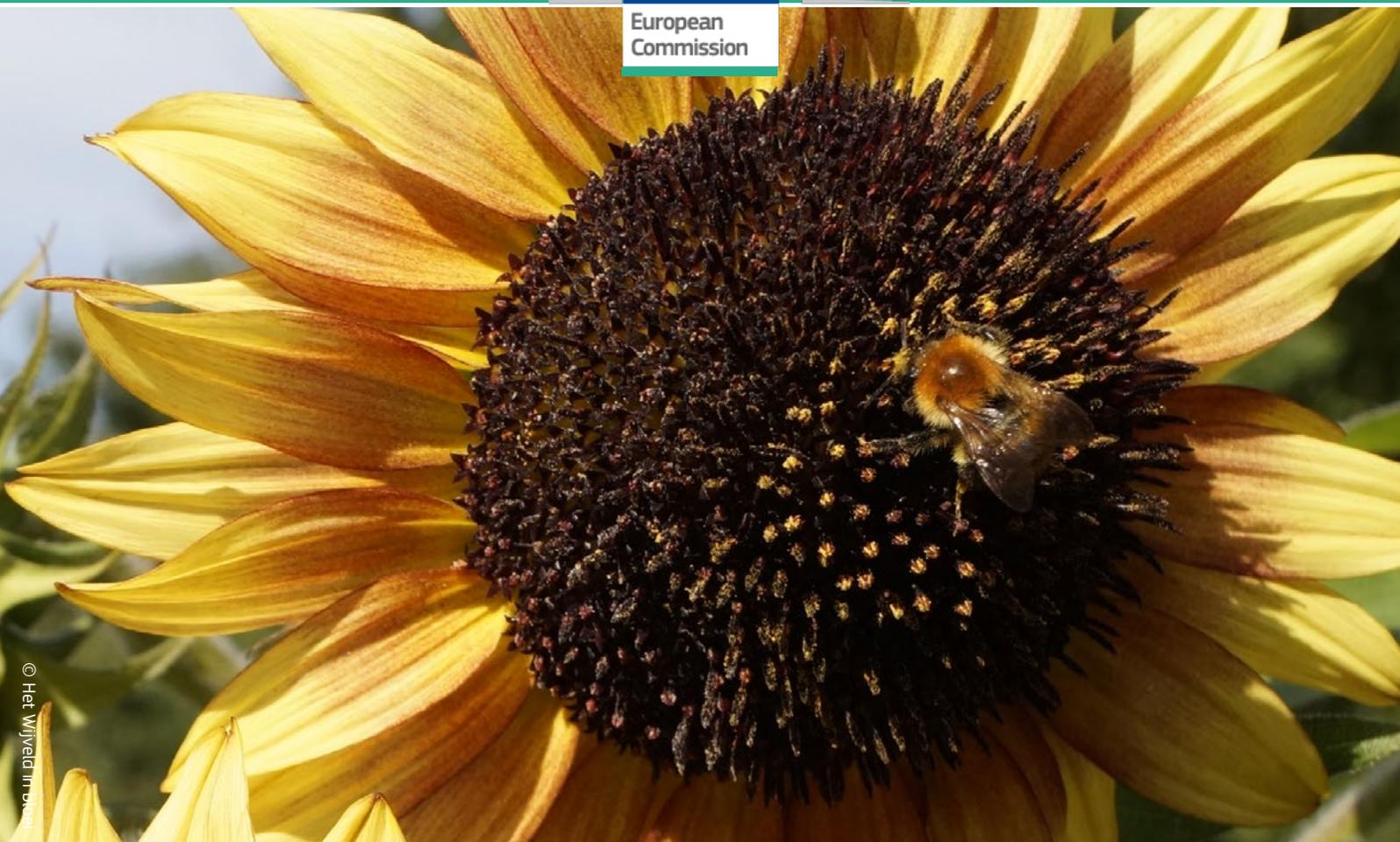




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A guide to pollinator-friendly farming

Environment

A guide to **POLLINATOR-FRIENDLY FARMING**

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A guide to **POLLINATOR-FRIENDLY FARMING**

Why this guidance?

Thriving wild pollinator populations are essential for healthy, resilient farmland ecosystems. They provide vital pollination services - three out of four of Europe's main food crops and four out of five wild plants rely on pollinating insects [1]. It has been estimated that insect pollination is worth nearly €15 billion per year in Europe [6]. Numerous scientific studies indicate that populations of wild pollinators (such as bees, hoverflies,

moths, and butterflies) have declined dramatically across Europe over the last few decades.

In 2018, the EU launched its first-ever initiative on pollinators¹ to tackle the problem. The farming sector has a crucial role to play in the efforts to halt and reverse the negative trends of pollinator populations in EU countries.

Who is this guidance for?

Everyone who has a role to play in making farmland across Europe a more hospitable place for wild pollinators, and in turn improving the pollination services for some of our most economically important crops.

The guidance is written specifically for three groups of individuals and organisations, but all three groups will need to play their part and work closely together if we are to reverse the alarming decline in wild pollinators and make it possible for them to thrive across Europe and provide crop pollination services long into the future.

- ▶ **Farmers and other land managers** - people and organisations involved in and/or responsible for the management of farmland, and the organisations representing them.

- ▶ **Farm and biodiversity advisers and extension services** - providers of agricultural and biodiversity advice and information to farmers and other land managers.
- ▶ **CAP managing authorities** - the organisations and experts responsible for design and delivery of the Common Agricultural Policy (CAP) and related state-aid support to farmers and other land managers. This part of the guidance is focused on the design and implementation of Member States' new CAP Strategic Plans for 2021-2027.

¹ EU Pollinators Initiative, <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52018DC0395>

How to use this guidance

Section 2 Introduction to pollinators

What? essential information on pollinators, their decline and significance.

Who? everyone should read.

Section 3 What can farmers and other land managers do for pollinators?

What? information on actions to create and manage habitats for pollinators, landscape approach, integrated pest management (IPM)-, monitoring, and joint actions with others.

Who? useful for everyone.

Section 4 What can farm advisors and extension services do for pollinators?

Who? useful for farm advisors and for other groups providing farmers with advice, such as farming associations, environmental groups, and research groups.

Section 5 CAP managing authorities

What? Step by step guide to integrating pollinator action into CAP Strategic Planning and measures.

Who? aimed at CAP managing authorities but also useful for groups involved in CAP implementation or design, for example eco-schemes and agri-environment.

Section 6 Further resources and references

What? Pointers to where to find more information. References cited in the guidance.

Who? Useful to all.



A close-up photograph of a fuzzy black and orange bee (Andrena fulva) on a blue flower. The bee is the central focus, with its head and thorax in sharp focus. It has a black head with large eyes and a long, thin antenna. Its thorax is covered in dense, bright orange fur. The wings are dark and translucent. The bee is positioned on a blue flower, with its legs and antennae interacting with the petals. The background is a soft, out-of-focus green and blue, suggesting a natural outdoor setting. A teal-colored rectangular box is overlaid on the lower right portion of the image, containing the text '2. INTRODUCTION TO POLLINATORS' in white, bold, sans-serif capital letters.

2. INTRODUCTION TO POLLINATORS

2.1 What are pollinators?

Pollination is an essential step in the seed production process of most flowering plants- including many food plants. It requires the transfer of grains of pollen between different flowers of the same species. In some groups of plants wind is the main agent of pollination but in many others pollen is transported by animals – pollinators – that move from plant to plant. The most effective pollinators are species that actively seek pollen as a source of food.

In Europe, pollinators are primarily insects – including bees, hoverflies, butterflies, moths, beetles, wasps, thrips, and other fly species. Some pollinators need little introduction – honeybees are often assumed to provide the majority of pollination services to agriculture – but actually most pollination is brought about by wild pollinators [3] [4] [5].

2.2 Why do we need pollinators?

Pollinators play a crucial role in healthy and resilient ecosystems and thriving pollinator populations are essential to underpin the stability of pollinator services in the future. Without pollinators, many plants could not set seed and reproduce, causing vegetation diversity to decline. In a world where farmers are having to adapt to the impacts of climate change, the spread of pests and diseases of crop plants and of honeybees, **it is ever more important that we maintain as much species diversity as possible in natural vegetation and wild pollinators – we may need on their genetic reserves and pollinator services in the future.**

It is estimated that in Europe, around 87% of wild plant species and 70% of crops depend on pollination by insects and other animals, and that insect pollination is worth nearly €15 billion per year [6]. Many important crops depend to some extent on insect pollination, and insect pollination is crucial for fruit production. It is well established that the presence of wild bees improves crop performance even in the presence of honeybees [7] [8] [9] [10]. Wild pollinators are important not just for the yield but also for the quality of produce, its shelf life and nutrient content (with essential contribution to healthy diets), and for producing seeds to grow the next crop.

INSECT POLLINATION INCREASES YIELD AND QUALITY OF CROPS GROWN IN EUROPE

Crops with a medium to high need for pollination include: apple, orange, pear, peach, melon, strawberry, raspberry, plum, apricot, cherry, kiwifruit, mango, currant, turnip, pumpkin, various beans, squash, cucumber, sunflower, almond, chestnut, oilseed rape, white mustard, buckwheat, alfalfa, clover, and many herbs like basil, sage, rosemary, thyme, coriander, cumin, dill, chamomile and lavender. Other crops like tomato, pepper, aubergine, cotton, soybean, lemon, and orange also benefit from animal pollination.

In the Netherlands, which has a large horticultural sector, the annual contribution of crop pollination to total crop production is around €359 million [11].

Apple – wild bee pollination improves quality and classification for market [12] and diversity of wild pollinators increases fruit set [5] [13]. Honeybees are not efficient pollinators of apples [13] [14].

Pear – pollination by bumblebees and solitary bees increases fruit set and fruit size [15].

Strawberry – pollination by solitary bees increases commercial value, shelf life [16], and yield [3].

Half of the market value of strawberries in the EU — over €1 billion — is attributed to pollinators [16].

Soft fruit on bush and cane (blueberries, raspberries, gooseberries, currants) – wild pollinators increase yield [17].

Pollinators contribute up to half the profits of apple and blueberry farmers in the Netherlands [18].

Field beans (*Vicia faba*) – pollination by bumblebees gives higher yield [3].

Oilseed rape – Insect pollination increases yield and oil content, and lowers chlorophyll [3]. Greater pollinator functional diversity and abundance enhances yield [19].

Economic value of insect pollination to oilseed rape in Ireland was estimated at €3.9 million [20].

Sunflower – higher wild bee abundance is associated with higher seed set [8].

Buckwheat – insect pollination enhances crop yield with a lower proportion of empty seeds [3].

2.3 Pollinators are declining

Populations of pollinating bees, hoverflies, moths, and butterflies have declined significantly across Europe over recent decades [21] [1].

- ▶ The European Red List of Bees showed that nearly one in ten bees are considered threatened in all of Europe, whilst for over half of the rest, we do not know enough to assess whether they are threatened or not [22]. In some countries, the red list shows that over half of bee species are threatened –for example in Germany [23].
- ▶ Butterfly abundance has declined by 75% in some EU Member States since 1990 and the abundance of grassland butterfly species across the EU has dropped by about 40% [24].

Pollinators depend on a diversity of plant species to provide them with food at different stages in their life cycles, and they need suitable breeding and hibernating sites too. Wild plants are an essential source of pollinator food outside the short period of the year when food crops are in flower, and **the main limiting factor for pollinator populations is the lack of sufficient, diverse floral resources in the landscape, especially in early spring and late summer to autumn.**

Pollinator decline and the continuing threats to their populations are linked to the changes in our agricultural landscape – including large-scale and continuing loss of semi-natural grasslands in Europe, and the decline in the abundance of flowering arable weeds in and around arable crops [25]. Pesticide and fertiliser use are additional pressures that are both directly harmful to pollinators and further decrease flower and habitat resources. Pollinators are also under pressure from pollution (including light pollution), habitat loss due to urbanisation, invasive alien species, and climate change [1].

2.4 What do pollinators need?

There are many different types of insect pollinators, but all have three basic needs:

- ▶ **Suitable food supplies within reasonable flying distance from spring through to late autumn**, in the form of protein-rich pollen and energy-rich nectar from plants in flower. Different pollinator species use different food plants, and some pollinators have evolved physical characteristics that give them a competitive advantage in gathering pollen and nectar from specific plant types. Peak pollinator numbers and demand for food is during the middle of summer when many flowers bloom, but there is often a ‘hungry gap’ in spring and early summer as the small over-wintering populations emerge from hibernation and need to feed in preparation for breeding. Then in late summer pollinators need to feed up in preparation for hibernation².
- ▶ **Nesting sites and materials.** These are also species-specific. For example, bumblebee nesting habitats include: short, open, warm grassland where carder bees construct a nest of grass, moss and animal hair; other bumble bee species need sunny patches of tall, tussocky grass where they build nests in disused small mammal burrows. Solitary bees nest in other places – mining bees need bare soil in which to excavate a nest chamber, leaf-cutter bees and mason bees use existing cavities in plant stems or masonry to make their nests of leaves or mud (respectively). Butterfly species require very specific wild plants as food for their caterpillars – often one specific species or a closely related group of wild plants.
- ▶ **Places to hibernate.** On farmland these include vegetation that is left uncut and undisturbed from late summer until late spring, such as permanent grass field margins, buffer strips, scrub, dense hedges, and deadwood.



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² Honeybees are the only bees which overwinter as a colony with food stores, and colonies can survive for many years. Other bee species and pollinators are mostly solitary (although they may live close to each other) and live for only a few weeks or months until they have reproduced and laid eggs for the next generation.

2.5 Action on pollinators is urgently needed

There are very few truly natural habitats left in the EU – places where human management plays no part and the characteristic vegetation and species maintains a natural equilibrium over many decades. What we may think of as wild natural places are mostly semi-natural habitats managed by farmers or foresters (e.g. mountain pastures, mixed forests) or are places where one land use has been partly or temporarily abandoned and another will soon take its place.

Semi-natural farmland habitats have declined dramatically in the past 60 years. Modern cropping and livestock systems have led to farming landscapes in many parts of Europe becoming more specialised and simplified, as farmers take advantage of economies of scale and opportunities to improve yields and reduce wastage from weeds, pests and diseases through advances in chemical plant protection. This means that there are fewer and fewer opportunities for wild pollinators to survive as viable populations, and their recovery now depends on the 10 million farmers in the EU securing pollinator-friendly environment on and around their farmland – this guidance explains how to do this, how advisory services can help, and how the CAP managing authority (the Ministry responsible for agriculture) in every EU country can make choices now that will help farmers to support pollinators under the new, post-2020 CAP.



Mining bee (*Andrena clarkella*) © thatmacrogy/Shutterstock



3. WHAT CAN FARMERS AND OTHER LAND MANAGERS DO FOR POLLINATORS?

Key recommendations for farmers and other land managers

Step 1) find out what wild pollinators need in terms of food, hibernating and nesting sites, how these differ from the needs of honeybees and how your day-to-day farming decisions can affect them – ask your advisor or an environmental group (see resources section)

Step 2) look for local advice on wild pollinators – publications, online resources, and advisory services, and find out if there are any pollinator groups involving farmers and other land managers near you

Step 3) assess how pollinator-friendly your farm already is, looking at key pollinator habitats and features and how you manage these; also consider where the pollinator-friendly habitats are located in relation to each other and to insect-pollinated crops

Step 4) prepare a list of possible actions you could take to help pollinators, from simple changes in field work (reducing pesticide use, changing mowing regimes) through changing how you manage existing habitats and features (buffer strips, hedges, field corners) to creating new food sources, nesting areas or places to hibernate

Step 5) make a 5-year plan to improve your pollinator habitats and resources, thinking carefully about where you locate new features as well as how you create and manage them to maximise the benefits for both the pollinators and your crops

Step 6) make effective use of any funding available in your region to implement your plan, especially environmental land management payments and environmental investments through the CAP and other EU funding possibilities³, regional and national funding

Step 7) explain to your family (especially your children), neighbouring farmers and your farmers' association what you are doing for wild pollinators

Step 8) consider setting up a local pollinator group (there may be government or other sources of support for this)

3.1 What can I do to support pollinators on my farm?

It is likely that you already have some pollinator resources on your farm, and once you know what to look for you may find solitary bee nest sites, bumblebee nests, and hoverfly mini-lagoons in hedges, field corners, old trees, sandy banks, and walls. However, your habitats may be of limited value if they do not provide enough suitable flowers in all seasons, as well as places for nesting and hibernation. Farmed landscapes with large areas of cereal cropping or intensively managed grassland or permanent crops and few field margins, hedges, rough grassland, or other unfarmed areas are likely to have the fewest pollinator resources.

All farmland, whatever its current state, can be managed to be more useful to pollinators. Often this means small but important changes in day-to-day management decisions, that can make a big difference to pollinators, but have a small cost. Creating new habitats or features within your farming system may cost more, but you may be able to apply for support for this from the agriculture ministry. And wild pollinators will bring you benefits through their contribution to crop production, and through the better image of your farm that you can convey to your customers, visitors, and community.

³ For example, by joining local innovation farmer groups under the agricultural European Innovation Partnership (EIP-AGRI) or conservation projects under the LIFE Programme

The key points to consider before you start planning pollinator improvements are to:

- ▶ keep in mind the importance of meeting all three key pollinator needs to sustain breeding populations – food throughout the season, nesting sites, and places to hibernate.
- ▶ start by making pollinator improvements to the habitats you already have; then consider providing extra resources for pollinators to fill any gaps in provision of food, nesting, or hibernating sites. The key farmland habitats and management actions for pollinators are listed in the box and essential management advice is described below.
- ▶ location, location, location – always think carefully not just about what improvements you are planning but where on the farm these will be most useful for pollinators; this is covered in section 3.2.

KEY FARMLAND HABITATS AND MANAGEMENT ACTIONS FOR POLLINATORS

Manage existing farmland habitats for pollinators

- Flower-rich semi-natural permanent grasslands
- Heath and scrubland pastures
- Vegetative ground cover in permanent crops
- Grassed field margins and buffer strips with flowers
- Grassland management across the farm with less cutting and fertiliser
- Hedges (with flowers), farmland trees and wooded land, including agroforestry
- Terraces, stone walls, ponds and ditches, and other landscape features

Create extra pollinator resources on the farm

- Sow wildflower strips and pollen and nectar strips
- Leave fields fallow with seeded or spontaneous vegetation (set-aside)
- Provide nesting and hibernating sites for wild pollinators
- Leave bare sandy or earth banks or patches as nesting habitat
- Leave field corners or other areas for biodiversity – leave nature to regenerate on its own here
- Grow legume flowering crops such as alfalfa and clover and let them flower

Avoid pesticide use and reduce fertiliser use

- Integrated pest management (IPM)
- Tolerate flowering weeds where possible – avoid herbicide use and reduce fertiliser use
- Avoid insecticides as they harm pollinators

Support native plant species

- Plant native trees and hedges
- Control invasive alien species on farm
- Leave patches of tall flowering weeds and wild plants

Take a landscape scale approach

- Plan and position your wild pollinator habitats so they make sense in your farm's landscape (e.g. on south facing slopes) and so they form part of the ecological network on your farm
- Find out how your habitats can also help the natural enemies of your main crop pests and plan for diverse habitats and suitable locations to help your biological control of pests
- Plan your pollinator conservation measures so that they complement what is on your neighbours' farms and in the surrounding landscape

3.1.1 Flower-rich semi-natural permanent grasslands

Flower-rich semi-natural permanent grasslands are a key habitat and food source for pollinators such as bumblebees and solitary bees, butterflies, moths and flies. Many solitary bee species are completely dependent on semi-natural grassland habitats that feature the flowers on which they specialize.

Please note: some flower-rich grasslands are protected sites e.g. in Natura 2000 or other protected wildlife areas – check with your environmental adviser⁴ if this applies to your grasslands and ask if there are local guidelines or payments for habitat management or restoration for these sites.

Using different management regimes on different parcels of flower-rich semi-natural pastures or meadows provides a supply of flowering wild plants from early spring through summer:

- ▶ on some areas in spring, remove livestock or use only a very low stocking rate (below 0.5 LU/ha), to provide early season pollen and nectar, and later in the season cut or graze more heavily.
- ▶ on other areas traditional hay meadow management will provide summer food supplies for pollinators – cutting or grazing in early spring then closing up the field and allowing the vegetation to grow until it is cut after the wild plants have flowered, then grazing again in the autumn to allow for flowering during the summer.

Creating new flower rich permanent grasslands requires care if it is to be successful, so do take advice, especially if your grassland is in a protected area. If you can, choose a site immediately adjacent to existing semi-natural permanent grassland; if it has light and infertile soil, natural colonisation may work but alternatively you can speed up the process by cutting seed-rich hay from the adjoining species-rich grassland and spreading it immediately on a well-prepared seed bed – **this is the best method if you are creating a new wildflower grassland next to an existing protected habitat, because only seed mixes collected from local meadows should be sown within 400m of grassland designated as a protected area (check with your adviser).** If you are starting from a more fertile arable soil you will need commercial wildflower seeds mixed with a proportion of fine-leaved, less competitive grasses to help suppress dominating grasses and to provide food plants for butterfly larvae. You may also need to reduce soil fertility by cutting and removing cuttings more frequently in the first years.

3.1.2 Heath and scrubland pastures

Heath and scrubland pastures are important breeding and foraging habitats for many pollinators. Some threatened bumblebees and many solitary bee species are completely dependent on this habitat [26]. Key sites are open heath and scrub that require regular grazing by livestock to maintain their characteristic plant communities and mosaic vegetation structure, and to prevent them developing into closed woodland that is of less value to pollinators (though it is important to remember that edges between open habitats and woodland are key habitats and many hoverflies benefit from woodland).

3.1.3 Vegetative ground cover in permanent crops

Establishing **permanent vegetative ground cover in vineyards, olive groves and orchards**, can provide food and other benefits for pollinators, especially if the ground cover includes wild plants that flower at a different times during the season, and is managed extensively by light grazing or cutting, without pesticides or herbicides. There are other long-term benefits of permanent ground cover – improved soil structure and function, reduced erosion risk and (in southern Europe) reduced fire risk. Keep plants that offer resources to the natural enemies of your crop pests too.



© Wolfgang Hasselmann/Unsplash

⁴ If you use the public farm advisory service provided by your country or region, ask for an advisor with expertise in nature conservation. If you rely on private farm advice, check whether your advisor has ecological knowledge. Also check your local nature conservation authority, civil society organisations with pollinator conservation projects, and farming associations working on biodiversity conservation.

3.1.4 Grassed field margins and buffer strips

Buffer strips are typically sown with tall tussock-forming grasses to create a linear buffer between crops and water bodies. Managed as permanent grassland without pesticides, these strips provide nesting and overwintering sites for bumblebees and other beneficial insects and their pollinator value can be enhanced by including 5-10% of robust or scrambling wildflowers in the seed mix when the strip is established.

3.1.5 Grassland management across the farm

Altering the frequency and timing of mowing on at least some of your grassland can reap great benefits for pollinators. There are several ways to do this:

- ▶ *Ensure that a supply of wildflowers is available for as long as possible:* If sufficient area is available, rotational mowing helps to ensure continuity of flower resources throughout the season.
- ▶ *Avoid mowing too early in spring:* delaying first mowing ensures that there is a source of critical food available for pollinators at an early stage of spring. For example, cutting late increases the growth of important plants like clover, selfheal, cuckooflower and bird's-foot trefoil.
- ▶ *Alter the frequency of mowing:* cutting grass less frequently in field margins, buffer strips and along farm tracks allows wildflowers to flower among the longer grass. Common plants like stinging nettles and dandelions can provide very valuable food sources and breeding places for butterflies and moths

3.1.6 Hedges, farmland trees and wooded land, including agroforestry

Hedges, farmland trees and other wooded land, including agroforestry systems, can be a 'one-stop shop' for pollinators, with the right management. These features and areas can provide overwintering habitat (e.g. for bumblebees), larval habitat (e.g. for hoverflies) and wildflower food resources at important times of year, especially in early spring before sown crops and commercial wildflower mixes come into bloom.

Open areas in wooded pastures or meadows are key habitats for many pollinator species, and deadwood is a key breeding habitat for hoverflies and other pollinating insects [27]. Agroforestry systems (where trees are grown among crops or grass in the same field) and woodland edges alongside farmland are important foraging and refuge habitats for pollinators visiting crops and grassland.



Pollinator friendly management includes

- ▶ managing hedgerows for pollinators by ensuring they are planted and gapped up with native species of flowering shrubs and trees rich in nectar and pollen.
- ▶ maintain a wide hedge base (minimum 2m) and protect both hedge and base from damage by soil compaction, field machinery use and trampling by livestock.
- ▶ reducing the frequency of hedgerow cutting can provide more flowers for pollinators. Hedges cut every three years provide more flowers than hedges cut annually; for hedges that are cut every two years, leaving the cut until late winter (instead of autumn) increases the number of flowers and berries and supports more butterflies and moths. Reducing the intensity of hedge cutting (by around 10cm higher than the previous cut) also increases the abundance of flowers, and butterfly and moth species.
- ▶ plan hedge-cutting in rotation across the farm to ensure some hedgerows flower every year.
- ▶ leave veteran trees and deadwood in place (if safe to do so) and tree holes, flowering creepers (such as ivy and bramble), stone banks, walls, terraces or stone piles and other micro-habitat as nesting sites.
- ▶ Along tree lines and in agroforestry, ensure that the areas that provide favourable conditions for pollinators (such as south facing for sun and warmth in northern countries and north facing for shade in southern countries) are buffered from potentially harmful crop management practices. Prevent pesticide drift from adjacent fields into tree lines, hedgerows, and hedge margins, particularly insecticides.
- ▶ Under tree lines, if practical, introduce extensive grazing or cutting outside the plant flowering season to encourage floristic diversity.
- ▶ If invasive alien plants must be controlled, use only targeted cutting as preferred option. As a last resort, and following advice from an environmental advisor, spot treatments with selective herbicides may be applied. In that case, herbicides of the lowest risk category should be preferred⁵. Note that herbicides must be subject to label approval and local regulations on pesticide use.

3.1.7 Creating wildflower strips and pollen and nectar strips on arable farmland

These are strips across arable fields or along field edges on which wildflowers are seeded or allowed to regenerate naturally, to provide extra food resources for pollinators. The two types of strip require different seed mixes and management. Wildflower seeds mixes are annual plants attractive to a range of pollinators that are grown for one year and not mown. Pollen and nectar mixes are usually perennial flower species that are sown and managed by timely mowing to flower for several years. Choose seed mixes that offer resources to natural enemies of your main crop pests too.



- ▶ Sow seed mixes with native wildflower species that are rich in pollen and nectar, choosing species with a range of flower structure and colour to benefit the widest range of pollinator species. Prepare the ground before sowing as if it were for a crop.
- ▶ Sow annual and perennial seed mixtures on different sites as they require different management.
- ▶ Annual mixes need to be re-established each year (often best on a new site) and cannot be managed by cutting as this eliminates the annuals.
- ▶ Perennial seed mixture can be managed by cutting and can remain on the same site for many years; maintaining these flowering margins for several years allows establishment and flowering of perennial species.
- ▶ Consider rotational establishment of perennial wildflower seed mixtures on a range of soil types and locations to ensure a variety of flowering habitats.
- ▶ Actively manage undesirable and competitive species by cutting or grazing to ensure establishment of sown species.
- ▶ Prevent drift of fertilizer and pesticide onto flowering margins.

⁵ Pesticides (including herbicides) that are classified as low risk are those that have been approved on the basis that they will pose only a low risk to human and animal health and the environment and do not contain substances that meet any of the regulatory criteria for being carcinogenic, mutagenic, toxic to reproduction, sensitising chemicals, very toxic or toxic, explosive, corrosive, persistent (half-life in soil is more than 60 days), with bioconcentration factor higher than 100, deemed to be an endocrine disrupter, or has neurotoxic or immunotoxic effects.

3.1.8 Creating arable fallow with seeded or spontaneous vegetation

Fallow arable fields on which wild flowers are seeded or allowed to grow naturally (with no herbicide use) can provide a rich foraging habitat for pollinators. Multi-year fallow can also provide breeding and hibernation habitat.

- ▶ Maintain fallow overwinter without ploughing (as this destroys nesting habitat) but maintain patches of bare ground.
- ▶ Maintain some long-term fallow areas (for at least five years) to also provide breeding and hibernation habitat.
- ▶ Prevent drift of fertilizer and pesticide onto fallow from nearby crop treatments.

3.1.9 Creating nesting and hibernating sites nesting sites for wild pollinators

Different pollinators have different nesting requirements and supportive management practices may vary according to species, but proximity to food sources is crucial for any nesting location. Terraces, stone walls, ponds and ditches, and other landscape features are potential nesting, breeding, or hibernating sites for different pollinator species.

- ▶ leave patches of bare soil as they can provide sites for ground-nesting wild bee species In arable fields, fallow, agroforestry systems and permanent crops (but take care in choosing the location and preparing the soil);
- ▶ in uncropped areas leave bare stone and rock formations as well as some shrubs or trees, and create nesting habitat for stem nesting species, for example by cutting back bramble (*Rubus fruticosus*) to expose stems; leave deadwood, in particular standing deadwood, or logs in sunny spots as many cavity nesting species use this habitat (for shelter and nesting).



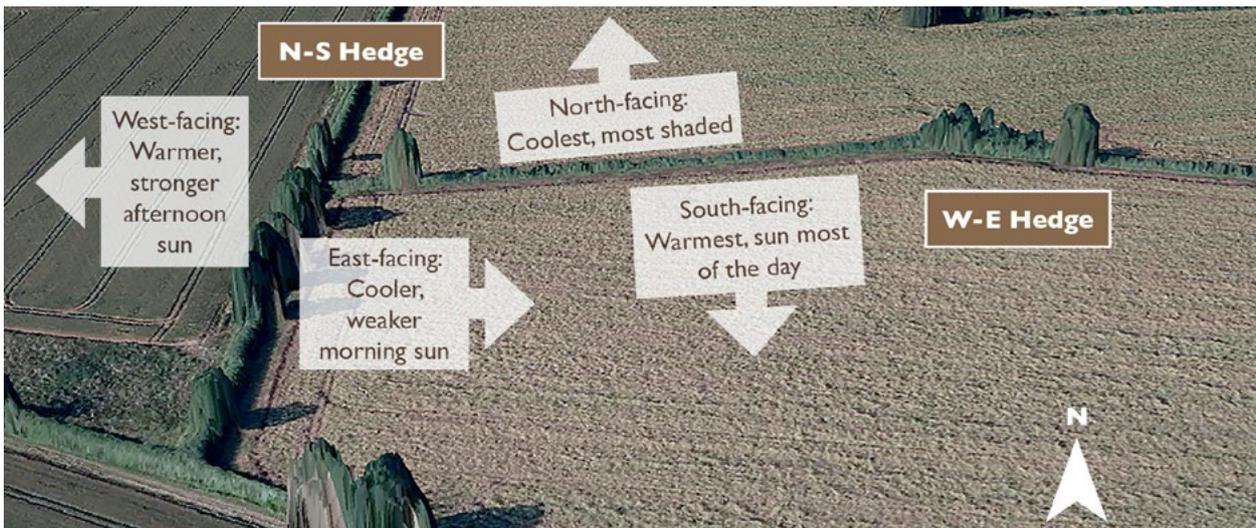
© Herbert Aust/Pixabay

3.2 Choosing the most effective locations for pollinator management and taking a landscape scale approach

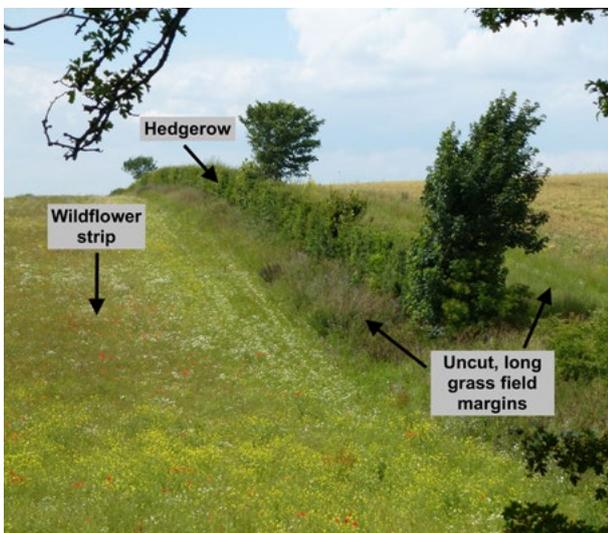
This is an essential aspect: having the right pieces of the pollinator puzzle is one step but putting them together is another. A good connection between various habitats across a farmland landscape is essential for the functional mobility of pollinators in their search for food, shelter, and mates.

Plan and position your wild pollinator habitats so they form part of the ecological network on your farm.

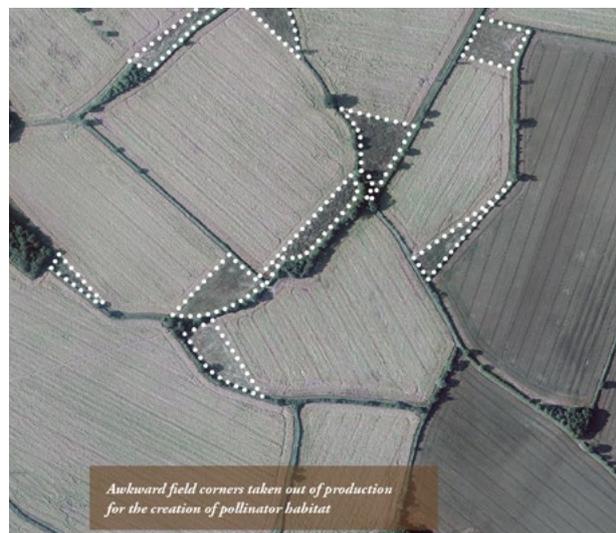
- ▶ Remember that solitary bees fly only 100 to 200m from their nest site.
- ▶ Any habitats containing flowers for pollinators are best placed in sunny locations such as south and west facing slopes and banks. In shady, north facing locations, sow or maintain tussocky grass, shrubs, and hedges as hibernation sites.
- ▶ Make awkward corners and obstacles into habitats and at the same time make your field operations more efficient.
- ▶ Make your field edges into a 'sandwich' of habitats that offer flowers from spring to autumn, and shelter for breeding, nesting, and hibernating sites.
- ▶ Sown pollen and nectar flower strips often work best when they are rotated around the farm after two to three years in one place. Make sure you can easily remove the cuttings from strips on fertile soil.



plan aspect to benefit pollinators



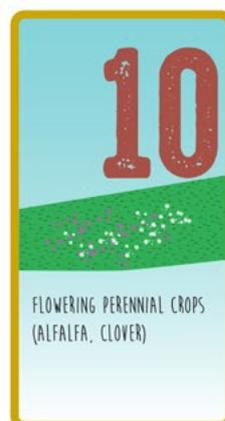
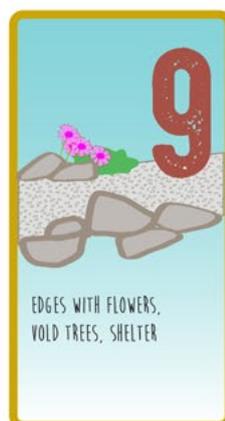
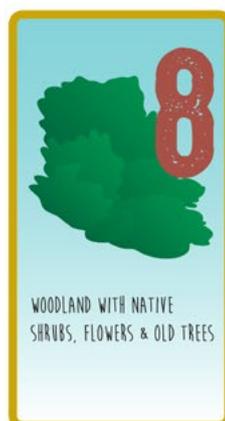
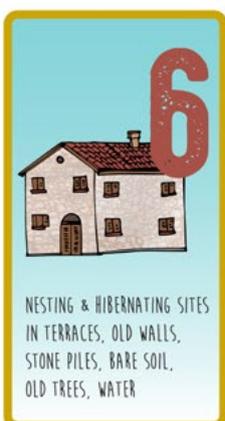
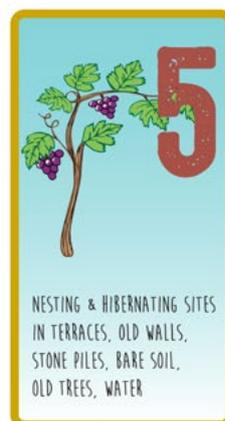
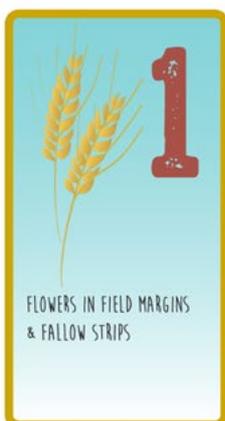
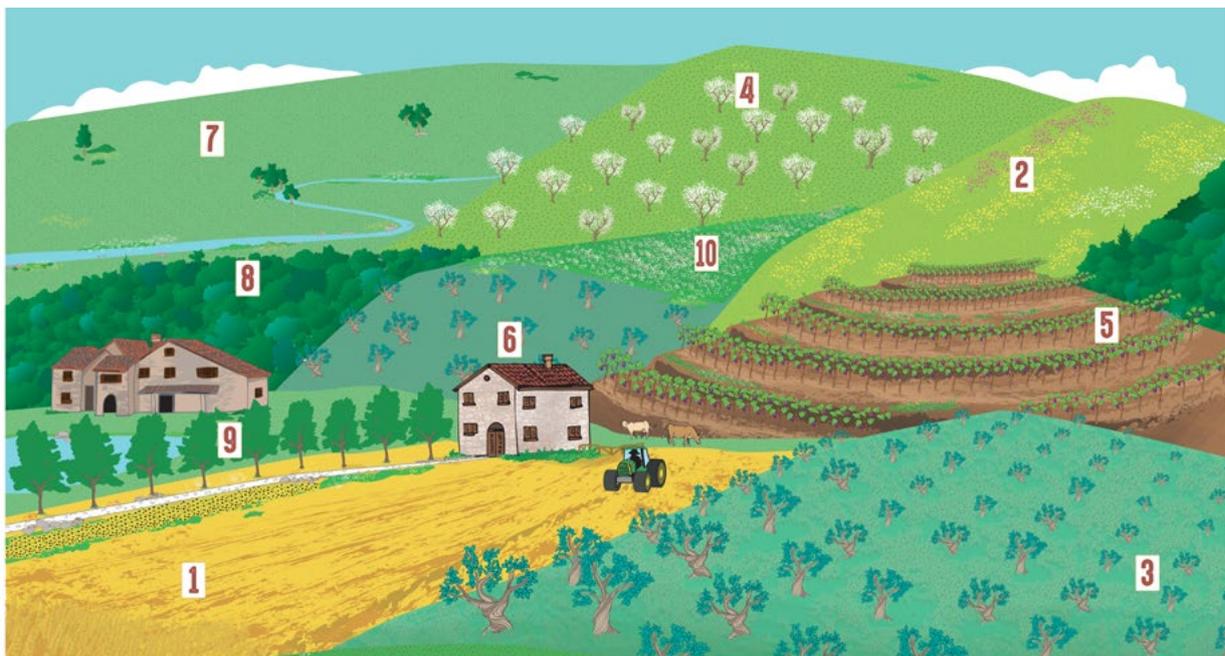
create a multi-layered field margin



leave awkward field corners to regenerate vegetation

Think about how your pollinator conservation measures complement and connect to what is on your neighbours' farms and in the surrounding landscape.

- ▶ Hedges, tree lines and woodland offer valuable shelter and breeding sites for hoverflies, as well as flowers and shrubs.
- ▶ Edges along fields, tracks, streams, buildings, old walls, terraces, small patches of water can all provide pollinator habitat if left undisturbed and uncut.
- ▶ Flower-rich grassland and ground cover under permanent crops such as olive or fruit trees can be rich pollinator habitat.



Pollinator habitats in a Mediterranean farming landscape

This picture shows ten habitats that can be made more attractive to pollinators:

- ▶ Field margins and fallow strips sown to flowers or left to regenerate flowering arable weeds
- ▶ Cut or graze grassland and scrub gently and do not fertilise so that it stays flower-rich
- ▶ Leave flowering ground cover in olive groves and almond and fruit orchards, and do not use herbicides or insecticides
- ▶ Leave terraces, old walls, stone piles, bare soil, old trees, water sites as nesting, breeding, and hibernating sites
- ▶ Manage woodlands to get a diversity of flowering shrubs, flowers, and old trees
- ▶ Keep field, track, and road edges undisturbed with flowers, old trees, and shelter

How much habitat is needed? There is no simple answer as it depends on what the surrounding landscape is like, but a rough guide for arable farmland is to create or safeguard as a minimum five flowering patches of 0.5 ha each (a total of 2.5 ha) for every 100ha farmland, in combination with field edge habitats and flower-rich grassland or forage on another 2.5 ha [28]. The EU Biodiversity Strategy to 2030 sets a target to bring back at least 10% of farmland under high biodiversity landscape features.



© Fred Heitzinger/Shutterstock

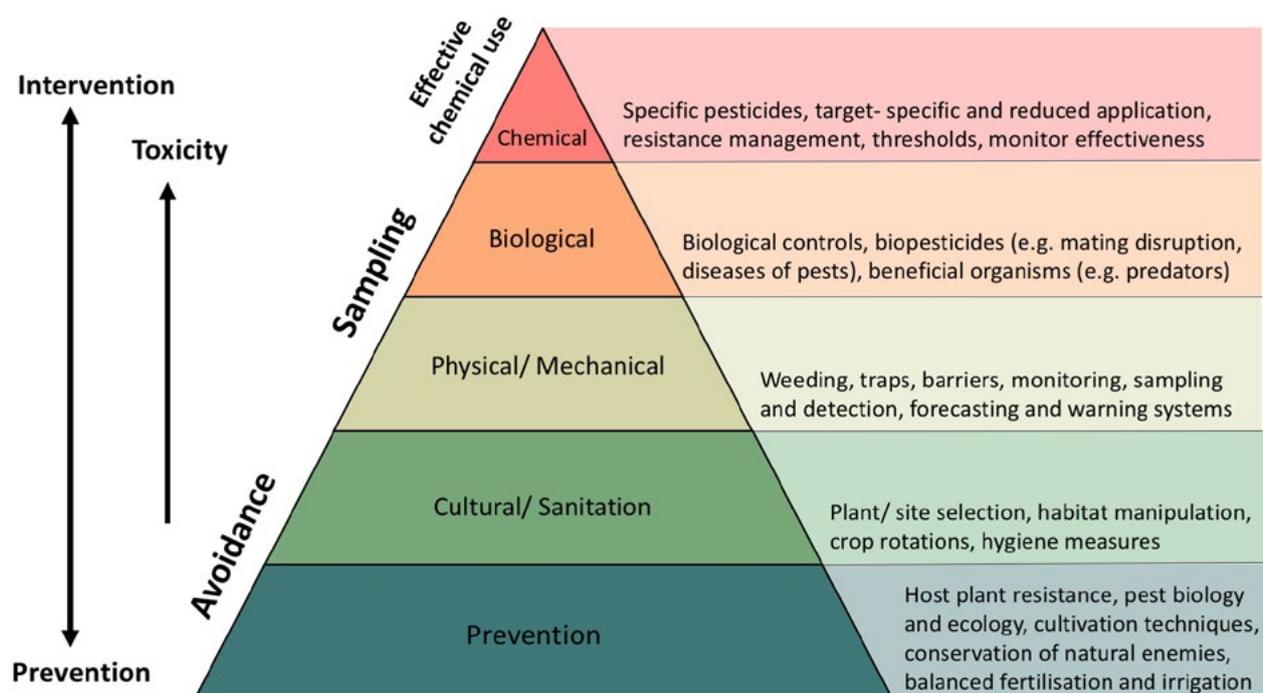
Avoid ‘over-neatness’. Remember bees and other wildlife see and need a very different landscape to humans.

Pollinators love messy corners – piles of stones, dead plants, old wood, wildflowers.

3.3 Integrated pest management (IPM)

There is clear evidence that pesticides, especially insecticides, are a major pressure on wild pollinators, as well as the lack of wildflowers linked to herbicide use. Therefore, measures to reduce pesticide use and implement integrated pest management on farms will benefit wild pollinator populations. Integrated pest management is a requirement of the EU legislation for sustainable use of pesticides⁶, and all professional users of pesticides must keep records of how they are using pesticides and follow the IPM principles (see the annex).

- ▶ Make sure to use pesticides only as a last resort and avoid using pesticides on flowering plants or where pollinators are active or nesting. The use of insecticides is particularly harmful.
- ▶ Pollinators will particularly benefit from IPM in crops that are highly attractive to pollinators, including fruit trees (apple, pear, plum, cherry) and soft fruit, sunflower and legumes (such as beans, peas, clover, alfalfa, lupins), but keep in mind that pollinators are also visiting the weeds and field margin vegetation in other crops. IPM will also reduce pesticide drift from crops onto field edge habitats, and into soil and water.



The integrated pest management principles

⁶ https://ec.europa.eu/food/plant/pesticides/sustainable_use_pesticides_en

3.4 Agroecological practices

Agroecology⁷ promotes farming practices that support species-rich and abundant communities of wild pollinators. Applying these practices as a whole system, rather than as single measures, means you benefit both biodiversity and its services to your farming system, including pollination and biological control of crop pests:

- ▶ add landscape features to your farm, including wide field margins, hedges, trees, shrubs, water, and manage them for pollinators (without being over-zealous!)
- ▶ grow cover crops and intercrops that include legumes (e.g. alfalfa, clover and lupins) and leave them in the field long enough to flower (this should be avoided directly following a crop treated with a systemic insecticide!);
- ▶ diversify your crop rotations and maintain a diverse mix of crops, grassland, and woody vegetation
- ▶ Implement integrated pest management methods to reduce the use of pesticides, and to reduce or eliminate the use of systemic pesticides and seed treatments and foliar sprays applied during the flowering period of the crop
- ▶ Reduce or cut out herbicide use and maintain weed populations along field edges and between crop rows, including long-flowering and bee-friendly species such as Red Deadnettle (*Lamium purpureum*) and thistles (*Cirsium spp.*)

3.5 Monitoring pollinators and their habitats on your farm

Find out if any expert groups are monitoring pollinators in your area⁸ and ask if they would include your land in their surveys – or find out how you and other family members can learn to recognise key pollinator species and do your own annual surveys. You can get involved in citizen science, take part in country-wide citizen science counts, and participate in research projects. The information will help you to adjust your pollinator-friendly management to get the best results.

Look at the EU Pollinator Information Hive for examples of citizens monitoring pollinators, including the guide *Citizens for pollinator conservation*⁹.

Farmers monitoring pollinators

NETHERLANDS

The farm insect monitoring scheme (BIMAG) is a pilot project funded by the EIP-AGRI innovation fund for agriculture. It looks at the effects of agri-environment management on the farmland area with a focus on moths. Farmers carry out the moth monitoring on their plots. They are involved at the design stage to ensure that the monitoring activities are simple and to facilitate their understanding of why pollinator conservation is necessary.

AUSTRIA

Farmers monitor biodiversity on their farms in the project [Biodiversitätsmonitoring mit LandwirtInnen](#). Farmers receive guidance on how to monitor typical grassland plants and animals on their farms from ecological experts. The results are published annually on the website along with personal stories and case studies.

3.6 Acting together with others

Farmers can become local champions or pollinator ambassadors, promoting actions for pollinators in the wider landscape. Joint action is crucial to ensure synergies between different farms, creating an ecological network of connected habitats and reducing the impacts of pesticide drift. Consider setting up a local pollinator group or set up a joint agri-environment management plan with your neighbours. Explain to your family (especially your children), neighbouring farmers, and your farmers' association what you are doing for wild pollinators.

You can find examples of collective approaches in the next section and pointers to further information at the end of this guidance.

⁷ <https://www.agroecology-europe.org/> ⁸ There are many different types of survey- some organised by [Butterfly Conservation in Europe](#)

⁹ <https://wikis.ec.europa.eu/display/EUPKH/Citizens>



4. WHAT CAN FARM ADVISORS AND EXTENSION SERVICES DO FOR POLLINATORS?

KEY RECOMMENDATIONS FOR FARM ADVISORS AND EXTENSION SERVICES AND PRIVATE ADVISERS

- ▶ **promote the benefits of pollinators – both for crop production and for a good public image – and the compatibility of pollinator friendly farming with profitability**
- ▶ **find out how wild pollinators can contribute to crop production in your area; gather evidence-based information on the needs of wild pollinators in terms of food, hibernating and nesting sites, how these differ from the needs of honeybees, and how land use and land management decisions affect pollinators; look for local advice on wild pollinators management – publications, online resources and advisory materials, and if there are any local pollinator groups**
- ▶ **integrate pollinator awareness and ‘pollinator—friendly’ advice within established channels of advice and information serving farmers and other land managers (newsletters, material aimed at specific farming systems, farmers’ groups, advisory publications, on-farm advice)**
- ▶ **develop detailed, specific pollinator planning advice for the key farming systems in your area, with the assistance of environmental experts (e.g. in bee and butterfly conservation groups, in government research establishments and universities); include information on how farmers can make best use of agriculture programme choices and funding (with advisory support for applying for funding)**
- ▶ **promote management systems and techniques that are of general benefit to wild pollinators – for example integrated pest management and agroecological approaches, including organic farming**
- ▶ **join a local pollinator group or if none exists, set one up (there may be sources of government support for this e.g. an agricultural European Innovation Partnership Operational Group)**
- ▶ **champion and publicise good practice for pollinator management in your area, through local ‘lead’ farmers, schools, and others with influence in the local community.**

4.1 Role of farm and environmental advisory and extension services

Member States have set up farm advisory services¹⁰ to help farmers, young farmers, forest holders, other land managers and small businesses in rural areas to improve the sustainable management and overall performance of their holding or business. Environment is one of the key topics to be covered by such advice. Farm advice is also provided by environmental groups, farmer associations, and by research institutes.

Trusted advisers have a vital role to play in helping farmers to improve wild pollinator conservation. Evidence shows that the support of technical advice or extension services has a positive effect on farmers’ willingness to take up agri-environment schemes – but trust is the key factor. Farmers are more likely to trust well established services with a track record in providing advice that is perceived as ‘impartial’ or actively ‘pro agriculture’, but the type of organisation providing the advice is less significant – it can be a public, private or a charitable institution.

The key first step for advisers is to develop evidence-based expertise in integration of locally relevant advice on meeting wild pollinator needs with the farming systems and management practices typical of their area. This underpins the ability to provide practical advice that works within the farmers’ individual management systems, plans and aspirations for their farm, and is likely to deliver tangible improvements in pollinator populations over a reasonable period. If a farmer grows pollinator-dependent crops, these improvements in wild pollinator populations should also bring improvements in crop yield, quality, and profits, provided other factors are not limiting.

¹⁰ As provided for in Regulation (EU) 1305/2013

EXAMPLES OF ADVICE AND TRAINING ON MANAGING FARMLAND FOR POLLINATORS SOURCE: [19]

GERMANY

Ministry for Rural Areas and Consumer Protection in Baden-Württemberg published a brochure on bee pasture [29]. It describes steps farmers can take - sowing flower mixtures, flowering crops, mixed cultivation, growing catch crops with undersowing, avoiding or reducing herbicide use, conserving field margins, leaving strips of sparse vegetation in arable fields, and creating bee banks. The University of Hohenheim hosts an Institute of Bee Science which offers free seminars, and an NGO promoting “blooming landscapes” across Germany is based in the State.

CROATIA

Croatia’s Farm Advisory Service has provided dedicated advice on wild pollinators since 1999. Training modules are compulsory for all farmers receiving support under the organic measure and the agri-environment-climate schemes for traditional orchards, flowering strips, and extensive olive groves. Solitary bees are a central theme, but also bumblebees, lacewing, hoverflies, and other beneficial insects. Farmers are trained in how to construct habitats such as bee houses. The advisory service also spreads knowledge and advice about pollinators in national TV and radio broadcasts, magazines, on-farm demonstrations of the effectiveness of bee houses and at agricultural fairs and shows.

4.2 Collective approaches and results-based approaches

Farm advisors have a key role in the piloting of a results-based approach to environmental payments¹¹ and in facilitating collective approaches by farmer groups. Here are some examples of current projects that use a whole farm scoring system to incentivise action for wild pollinators.

IRELAND Protecting Farmland Pollinators¹²

This locally led agri-environment pilot is funded through Ireland’s EIP-AGRI fund for innovation in agriculture. Scientists from Ireland’s National Biodiversity Data Centre are working with farmers to develop a whole farm pollinator scoring system. Farms must have nesting habitat for mining solitary bees and cavity nesting solitary bees. Farms are scored annually, and this is compared with an initial baseline. Scientists and farmers collaborate to identify simple actions that can be taken to improve their score. Over four years, farmers will be paid annually through a results-based payment scheme.

DENMARK SEGES Bee Campaign¹³

The Danish Agriculture & Food Council (SEGES) has launched a bee campaign aimed at farmers in Natura 2000 areas, with 10 ways to improve the farm for pollinators. Farmers can also score their farm against indicators for: the variety and abundance of wild flowers, presence of bare soil, mosses, lichens, and low growing herbs, old trees, bushes, dead wood, grazing animals (all year round), natural structures (rocks, mounds etc), and natural hydrology.

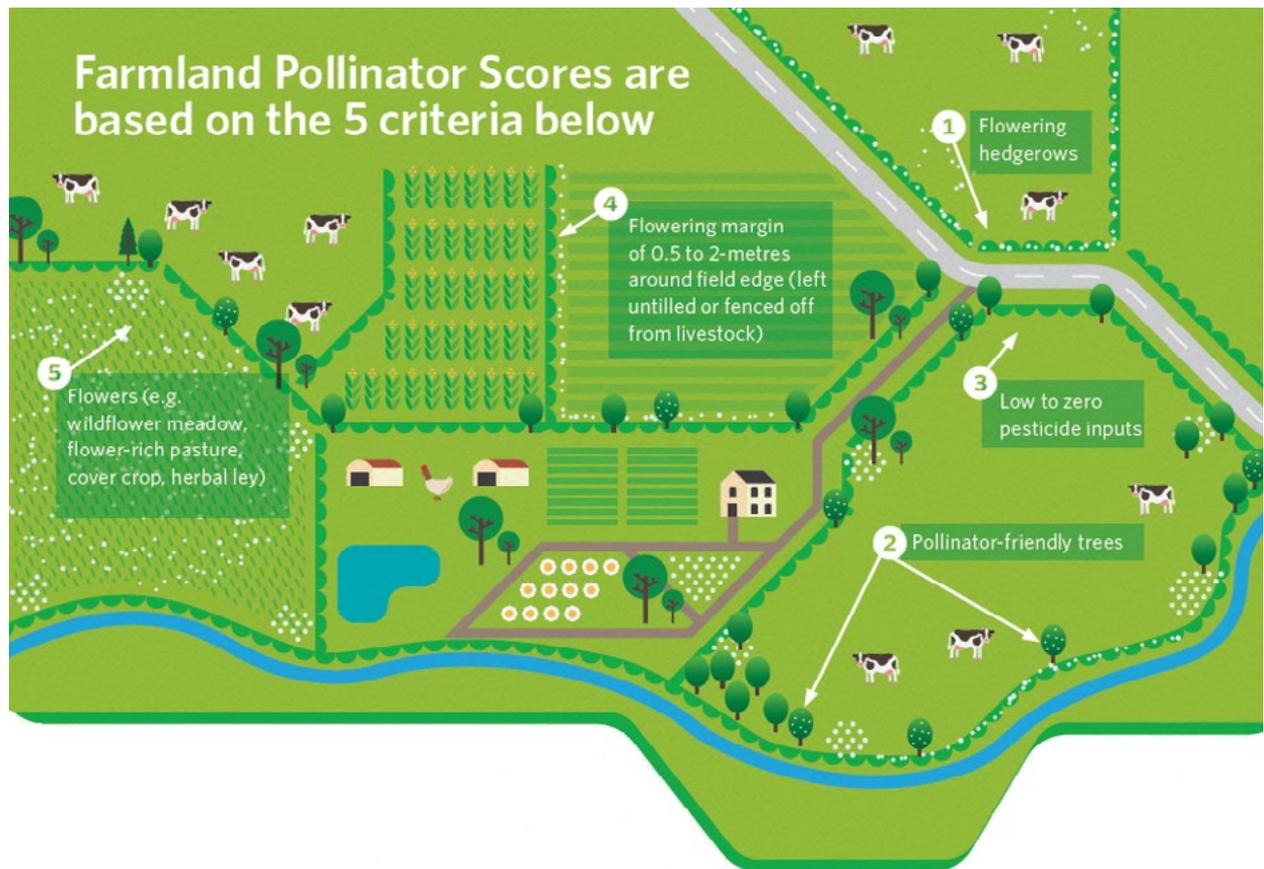
SLOVENIA Pollinators for fruit growers and fruit growers for pollinators¹⁴

This two year project funded by Slovenia’s Rural Development Programme aims to develop improved application of knowledge regarding wild pollinators in fruit growing within Slovenia, establish good practices for the protection of pollinators in orchards, enhance biodiversity in orchards and improve conditions for wild pollinators, and increase the quality and reliability of pollination services. Using funding from the Slovenian EIP-AGRI from 2018 to 2021, the project team is working with orchard farmers to set up nesting stations and increase food plants and meadows for pollinators in orchards. It is providing training for farmers concerning pollinators and biodiversity, producing a brochure and educational videos about pollinators, and organising expert meetings. The orchard farmers have already recognised the pollination benefits that the wild pollinators are bringing to their pear harvests and are strongly motivated to continue the actions.

¹¹ <https://ec.europa.eu/environment/nature/rbaps>

¹² <https://www.biodiversityireland.ie/projects/protecting-farmland-pollinators/> ¹³ <https://lf.dk/bi/det-kan-landmanden-goere>

¹⁴ <https://ec.europa.eu/eip/agriculture/en/find-connect/projects/opra%C5%A1evalci-za-sadjarje-sadjarji-za-opra%C5%A1evalce>



Farmland Pollinator Score Card



5. WHAT CAN CAP MANAGING AUTHORITIES DO FOR POLLINATORS?

KEY RECOMMENDATIONS FOR COMMON AGRICULTURAL POLICY (CAP) MANAGING AUTHORITIES

- ▶ **With technical advice and support from pollinator experts, identify the type and context of agricultural and forest land management (changes) needed to:**
 - **protect existing wild pollinator populations, and secure good conservation status of pollinator species)**
 - **increase the diversity and abundance of wild pollinator species, identifying any sectoral or regional differences**
 - **reduce the use and impact of pesticides on pollinators considering regional and local situations and contexts**
- ▶ **In preparing the CAP Strategic Plan, prioritise these needs as part of the biodiversity objective. The CAP strategic plan should explain, based on the SWOT and the needs assessment, how the measures and interventions will lead to an improvement of the situation of pollinators.**
- ▶ **Plan to address pollinator needs as a coherent series of steps running through all decision-making stages of preparing and implementing the CAP Strategic Plan:**
 - **defining eligibility for CAP support**
 - **setting conditionality standards choosing interventions**
 - **designing of detailed measures, (for example through tailored packages of measures, results-based payments, landscape-scale contracts with groups of land managers)**
 - **provision of farm advice and support for innovative approaches to improving management for wild pollinators.**

5.1 Ensuring coherence with national and regional policy frameworks for biodiversity and nature conservation

The preparation of a new CAP Strategic Plan in each Member State provides an important opportunity to integrate support for wild pollinators and their habitats throughout both pillars of the CAP. Liaise with environmental authorities at national and regional level to integrate and build on priorities set out in existing policy frameworks. These should include:

- ▶ *Prioritized Action Framework (PAF) for Natura 2000 and green infrastructure.* EU Birds and Habitats Directives and the Natura 2000 network protect many key pollinator habitats and directly protect more than 15 pollinator species. The PAF sets out key conservation measures and their costs.
- ▶ *National and regional biodiversity strategies and action plans with objectives and measures targeted at wild pollinators.*
- ▶ *National and/or regional pollinator strategies or action plans for insect protection.*
- ▶ *Species action plans for pollinator species and/or other national protection measures.* As an example, Latvia has legal protection for *Bombus confusus*. EU species action plans for pollinator groups are being developed.
- ▶ *EU Habitat Action Plans for key pollinator habitats.* The EU plans for European dry heaths and for calcareous grasslands contain key measures for wild pollinators in these habitats.

5.2 Setting a target for wild pollinators in the CAP strategic plan monitoring framework

Include an indicator on bees, butterflies, moths, hoverflies, or other pollinators in the monitoring framework of your CAP strategic plan to provide an overarching policy incentive to produce results. National agricultural and environmental authorities are encouraged to define targets that translate EU and national environmental and biodiversity policy objectives into measurable achievements for pollinators. A key step is to make the crop data from the agricultural payments management system¹⁵ available so that researchers can better assess the impacts of measures and the pollination deficit of crops. This will help to better prepare the SWOT analysis in this or the next programming period.

¹⁵ Integrated Administration and Control System for the Common Agricultural Policy measures

5.3 Designing the Strategic Plan to deliver farmland management for wild pollinators

This process **should begin** by identifying and prioritising pollinator needs within the Member State's broader biodiversity objectives, then addressing those needs at each decision point in the strategic planning process through a joined-up, coherent approach. This must be done following a regionalised approach as the needs may differ considerably across one Member State. These steps need to be done in collaboration with the environmental authorities.

The key **second step** is aimed at protecting existing wild pollinator populations and habitats – including but not limited to those associated with Natura 2000 sites – and covers defining eligibility rules; choosing the type of support for relevant sectors; and defining conditionality standards to protect existing pollinator habitats from damage and encourage integrated pest management.

This provides a firm foundation for the **third step** of designing a range of intervention measures in both pillars of the CAP, targeted at supporting and improving habitat management for pollinators in different farming systems and creating new habitats and landscape features where needed. This needs to be complemented by measures to reduce the impact of pesticide applications on pollinators. The CAP measures should fully support the national action plan for the sustainable use of pesticides and the requirement for implementation of IPM.

The **fourth, very important step** is to ensure that farmers, their advisors and contractors understand the role of wild pollinators and why their conservation is so important, and have opportunities to learn how to manage farmland to support pollinators and to see and exchange examples of best practices with other farmers and experts. This requires using the broad range of measures available to CAP managing authorities to set up specific, specialised sources of information and advice within the wider AKIS and Farm Advisory Systems, and to provide training for farmers and advisers. In this context, it is important to explain the economic dimension to farmers, convincing them of the benefits in the long term.

The **fifth step** is to encourage co-operation and innovation among land managers and others involved in pollinator support by providing funding for setting up Wild Pollinator Operational Groups as part of the EIP for agricultural productivity and sustainability. The detailed decisions that would benefit pollinators for each of the main strategic plan elements are described in Table 2.

5.4 Monitoring and evaluating the impacts of undertaken actions on pollinators

Put in place monitoring mechanisms for bees, butterflies, moths, hoverflies, and other pollinators, in cooperation with environmental authorities, to ensure that the impacts of the actions can be measured. This can be funded for example through the technical assistance of the CAP Strategic Plan. Potential approaches to monitoring pollinators and examples across the EU can be found in the report on an EU Pollinator Monitoring Scheme¹⁶.

Table 2. Making pollinator-friendly decisions in CAP Strategic Plan design

Strategic Plan decision point (references to COM(2018) 392 final)	Key choices for the benefit of wild pollinators
Needs and SWOT assessment and intervention strategy (Articles 96 and 97)	<ul style="list-style-type: none"> ▶ identify land management and agricultural practices needs of wild pollinators, including the needs and actions identified for pollinator species and habitats in the PAF ▶ detail how these are to be addressed through the coherent choice of interventions for wild pollinators, as part of the green architecture ▶ identify cropping systems that need the pollination service from wild pollinators and may already be suffering a pollination deficit
Definition of 'permanent grassland' and 'permanent pasture' (Article 4(b)iii)	<ul style="list-style-type: none"> ▶ ensure that this definition includes permanent grassland habitats with shrubs and/or trees, where these provide food, breeding or hibernating resources for pollinators

¹⁶ <https://wikis.ec.europa.eu/display/EUPKH/EU+Pollinator+Monitoring+Scheme>

Strategic Plan decision point (references to COM(2018) 392 final)	Key choices for the benefit of wild pollinators
Sectoral support for the fruit and vegetable sector (Article 43)	<ul style="list-style-type: none"> ▶ prioritise support measures that favour wild pollinators, including agroecological practices, organic production, IPM and integrated production, and other actions to create and maintain habitats favourable for biodiversity or the landscape.
Sectoral support for the apiculture sector (Article 48 and 49)	<ul style="list-style-type: none"> ▶ ensure that support for this sector (for example on rationalising transhumance or combating pathogens) does not conflict with the conservation of wild pollinator populations in the target area, for example with regard to the spread of diseases, competition for resources or the impacts of veterinary medicines.
Farm Advisory Service and Agricultural Knowledge and Innovation System (Articles 13 and 72)	<ul style="list-style-type: none"> ▶ ensure that farm advisory services and the wider AKIS system provide up-to-date technical advice on needs/benefits of wild pollinators and the management and creation of habitats and features to support them ▶ provide technical training on pollinator management for advisory services (public and private)
Conditionality (Articles 11 and 12)	<ul style="list-style-type: none"> ▶ ensure protection of EU Habitats Directive Annex 1 habitat types important for pollinators¹⁷ (SMR 4) ▶ prohibit use of pesticides in Natura 2000 areas (SMR 13)¹⁸ ▶ protect all permanent grassland habitats in Natura 2000 sites (GAEC 10) ▶ prohibit use of pesticides on non-productive areas and retained landscape features (GAEC 9) ▶ define minimal share of landscape features and non-productive areas such that additional pollinator habitats need to be created (GAEC 9) ▶ specify minimum proportion of legumes in crop rotation (GAEC 8) ▶ actively promote integrated pest management among farmers and pesticide contractors (SMR 12)¹⁹
Eco-schemes (Article 28)	<ul style="list-style-type: none"> ▶ support to High Nature Value Farmland ▶ non-rotational set-aside for nature regeneration ▶ melliferous fallow ▶ landscape features going beyond requirements set out in GAEC 9, accompanied by pollinator-friendly management ▶ results-based payment schemes for pollinator friendly management at whole farm level or landscape scale
Environmental management commitments (Article 65)	<ul style="list-style-type: none"> ▶ support for the pollinator habitat measures indicated in PAF and Species Action Plans ▶ Result-based payment schemes for pollinators ▶ support for management of existing pollinator habitats and creation of new pollinator resources in the most effective locations (as described in section 3 of this guidance)
Natura 2000 disadvantages (Article 67)	<ul style="list-style-type: none"> ▶ provide compensation payments for habitats that depend on agricultural management (for example species-rich grasslands)
Investments in biodiversity, ecosystem services, habitats and landscapes (Article 68(2) and 6(1)f)	<ul style="list-style-type: none"> ▶ restoration/creation of new landscape features and/or agroforestry to meet needs of pollinators
Cooperation (Article 71)	<ul style="list-style-type: none"> ▶ set-up European Innovation Partnership Operational Groups for the conservation of wild pollinators

¹⁷ <https://www.eionet.europa.eu/etcs/etc-bd/products/etc-bd-reports/etc-bd-technical-paper-1-2020-report-for-a-list-of-annex-i-habitat-types-important-for-pollinators>

¹⁸ Article 12 of Directive 2009/128/EC

¹⁹ Under SMR 12, Member States must ensure that farmers using plant protection products comply with the principles of good plant protection practice and in particular those of integrated pest management. Member State should *'take all necessary measures to promote low pesticide-input pest management, giving wherever possible priority to non-chemical methods, so that professional users of pesticides switch to practices and products with the lowest risk to human health and the environment among those available for the same pest problem. Low pesticide-input pest management includes integrated pest management as well as organic farming'* (Article 14 and Annex III of Directive 2009/128/EC, referred to in Article 55 of Regulation (EC) No 1107/2009.)

5.5 Examples of Member States' approaches to the conservation of wild pollinators within the CAP

The examples below, taken from case studies of implementation of the 2014-20 CAP, are all relevant to the design of an integrated approach to the conservation of wild pollinators in the new CAP Strategic Plans.

EXAMPLES OF APPROACHES TO WILD POLLINATOR CONSERVATION IN THE 2014-20 CAP

SOURCE: [19] UNLESS OTHERWISE STATED

ROMANIA Expert help from an NGO in design of a measure for an iconic butterfly

Romania's agri-environment climate option in support of *Maculinea* butterflies has been designed with the involvement of the Romanian Lepidopteran Society and a University-based expert. Requirements are broadly in line with the *Maculinea* species management plan for this Natura 2000 species and include no use of pesticides or fertilisers (other than traditional use of manure), no land drainage and only light grazing (< 0.7LU/ha), with mowing delayed until after 25 August (end of the *Maculinea* breeding season). There is a higher rate of payment for farmers willing to undertake hand-mowing rather than light mechanical mowing. Members of the Lepidopteran Society supported farmers in the field and their involvement has helped uptake.

CROATIA Integrating CAP land eligibility with support for flower-rich karst habitats

Croatia has not adopted a broad definition of "permanent grassland" but the national legislation which implements the CAP explicitly refers to karst pasture as an eligible type of grassland. Such land has low agricultural productivity but is extremely rich in biodiversity habitats with up to 50 different plant species per m², and caverns and sinkholes formed by the action of water on the limestone substrate, all of which provide resources for numerous pollinator species. Croatia supports extensive grazing on karst land directly through its RDP with payments to farmers who graze traditional breeds of goat, cattle, horses etc. under the agri-environment programme.

GERMANY and AUSTRIA Eligibility of heathland, scrubland, and wood pastures for CAP funding from both Pillars

In Germany, from 2015 the broader CAP definition of 'non-herbaceous' permanent grassland was adopted for agricultural and conservation reasons, with the intention of ensuring the viability of extensive grazing²⁰. The effect is that all farmers grazing the heathland Germany protects under the Natura 2000 directives, plus those grazing some other valuable heathlands are eligible for CAP direct payments and agri-environment climate support. This firm classification of eligible heathland types made administration easier.

Austria uses the pro rata scheme for wooded or scrubland pastures, which allows direct payments to be made in respect of land containing very low proportions of forage area, based on the actual area. Although Austria's approach to administering direct payments for scrubby grassland in this way can lead to low CAP direct payments per hectare, this type of landscape benefits from relatively generous environmental land management payment rates under the rural development programme.

AUSTRIA Environmentally friendly farming agri-environment option with biodiversity training

In Austria advice on biodiversity is a component of the compulsory training for the 50,000 farmers taking up the "environmentally friendly farming" (UBB) agri-environment climate option. The 20,000 farmers participating in the "nature conservation" agri-environment climate option receive a field visit from an ecologist. Options from the funding package (e.g. late mowing) are chosen and there is scope for farmers who are interested to receive additional advice on the needs of individual species.

²⁰ Deutscher Bundestag (2014) Entwurf eines Gesetzes zur Durchführung der Direktzahlungen an Inhaber landwirtschaftlicher Betriebe im Rahmen von Stützungsregelungen der Gemeinsamen Agrarpolitik (Direktzahlungen-Durchführungsgesetz – DirektZahlDurchfG). 25.03.2014. Drucksache 18/908. Available at: <http://dip21.bundestag.de/dip21/btd/18/009/1800908.pdf>



6. FURTHER RESOURCES AND REFERENCES

6.1 Further resources and information

Go to the **EU Pollinator Information Hive**²¹ to find:

- ▶ Advice on creating pollinator habitat and managing Natura 2000 for pollinators
- ▶ Pointers to where you can find organisations and advice in your region or country
- ▶ Examples of farmers taking action for pollinators
- ▶ Guidance on how all citizens can engage in pollinator conservation and monitoring
- ▶ Guidance on how to set up a local pollinator group and how to plan a pollinator strategy for your region (see get involved – citizens)
- ▶ Information on agriculture and pollinators and how the CAP can work for pollinators in [25].
- ▶ Information and examples of how National Action Plans for Sustainable Use of Pesticides can work for pollinators in [30].

Key resources

Results-based payments for biodiversity²²

EU Habitat Action Plan for European dry heathlands²³

EU Habitat Action Plan for semi-natural dry grasslands and scrub facies on calcareous substrates²⁴

Farmland: Actions to help Pollinators²⁵ by All-Ireland Pollinator Plan

Habitat Creation and Management for Pollinators²⁶. Centre for Ecology & Hydrology, Wallingford, UK.

General principles of Integrated Pest Management

1. The prevention and/or suppression of harmful organisms should be achieved or supported among other options especially by:
 - crop rotation,
 - use of adequate cultivation techniques (e.g. stale seedbed technique, sowing dates and densities, under-sowing, conservation tillage, pruning and direct sowing),
 - use, where appropriate, of resistant/tolerant cultivars and standard/certified seed and planting material,
 - use of balanced fertilisation, liming and irrigation/drainage practices,
 - preventing the spreading of harmful organisms by hygiene measures (e.g. by regular cleansing of machinery and equipment),
 - protection and enhancement of important beneficial organisms, e.g. by adequate plant protection measures or the utilisation of ecological infrastructures inside and outside production sites.
2. Harmful organisms must be monitored by adequate methods and tools, where available. Such adequate tools should include observations in the field as well as scientifically sound warning, forecasting and early diagnosis systems, where feasible, as well as the use of advice from professionally qualified advisors.
3. Based on the results of the monitoring the professional user has to decide whether and when to apply plant protection measures. Robust and scientifically sound threshold values are essential components for decision making. For harmful organisms threshold levels defined for the region, specific areas, crops and particular climatic conditions must be taken into account before treatments, where feasible.
4. Sustainable biological, physical and other non-chemical methods must be preferred to chemical methods if they provide satisfactory pest control.
5. The pesticides applied shall be as specific as possible for the target and shall have the least side effects on human health, non-target organisms and the environment.
6. The professional user should keep the use of pesticides and other forms of intervention to levels that are necessary, e.g. by reduced doses, reduced application frequency or partial applications, considering that the level of risk in vegetation is acceptable and they do not increase the risk for development of resistance in populations of harmful organisms.

²¹ <https://wikis.ec.europa.eu/display/EUPKH/EU+Pollinator+Information+Hive>

²² <https://ec.europa.eu/environment/nature/rbaps>

²³ <https://wikis.ec.europa.eu/display/EUPKH/Action+plans>

²⁴ https://ec.europa.eu/environment/nature/natura2000/management/pdf/EUHabitat_ap6210.pdf

²⁵ <https://pollinators.ie/farmland/>

²⁶ <https://www.ceh.ac.uk/book-habitat-creation-and-management-pollinators>

²⁷ Source: Directive 2009/128/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for Community action to achieve the sustainable use of pesticides. Annex III.

7. Where the risk of resistance against a plant protection measure is known and where the level of harmful organisms requires repeated application of pesticides to the crops, available anti-resistance strategies should be applied to maintain the effectiveness of the products. This may include the use of multiple pesticides with different modes of action.
8. Based on the records on the use of pesticides and on the monitoring of harmful organisms the professional user should check the success of the applied plant protection measures.

6.2 References

1. IPBES, *The assessment report of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services on pollinators, pollination and food production*. 2016, Secretariat of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services: Bonn, Germany. p. 552 pp.
2. Schulp, C.J.E., S. Lautenbach, and P.H. Verburg, *Quantifying and mapping ecosystem services: Demand and supply of pollination in the European Union*. Ecological Indicators, 2014. **36**: p. 131-141.
3. Bartomeus, I., et al., *Contribution of insect pollinators to crop yield and quality varies with agricultural intensification*. PeerJ, 2014. **2**: p. e328.
4. Garibaldi, L.A., et al., *From research to action: enhancing crop yield through wild pollinators*. Frontiers in Ecology and the Environment, 2014. **12**(8): p. 439-447.
5. Mallinger, R.E. and C. Gratton, *Species richness of wild bees, but not the use of managed honeybees, increases fruit set of a pollinator-dependent crop*. Journal of Applied Ecology, 2014. **52**(2): p. 323-330.
6. Gallai, N., et al., *Economic valuation of the vulnerability of world agriculture confronted with pollinator declines*. Ecological Economics, 2009. **68**(3): p. 810-821.
7. Holzschuh, A., J.-H. Dudenhöffer, and T. Tschamtkke, *Landscapes with wild bee habitats enhance pollination, fruit set and yield of sweet cherry*. Biological Conservation, 2012. **153**: p. 101-107.
8. Hevia, V., et al., *Bee diversity and abundance in a livestock drove road and its impact on pollination and seed set in adjacent sunflower fields*. Agriculture, Ecosystems & Environment, 2016. **232**: p. 336-344.
9. Garibaldi, L.A., et al., *Wild pollinators enhance fruit set of crops regardless of honey bee abundance*. Science, 2013. **339**(6127): p. 1608-1611.
10. Garibaldi, L.A., et al., *Stability of pollination services decreases with isolation from natural areas despite honey bee visits*. Ecology Letters, 2011. **14**(10): p. 1062-1072.
11. Horlings, E., et al., *Experimental monetary valuation of ecosystem services and assets in the Netherlands*. 2020, Wageningen University & Research: The Netherlands.
12. Garratt, M.P.D., et al., *Avoiding a bad apple: Insect pollination enhances fruit quality and economic value*. Agriculture, Ecosystems & Environment, 2014. **184**: p. 34-40.
13. Blitzer, E.J., et al., *Pollination services for apple are dependent on diverse wild bee communities*. Agriculture, Ecosystems & Environment, 2016. **221**: p. 1-7.
14. Miñarro, M. and D. García, *Complementarity and redundancy in the functional niche of cider apple pollinators*. Apidologie, 2018. **49**(6): p. 789-802.
15. Fountain, M.T., et al., *Insect pollinators of conference pear (*Pyrus communis* L.) and their contribution to fruit quality*. Journal of Pollination Ecology, 2019. **25**(dec 2019).
16. Klatt, B.K., et al., **Bee pollination improves crop quality, shelf life and commercial value**. Proceedings of the Royal Society B Biological Sciences, 2013. **282**(1802).
17. Blaaw, B.R. and R. Isaacs, *Flower plantings increase wild bee abundance and the pollination services provided to a pollination-dependent crop*. Journal of Applied Ecology, 2014. **51**(4): p. 890-898.
18. De Groot, G.A., et al., *De bijdrage van (wilde) bestuivers aan de opbrengst van appels en blauwe besse*. 2015, Alterra Wageningen UR (University & Research): Wageningen.
19. Woodcock, B.A., et al., *Meta-analysis reveals that pollinator functional diversity and abundance enhance crop pollination and yield*. Nature Communications, 2019. **10**(1): p. 1481.

20. Stanley, D.A., D. Gunning, and J.C. Stout, *Pollinators and pollination of oilseed rape crops (Brassica napus L.) in Ireland: ecological and economic incentives for pollinator conservation*. Journal of Insect Conservation, 2013. **17**(6): p. 1181-1189.
21. Goulson, D., et al., *Bee declines driven by combined stress from parasites, pesticides, and lack of flowers*. Science, 2015. **347**(6229).
22. Nieto, A., et al., *European Red List of Bees*. 2014, Publication Office of the European Union: Luxembourg.
23. Westrich, P., et al., *Rote Liste und Gesamtartenliste der Bienen (Hymenoptera, Apidae) Deutschlands, in Naturschutz und Biologische Vielfalt 70 (3), 2012 (2011)*. 2011, Bundesamt für Naturschutz: Bonn. p. 373-416.
24. Van Swaay, C.A.M., et al., *The EU Butterfly Indicator for Grassland species: 1990-2017: Technical Report*. 2019, Butterfly Conservation Europe & ABLE/eBMS (www.butterfly-monitoring.net).
25. Mottershead, D. and E. Underwood, *Integration of pollinator conservation into the Common Agricultural Policy*. 2020, Institute for European Environmental Policy (IEEP): Brussels.
26. Bumblebee Conservation Trust, *Managing moorland for bumblebees 2017*, Bumblebee Conservation Trust Briefing: UK, available at https://www.bumblebeeconservation.org/wp-content/uploads/2017/08/BBCT_Land_Factsheet_10_Moorland_management.pdf
27. Buglife, *Managing Woodland for Pollinators*. 2019, Buglife Briefing: <https://www.buglife.org.uk/managing-woodland-for-pollinators>.
28. Nowakowski, M. and R. Pywell, *Habitat Creation and Management for Pollinators*. 2016, Centre for Ecology & Hydrology: Wallingford, UK.
29. Albinger, G., et al., *Bienenweidekatalog: Verbesserung der Bienenweide und des Artenreichtums*. 2018, Baden-Württemberg Ministerium für Ländlichen Raum und Verbraucherschutz: Stuttgart, Germany.
30. Underwood, E., *Pollinator conservation in Member States' national action plans for the sustainable use of pesticides*. 2020, Institute for European Environmental Policy: Brussels.

Photo credits

Planning actions on farm: aspect

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Planning actions on farm: awkward field corners

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Planning actions on farm: multi-layered field margin

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Pollinator habitats in a Mediterranean farming landscape

Created by Massimiliano Lipperi

Farmland Pollinator Score card

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