EU CAP NETWORK

EU CAP Network Workshop: Promoting pollinator-friendly farming

Final Report

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Executive Summary

The EU Biodiversity Strategy 2030 highlights pollinators as key indicators of the health of agroecosystems and stresses their importance for agricultural production and food security. The strategy sets a policy target to reverse their decline by 2030. This recognition, coupled with the establishment of the EU Pollinators Initiative in 2018 (revised in 2023), demonstrates their significance from a policy perspective. Additionally, protecting and restoring pollinators on farmland are principal goals within the Nature Restoration Law.

Protecting pollinators on farmland requires comprehensive knowledge about pollinator-friendly farming practices and an understanding of the ecology of all pollinator groups. Facilitating networking across different stakeholder groups (e.g. farmers, researchers, advisors and policymakers) and different Member States provides opportunities to exchange and disseminate knowledge, best practice examples and innovative ideas in Europe. Such networking events can contribute to meeting farmers' needs in taking action to halt and reverse pollinator decline.

The EU CAP Network workshop 'Promoting pollinator-friendly farming' was a one-and-a-half day event designed to create conditions for the exchange of knowledge and for sharing innovative ideas and inspirational practices relating to pollinator-friendly farming. The workshop was designed as a multi-stakeholder event. Participation was based on an open call and 69 participants from 21 countries attended the event. Ljubljana was chosen to host the workshop because of Slovenia's ability to demonstrate practical examples of successful pollinator-friendly farming projects and best practice examples of cooperation between farmers, NGOs, researchers and policymakers.

The plenary session opened with an overview of Europe's pollinators' status, value, threats, relevant policies and best practices to protect them. Then, three inspiring pollinator-friendly farming best practice examples were presented in a panel discussion, followed by 18 poster presentations showcasing a diversity of projects relating to pollinator-friendly farming practices. Later, field visits focused on best practices for pollinators on farmland in Slovenia.

During the second day, participants concentrated on identifying the need for capacity building, training, cooperation, and education to enable the adoption of pollinator-friendly farming practices. They also identified knowledge gaps, research needs from practice, and ideas for EIP Operational Groups and other innovative projects.

Solutions were identified to overcome challenges and help farmers implement pollinator-friendly farm management practices. This is key to enhancing the facilitation of knowledge sharing and exchange. Proposed solutions include using farm demonstration sites and peer-to-peer mentoring to highlight best practices for pollinators. The barriers to the uptake of solutions include a lack of financial and advisory support and policy incentives, local expertise and management guidelines.

Examples of requests for further research include more knowledge on the co-benefits of pollinator-friendly farming practices and lesser-known pollinators, how to increase flowers in the landscape and how farmers can be supported in helping to halt pollinator decline. Action is required at the local, regional, national and European level. When considering actions for pollinators on farms, clear communication with simple actions that make sense to farmers is essential.

1. Introduction

Insect pollinators are one group of organisms that have shown a decline in recent years [1, 2]. It is widely agreed that insect pollinator decline is due to a combination of factors, including habitat loss, pests and diseases, and pesticide exposure [3, 4]. Farmland is the dominant land use in Europe and the way it is managed is important for pollinator conservation. Providing food, breeding sites and shelter for pollinators on the farm will contribute to stopping, if not reversing, their decline.

1.1 Background

Pollinators provide a vital service to both natural ecosystems and farming. They, therefore, should be afforded a high level of protection, especially given the potentially far-reaching effects of their decline. A number of **EU initiatives** are linked to **halting** and **reversing global biodiversity loss** broadly, which should benefit pollinators specifically. Decoupling economic growth from the exploitation of natural resources, protecting ecosystem services, and restoring habitats are some of the key principles of the **European Green Deal.** In particular, the **Nature Restoration Law,** the **European Biodiversity Strategy for 2030 and the EU Pollinator Initiative aim to protect nature and reverse the degradation of ecosystems and commit to** reversing the decline in wild pollinators by 2030. The Common Agricultural Policy's (CAP's) new green architecture contains measures that are aimed at achieving significant improvements in the area of biodiversity and one of the nine Specific Objectives of the CAP is to contribute to halting and reversing biodiversity loss, enhancing ecosystem services and preserving habitats and landscapes.

Building on **Horizon 2020,** the European Commission strengthened the support for pollinator research in the current **EU research framework programme** for the 2021-2027 period (Horizon Europe). The '**Cluster 6** Work Programme', for example, has one 'destination' to boost practices in agriculture and forestry that support biodiversity and a wide range of ecosystem services.

1.2 Objectives of the workshop

In line with the **EU Biodiversity Strategy** for 2030, the **EU Pollinators Initiative** and the **EU Nature Restoration Law** under the **European Green Deal,** this EU CAP Network workshop aimed to support sustainable agriculture by sharing innovative pollinator-friendly farming practices and systems that promote knowledge exchange and cooperation between different actors in this field.

The specific objectives of the workshop were to:

1. Improve understanding of the relationship between farming practices and pollinator conservation and restoration.
2. Exchange knowledge on innovative pollinator-friendly practices, including:
   - farmland actions to promote pollinators;
   - results-based payment schemes;
   - education and training;
   - socio-cultural value and knowledge gathering.
3. Identify challenges and opportunities and explore potential solutions and innovative tools for pollinator conservation and promotion in Europe.
4. Examine the need for capacity building, training, cooperation and education to enable the adoption of pollinator-friendly agricultural practices.
5. Identify knowledge gaps in research.
6. Promote networking among EIP-AGRI Operational Groups/other innovative projects, Horizon Europe multi-actor research projects and relevant stakeholders.

Workshop content

The workshop provided a platform for knowledge exchange and sharing between key stakeholders, initiatives and projects, including EIP-AGRI Operational Groups and Horizon 2020 projects. Nine EIP Operational Groups, seven Horizon 2020/Horizon Europe, four INTERREG, six LIFE, and ten nationally funded projects were presented. Workshop participants shared experiences on:

- the relationship between farming practices and pollinators, including learnings from farming systems and scientific research programmes (Operational Groups, other innovative projects, Horizon Europe); and
- how farmers can support pollinator conservation and restoration in parallel with economically and environmentally sustainable farming practices.

[1] IPBES (2016), *The Assessment Report of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services on Pollinators, Pollination and Food Production.*
[2] Potts, S. G. *et al. Global pollinator declines: trends, impacts and drivers,* Trends Ecol. Evol. 25, 2010, p. 345-353.
[3] Goulson, D., Nicholls, E., Botías, C. & Rotheray, E. L., *Bee declines driven by combined stress from parasites, pesticides, and lack of flowers,* ScienceExpress, 2015, p. 1-16, doi:10.1126/science.1255957.
[4] Cole, L. J. *et al., A critical analysis of the potential for EU Common Agricultural Policy measures to support wild pollinators on farmland,* J. Appl. Ecol. 57, 2020, p. 681-694.

Participants

Sixty-nine participants from 21 countries participated in the workshop (Tables 1 and 2). The workshop participants included farmers, beekeepers, representatives from farmers' associations and cooperatives/networks, farm advisors, researchers, public bodies, NGOs and other innovators. Participants exchanged inspirational ideas, local knowledge and innovations, identifying what farmers need in order to implement pollinator-friendly farming practices.

Picture 1. Group photo with participants, DG AGRI and EU CAP Network organising team. Copyright: European Commission

Table 1. Number of participants per professional background.

Professional background	Participants
Researcher	22
Farm or forester manager/owner	10
Rural entrepreneur other than farmer or forester	3
Advisor/Farm advisor	27
Civil Servant	1
Innovation support agent/innovation broker	1
Host institution	6
Other	5

Source: European Commission

Table 2. The total number of participants per country and the number who have been speakers in the panel discussion or the marketplace poster session.

Country	Participants	Speakers	Country	Participants	Speakers
Austria	1	1	Poland	3	
Belgium	5	1	Portugal	4	1
Croatia	3	1	Romania	2	1
Estonia	2	1	Serbia	1	1
Finland	2	1	Slovakia	1	
France	1	1	Slovenia	7	1
Germany	5	3	Spain	4	
Greece	6		Sweden	3	2
Ireland	5	2	The Netherlands	2	
Italy	9	2	United Kingdom	2	1
Lithuania	1				

Source: European Commission

2. Proceedings

2.1 Setting the scene

During registration, participants were asked to share their ideas on the knowledge gaps and research needs of pollinator-friendly farming.

The main facilitator, Neils Rump, welcomed all guests. Ms Antonia Gamez Moreno, head of Unit D.1 'Rural areas and networks' from the European Commission's Directorate-General for Agriculture and Rural Development (DG AGRI) and Ms Maša Žaga, Slovenia's Director General for the Ministry of Agriculture, Forestry and Food, also welcomed participants.

Picture 2. Presenters from day one. Copyright: European Commission

2.2 Inspiring presentations

Coordinating expert Dr Saorla Kavanagh introduced the topic with a broad overview of pollinator groups in Europe and their value, and presented a positive case study from the Irish Protecting Farmland Pollinators EIP-AGRI Operational Group.

It can be difficult to inspire attitude change to address pollinator decline. Operational Groups (OGs) used a locally-led approach working directly with farmers so they were involved in the planning and decision-making. This created trust between all parties and facilitated attitude change. Farmers want to gain more knowledge, especially in relation to minimising input on farms and managing areas in a pollinator-friendly way. Protecting Farmland Pollinators identified small actions farmers can take to allow biodiversity to coexist within a productive farming system. By working closely with 40 farmers, management practices that benefit bees and hoverflies on Irish farmland were identified. Using a whole farm pollinator scorecard, farmers received 'pollinator points' each year based on the amount and quality of pollinator-friendly habitat maintained and/or created, and farmers received a results-based payment that related to the points obtained. Through knowledge transfer, farmers were encouraged to establish small wildlife habitats for pollinators on their farms. This project helped farmers better understand and engage with nature on their land. It has also developed a measurable system for improving biodiversity habitats on farms that is accessible to all and has the potential for wider implementation.

Policy Officer Andreas Gumbert from the Commission's Directorate-General for the Environment (DG ENV) gave an overview of pollinator decline in Europe, the drivers of this decline, and how Europe is aiming to halt and/or reverse pollinator decline through the European Green Deal, Nature Restoration Law and EU Pollinator Initiative. Policy Officer Marina Hadjiyanni presented the actions in the Pollinators Initiative, which are relevant to agriculture and described the different possibilities of supporting pollinators through the CAP.

Policy Officer Anikó Seregélyi (DG AGRI) introduced the EU CAP Network, a forum for exchanging knowledge and supporting policy implementation, and introduced the European Innovation Partnership EIP-AGRI. There are currently 3 500 EIP-AGRI Operational Group projects from across Europe listed in the EIP-AGRI project database. To date, around 100 OG projects related to pollinators have been funded.

2.3 Inspiring projects

A panel discussion highlighting successful projects/initiatives that promote pollinator-friendly farming followed the presentations. Details on the panellists and their associated projects are below.

Picture 3. Panellists from left to right: Rachel Creighton, Neus Rodriguez-Gasol, Ben Mehedin and co-ordinating expert Saorla Kavanagh. Copyright: European Commission

Rachel Creighton Protecting Farmland Pollinators **EIP-AGRI Ireland.** Rachel was a farmer participant in the EIP-AGRI Operational Group Protecting Farmland Pollinators, funded by the Irish Department of Agriculture, Food, and the Marine (DAFM) under the 2014-2020 Rural Development Programme. The Protecting Farmland Pollinators EIP project worked closely with farmers to create an evidence-based 'Pollinator Scorecard' that allows farmers to identify how pollinator-friendly their farm is and what actions they can take to enhance their farm for pollinators. This project resulted in the successful creation of pollinator-friendly habitats on the farm, which included nesting sites for solitary bees.

Neus Rodriguez Gasol SLU (Sveriges lantbruksuniversitet). Neus is currently researching flower attractiveness to beneficial organisms and the promotion of ecosystem services (i.e. pollination and biological control). This is a national/public funded project in the Institution for Ecology at SLU. She is an expert on hoverflies and completed her PhD in hoverfly ecology in Spain.

Ben Mehedin Fundatia ADEPT Romania (advisor). Ben is collaborating on the LIFE Metamorphosis project. In Romania, the project focuses on restoring the habitats of target species of butterflies and developing cooperation with farmers to protect these habitats. Additionally, it aims to restore semi-natural dry grasslands. Farmers and other stakeholders are actively involved in decision-making processes related to habitat restoration and management.

The key to success in these projects is clear communication. By facilitating positive cooperation between farmers and identifying simple actions that make sense to the farmer, their love for nature can be further nurtured.

The panel discussion was followed by the poster session *'Foraging in the flower meadow'*. Twenty-six participants were selected to give a flash poster presentation. This session showcased a diversity of projects from different countries and identified a number of pollinator-friendly farming practices. Innovative ideas for engaging with farmers from different countries and farming types were highlighted. The projects' main challenges and successes were presented.

The projects broadly aimed to:

- understand the drivers of pollinator decline (e.g. SAFEGUARD);
- identify interventions to halt further decline;
- increase pollinator populations by reducing inputs, namely pesticides, and increasing floral resources;
- protect and restore existing pollinator-friendly habitats;
- monitor pollinators (e.g. Farmer Moth Monitoring EIP Project);
- raise awareness of the importance of pollinators and engaging with farmers to encourage pollinator-friendly farming;
- facilitate farmer clusters and peer-to-peer mentoring (e.g. FRAMEWORK); and
- find out more information on the lesser-known pollinator groups, namely hoverflies and moths.

One of the many outcomes of these projects was the publication of farmer-friendly guidelines for pollinator-friendly farming. Discussions from this session have identified the need for these guidelines to be held in a repository, translated and updated so that they can be relevant to all farm types, regions and countries. The posters can be found here and links to guideline documents are available on posters, when applicable.

2.4 Collecting honey

Collecting honey allowed participants to work in groups and share their findings from the morning session. Opportunities and/or ideas about pollinator-friendly farming were added to the honey pot (Picture 4 and Figure 1). It was widely agreed that farmers are the solution to halting and reversing pollinator decline on agricultural landscapes, but support at all levels is required. The session highlighted the:

- benefits of peer-to-peer mentoring between farmers;
- importance of simple solutions and clear communication;
- importance of species-rich grasslands and the lack of access to native, local provenance seed; and
- lack of knowledge of all pollinator groups.

Picture 4. Honey pot. Copyright: European Commission

Figure 1. Wordle showing the most frequently used words in the honey pot. The size of the text relates to the frequency of the word used.

Copyright: European Commission

2.5 Field Visits

Participants were divided into two groups. Each group visited the same two sites.

Site A - Hay meadow in Roje, north Ljubljana

The meadow is located on gravel soils along the Sava River and is one of two lowland areas where some species-rich grasslands are still well preserved.

Picture 5. Field visit to Site A, hay meadow in Roje.
Copyright: European Commission

The area is a Natura 2000 site and, since 2002, the University Botanic Gardens Ljubljana leased a two-hectare dry meadow from a farmer. The meadow is managed to maximise plant diversity and is mowed once a year, usually in August, with all mown material then removed. Land abandonment and invasive species are the main threats to biodiversity at this site. In year one, the field was burnt to remove invasive species. The plant species are recorded annually and the meadow contains many endangered plants, with 164 flowering plants recorded and 15 of these are examples of in-situ conservation. Seeds are harvested from the meadow and sold in the botanic gardens. The site was involved in the Life Naturaviva project.

After the site visit, a presentation was given by Dr Danilo Bevk who provided an overview of two EIP-AGRI Operational Groups coordinated by the National Institute of Biology (NIB) Slovenia.

The EIP-AGRI Operational Group project Supporting pollinators in intensive agricultural landscapes to promote biodiversity (EIP-POMOP) aims to improve the nutritional conditions and nesting opportunities for pollinators by developing and implementing actions that will improve conditions for pollinators and biodiversity in the agricultural landscape. One such action is using stubble litter (i.e. remains of crop residues, such as stalks and leaves left in the field after harvest) and ground nest boxes to create nesting sites for mining bees.

The EIP-AGRI Operational Group project Fruit growers for pollinators and pollinators for fruit growers (EIPSOOS) was one of the first projects on pollinator protection in agriculture in Slovenia and contributed to the country becoming a model for sustainable management of pollinator populations. In the fruit orchards involved in the project, pollinators' nutritional and nesting conditions were improved. Throughout the project, the team organised and facilitated a training program including lectures and workshops targeted at farmers.

Picture 6. Dr Danilo Bevk. Copyright: European Commission

Site B – Ljubljana Marshes, south Ljubljana

This is the largest marsh area in the country with 163 square kilometres (1% of Slovenian territory). The marshes are home to rare plant and animal species and are located within a Natura 2000 site. Participants were shown a species-rich grassland in a network of celebrated grassland sites in Slovenia. These grasslands are important habitats for pollinators and are being lost across Europe. Within the marsh, plants and butterflies are monitored. Green hay is used to enhance the species richness of other grassland sites. This site is also part of the LIFE for Seeds project. Green hay transfer from species-rich donor sites is becoming increasingly common practice in Europe to restore species-rich semi-natural grassland [5].

Picture 7. Field trip to Ljubljana Marshes. Copyright: European Commission

An overview of the EIP-AGRI Operational Group project Farming with (for) biodiversity on lowland farms in Slovenia (EIP VIVEK) was given by BirdLife Slovenia. This project was coordinated by the E-institute, Institute for Comprehensive Development Solutions. The project team worked with six farmers to design and test different biodiversity-friendly agricultural practices on grasslands and arable fields. A locally led results-based approach was used. The results of the project were important for designing one results-based measure in the current agri-environmental scheme in Slovenia. As part of this measure, farmers cannot cut or harrow their field until the 15th day of June. Under this measure, for every lapwing or skylark nest on the farm, the farmer receives a payment of EUR 200. One farmer had 37 nests this year, which resulted in him receiving a payment of EUR 7 400 for this one measure alone. Once a skylark nest is found on a farm, then farmers can sign up for the measure.

Following the field trips, participants were asked to answer four questions.

Table 3. List of field visit questions.

	Field visit questions:
1.	How do the practices you have seen during the field trips relate to your experience?
2.	Can practices that you have seen be implemented/ replicated on farms in your country?
3.	What is needed to scale up the implementation of such practices?
4.	Does the field visit inspire ideas for you to take home?

Source: European Commission

Based on the answers provided by participants, it was widely agreed that species-rich grasslands (native hay meadows) are the most important habitats on farmland for pollinators. Despite the importance of these habitats, they have substantially reduced in area over the last 100 years [6, 7]. Several types of semi-natural grasslands are now red-listed habitats in the EU [8].

The practices implemented in Slovenia can be adapted for other nations, regions and climates, but their implementation requires knowledge sharing, stakeholder upskilling and training, and resources like financial management systems to pay farmers for the additional benefits that making such habitats available provides. There was a consensus that government policy is an important enabling factor for farmers to adopt innovative, pollinator-friendly practices. More information and dissemination of good practices are also needed. This can be achieved through the publication of evidence-based guideline documents.

Meadow restoration projects to increase pollinator populations using multi-actor and multi-disciplinary approaches exist in some countries, but this research needs to be scaled up to a European hay meadow network. Several participants highlighted that the strong collaboration between government bodies, researchers, farmers and advisors in Slovenia is lacking in their countries. This strong collaboration and cooperation, as well as farmer involvement from the onset, is key to success. One suggestion is to create a demonstration farm network and showcase these habitats for farmers. This has the potential to lead to a transnational EIP Operational Group.

[5] Wagner, M. *et al. Green hay transfer for grassland restoration: species capture and establishment, Restor. Ecol. 29, e13259, 2021.*
[6] Bullock C., Kretsch C., C. E., *The Economic and Social Aspects of Biodiversity Benefits and Costs of Biodiversity in Ireland,* Spring, 2008, doi: ISBN 978-1-4064-2105-7.
[7] Isselstein, J., Jeangros, B. & Pavlu, V., *Agronomic aspects of biodiversity targeted management of temperate grasslands in Europe – a review,* Agron. Res. 3, 2005, p. 139-151.
[8] European Union (2016), *European Red List of Habitats. Part 2. Terrestrial and Freshwater Habitats.*

2.6 Solutions to halting pollinator decline

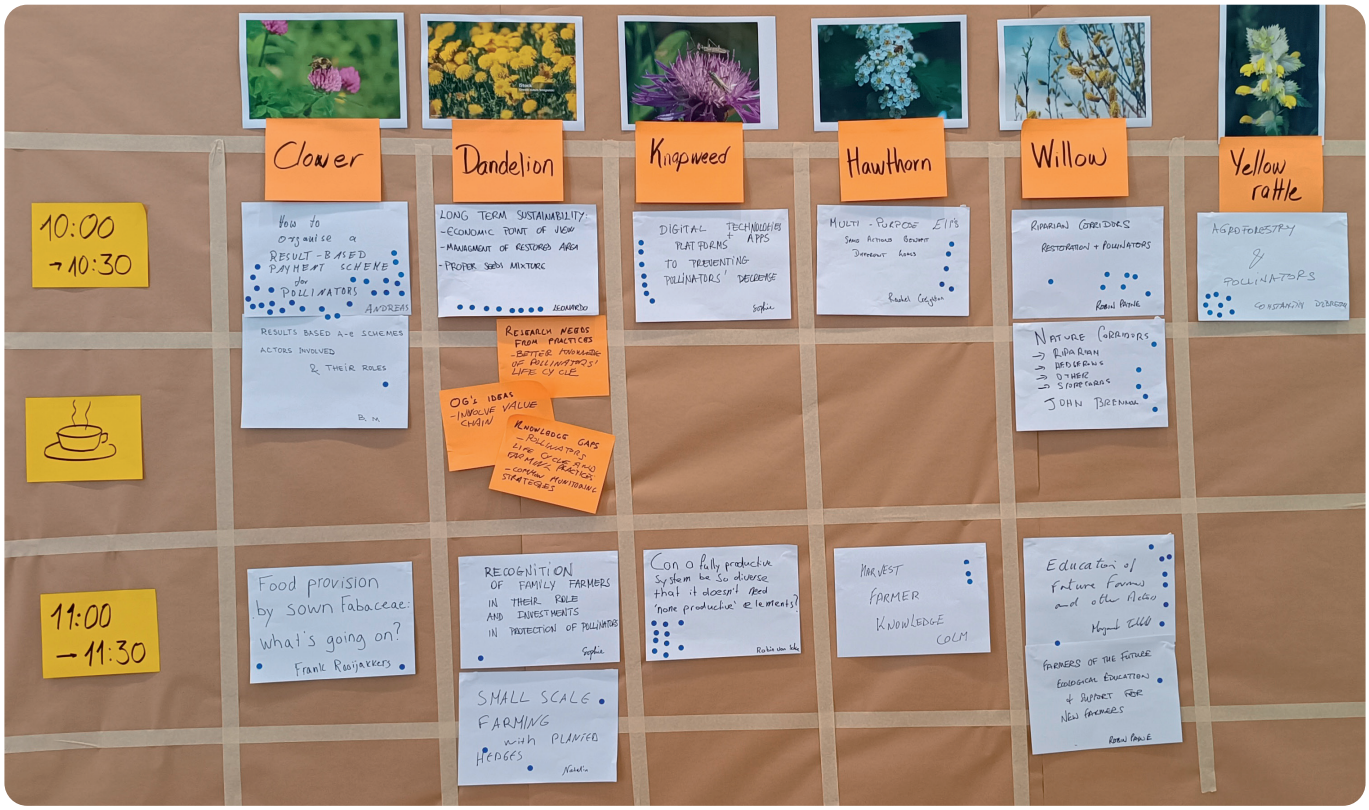
Implementation of innovative practices

The first interactive session on day two focussed on the implementation of innovative practices. Participants were invited to identify issues or opportunities related to pollinator-friendly farming. The issue, or the opportunity, was presented by the participant and a short title summarising the issue/opportunity was added to a flower group on the wall (Picture 8). Topics related to innovative practices (flower group) were divided throughout two rooms and participants voted on the importance of each of the topics and contributed to discussions on their preferred topic(s) under the following themes:

- Needs for capacity building, training, cooperation and education to enable the adoption of pollinator-friendly farming practices.
- Research needs from practice and knowledge gaps.
- Ideas for EIP Operational Groups/other innovative projects.

Eleven topics were presented by eleven different participants and all participants voted on the topics they believed to be the most relevant. Topics are listed according to the number of votes in decreasing order:

- Results-based payment agri-environment scheme for pollinators (27 votes)
- Nature corridors (12 votes)
- Farmers of the past, present and future (12 votes)
- High-diversity farming systems – combining pollinator-friendly farming with production (10 votes)
- Agroforestry and pollinators (8 votes)
- Long-term sustainability of pollinator-friendly farming (8 votes)
- Tools for pollinator conservation and promotion (7 votes)
- Multi-purpose EIP-AGRI Operational Group projects (5 votes)
- Small farms with big benefits for biodiversity (4 votes)
- Harvest farmers' knowledge (3 votes)
- Increasing food for pollinators (2 votes)



Picture 8. Innovative practices split between flower groups and time sessions. Blue dots indicate participants' vote. Copyright: European Commission.

'Results-based payment agri-environment scheme for pollinators' received the most votes. The topics of *'Harvest farmers knowledge'* and *'Farmers of the past, present and future'* were merged for the discussion section below.

Results-based payment agri-environment scheme for pollinators

Farmers, advisors, policymakers and paying agencies require training, cooperation and education to adopt pollinator-friendly farming practices. They should also learn from existing schemes by collecting good practices, such as the result-based agri-environmental payment schemes (RBAPS) of grassland scorecards in Austria, birds in Slovenia and the pollinator scorecard in Ireland.

Figure 2. Challenges, solutions and barriers to results-based payment agri-environment scheme for pollinators.

Source: European Commission.

Most beneficial farmland habitats differ depending on country and sometimes region. Using a whole-farm pollinator scorecard, where farmers would receive an annual payment based on their overall whole farm pollinator score, which is calculated depending on the amount and quality of habitat created. This has a lower administrative burden than more traditional results-based payment methods linked to a series of individual actions.

Combine RBAPS with existing CAP payments and private support could ensure enough funds are available. Using a multi-actor approach and bringing different stakeholders together to overcome the inertia with authorities and enhancing capacity building may increase the likelihood of uptake.

Nature's corridors managed for pollinators

Corridors include riparian margins, hedgerows, stonewalls, woodland edges, flower strips and more. They can play an important role in pollinator restoration. They act as roadways and provide food, shelter and nesting sites for pollinators. Increasing farmland edge density with corridors can increase connectivity of habitats, which has been shown to benefit pollinators [9]. The management of roadside vegetation or riparian areas can increase the abundance and richness of wild bees [10]. Along hedgerows is the location most likely to be used by ground-nesting mining bees on Irish farms [11]. Creating nesting habitat along hedgerows minimises the distance between nesting habitat and potential foraging habitat and so provide solitary bees with a food source within their short foraging distances [12]. If managed correctly, hedgerows not only benefit pollinators but can have many other benefits for biodiversity [13, 14], such as, providing berries and nesting habitat for birds [15].

[9] Martin, E. A. *et al., The interplay of landscape composition and configuration: new pathways to manage functional biodiversity and agroecosystem services across Europe,* Ecol. Lett. 22, 2019, p. 1083-1094.

[10] Hopwood, J. L., *The contribution of roadside grassland restorations to native bee conservation,* Biol. Conserv, 141, 2008, p. 2632-2640.

[11] Kavanagh, S., *Protecting Farmland Pollinators Midterm Report October, 2022.*

[12] Gathmann, A. & Tscharntke, T., *Foraging ranges of solitary bees,* J. Anim. Ecol., 71, 2002, p. 757-764.

[13] Graham, L., Gaulton, R., Gerard, F. & Staley, J. T., *The influence of hedgerow structural condition on wildlife habitat provision in farmed landscapes,* Biol. Conserv., 220, 2018, p. 122-131.

[14] Froidevaux, J. S. P., Broyles, M. & Jones, G., *Moth responses to sympathetic hedgerow management in temperate farmland,* Agric. Ecosyst. Environ., 270-271, 2019, p. 55-64.

[15] Heath, S. K., Soykan, C. U., Velas, K. L., Kelsey, R. & Kross, S. M., *A bustle in the hedgerow: Woody field margins boost on farm avian diversity and abundance in an intensive agricultural landscape,* Biol. Conserv., 212, 2017, p. 153-161

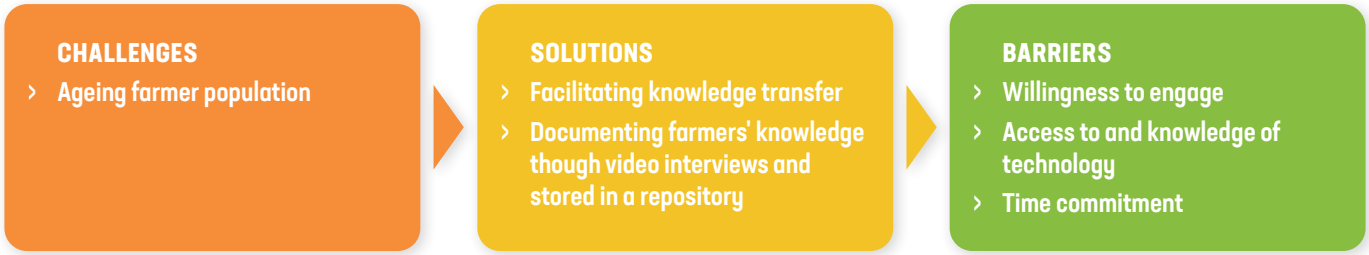
Figure 3. Challenges, solutions and barriers associated with managing nature's corridors for pollinators.

Source: European Commission.

Farmers of the past, present and future

Ecological education and support for farmers and advisors are essential. More resources are required to help facilitate the transfer of pollinator-friendly farming knowledge within the farming community. A large portion of the farming community is aging and extensive knowledge could be lost if it is not recorded. To mitigate against this, farmers' knowledge can be documented, collected and placed into a repository.

Figure 4. Challenges, solutions and barriers associated with farmers of the past, present and future.



Source: European Commission.

High-diversity farming systems – combining pollinator-friendly farming with production

High-diversity farming systems contain a number of different habitats that can benefit different species while maintaining a productive farm. Promoting diversification of farming systems has been shown to benefit pollinators. Intensive grasslands support fewer plant [16] and bee [17] species compared to plant and bee communities found in semi-natural grasslands. This is because grasslands rich in flowers offer many floral resources for bumble, honey and solitary bees [18]. Grasslands with the highest biodiversity are called semi-natural grasslands. They are managed with low levels of inputs such as fertilisers. They support a diverse range of plant and animal species. Incorporating **pollinator-friendly fields** with higher plant diversity, for example, **clover** pasture, **cover crops, companion crops, herbal leys** and/or **mixed species** sward, and allowing flowers to grow within fields will provide food for pollinators. **Herbal leys** (i.e. multi-species herbal leys) are a mix of grass, legume and herb seeds. They can benefit soil fertility and provide food for pollinators while protecting the farm against drought and erosion [19] which is associated with negative environmental impacts. Multi-species grass\u2013legume mixtures are a promising tool for stimulating both productivity and sustainability in intensively managed grasslands, but questions remain about the benefit of increasing the diversity of plant functional groups. We established a plot-scale experiment that manipulated the diversity of plant communities from a six-species pool comprising three functional groups: grasses, legumes and herbs (two species each. Similarly, mixtures of flowering crops (e.g. buckwheat, sunflower, and lupine) can provide accessible, high-quality nectar and pollen that can benefit pollinators [20] and subsequent field trials to assess their attractiveness to insects are commonly carried out at low taxonomic resolution (e.g., pooling all \u2018solitary\u2019 bees. However, it is important that these do not replace existing species-rich permanent pasture. Species-rich permanent pasture has the potential to be

[16] Socher, S. A. *et al., Interacting effects of fertilization, mowing and grazing on plant species diversity of 1500 grasslands in Germany differ between regions,* Basic Appl. Ecol., 14, 2013, p. 126-136.

[17] Santorum, V. & Breen, J., *Bumblebee diversity on Irish farmland,* Irish J. agri-environmental Res. 4, 2005, p. 79-90.

[18] Krewenka, K. M., Holzschuh, A., Tscharntke, T. & Dormann, C. F., *Landscape elements as potential barriers and corridors for bees, wasps and parasitoids,* Biol. Conserv. 144, 2011, p. 1816-1825.

[19] Grange, G., Finn, J. A. & Brophy, C., *Plant diversity enhanced yield and mitigated drought impacts in intensively managed grassland communities,* J. Appl. Ecol. 58, 2021, p. 1864-1875.

[20] Nichols, R. N., Holland, J. M. & Goulson, D., *A novel farmland wildflower seed mix attracts a greater abundance and richness of pollinating insects than standard mixes,* Insect Conserv. Divers., 2022, p. 1-15, doi: https://doi.org/10.1111/icad.12624.

even more beneficial to pollinators as they have a higher diversity of plant species that support a higher diversity of pollinator species [21]. Native plant species often provide better food sources for native pollinators, so maintaining or creating habitats that support native plants is considered preferable.

Figure 5. Challenges, solutions and barriers.

Source: European Commission.

Within productive areas, farmers can promote pollinator-friendly field management by ensuring a consistent availability of flowering plants. One effective method to increase floral resources in grass-based pasture systems is by incorporating clover. When allowed to flower, clover provides an excellent source of nectar for bumble bees [22, 23]. Additionally, clover and alfalfa are commonly used in cover cropping systems, yet there are knowledge gaps regarding their nutritional value and nectar provision for pollinators.

Hay meadows can also produce valuable seeds. By identifying farms with fields suitable for native hay meadow donor sites, farmers can create additional income by selling wildflower seeds. Seeds can be sustainably harvested using a brush harvester and the seed can be used to restore meadows on other farms. Selected sites can serve as seed zones where local seeds are harvested for habitat restoration at nearby sites. Using native species and locally sourced seeds for habitat restoration is a significant step towards maintaining, enhancing and protecting local pollinators. This initiative would require multi-actor collaboration among farmers, researchers and other stakeholders.

Agroforestry and pollinators

Agroforestry has the potential to provide flowers and nesting resources for pollinators. Despite the evidence that agroforestry and other agroecological farming practices can reduce the environmental footprint of agriculture, agroforestry is still struggling to expand across Europe. This limited adoption emerges from a very limited understanding of the cross-disciplinary impacts (i.e. agronomic, ecological, economic and social dimensions) of upscaling agroforestry. A major challenge for agroforestry is that there is no single practice suitable for all contexts, but a range of practices need to be targeted and adapted to local socio-ecological contexts and with the strong involvement of stakeholders. Addressing this challenge requires quantifying the multiple agronomical, environmental and socio-economic benefits.

Figure 6. Challenges, solutions and barriers associated with agroforestry and pollinators.

Source: European Commission.

[21] Ebeling, A., Klein, A.-M., Schumacher, J., Weisser, W. W. & Tscharntke, T., *How does plant richness affect pollinator richness and temporal stability of flower visits,* Oikos 117, 2008, p. 1808-1815.
[22] Goulson, D., Hanley, M. E., Darvill, B., Ellis, J. S. & Knight, M. E., *Causes of rarity in bumblebees,* Biol. Conserv, 122, 2005, p. 1-8.
[23] Power, E. F. & Stout, J. C., *Organic dairy farming: impacts on insect–flower interaction networks and pollination,* J. Appl. Ecol., 48, 2011, p. 561-569.

Long-term pollinator-friendly farming

Long-term planning and investment are required to maintain pollinator-friendly habitats across all farms in the future. Farmers need to be credited, rewarded, and incentivised to protect and enhance pollinators on their farms. Small areas of non-farmed land can act as biodiversity hotspots on the farm. Managing these areas for pollinators by allowing them to flower and avoiding pesticides can ensure their long-term viability. Using a marketed approach, where farmers receive accreditation for pollinator-friendly farming (see the section on page 17 *Farmer support for pollinator-friendly farming practices*) will further support the continuity of these efforts.

Figure 7. Challenges, solutions and barriers related to long-term pollinator-friendly farming.

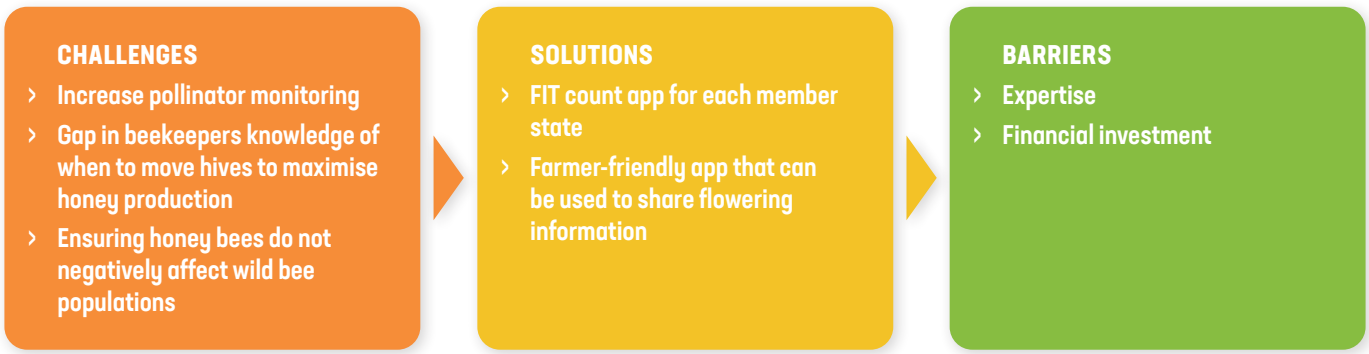
Source: European Commission.

Using motivation points (or pollinator points) could change farmer attitudes. A points system could also create healthy competition among neighbouring farmers. Many guidelines exist and they need to be collated. Using best practice examples of what is already in place but making them available to all Member States (e.g. translating guidelines from the All-Ireland Pollinator Plan to other languages) would also help. Investment is also required to adapt guidelines for different countries/regions/climates. Community engagement initiatives such as farmer school visits and open farm walks could be organised during quiet times on the farm and farmers could be offered incentives e.g. payment by the school.

Tools for pollinator conservation and promotion

Digital technologies, platforms and applications can contribute to halting and reversing pollinator decline. Applications need to be available, accessible, affordable, actionable and scaleable. One such example is a farm-scale pollinator scoring system that could be used by any farmer, regardless of farm type, intensity level or geographic location, which considers their entire farm and determines how pollinator-friendly it is. The score would be easily calculated, understood and improved. A success factor could then be reliably measured by the improvements to the overall score. The tool would show what simple, low-cost actions farmers could take to improve their score and whole farm for pollinators and other biodiversity in a measurable way that would not impact farm productivity. Having a range of different measures on the scorecard would offer each farmer the flexibility to improve the score in their own time.

Figure 8. Challenges, solutions and barriers related to tools for pollinator conservation and promotion.



Source: European Commission.

Multi-purpose EIP-AGRI Operational Groups

Highlighting the multiple benefits associated with pollinator-friendly farming can help increase farmer interest. Promoting pollinator-friendly farming practices is not only in the farmers' best interest because increasing pollinators on the farm can have multiple benefits.

For example, flowering cover crops can help protect soil structure and provide food for pollinators. Flowering mixed species swards can help reduce fertiliser inputs, mitigate against the negative effects of drought [24], provide food for pollinators and have additional environmental benefits [25]. Flowering mixed species swards supports improved livestock production efficiency, reduces dependence on expensive chemical nitrogen and provides a selection of necessary minerals, potentially reducing supplement costs. Multi-species grasslands can also benefit soil biodiversity [26].

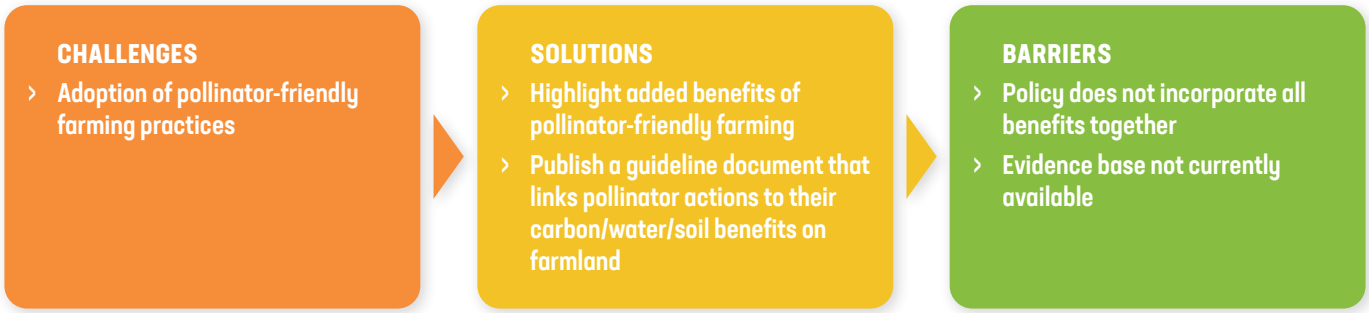
Clover and other nitrogen-fixing legumes are natural substitutes for nitrogen fertiliser and their use can help keep farm input costs down.

Hedgerows can help with flood mitigation [27] and provide shade for livestock on hot days and shelter on wet and windy days. Hedgerows can also help with pest control [28, 29] and sequester carbon [30].

Buffer stipes are used to reduce pollution to waterways. If managed appropriately, buffer stripes can also help pollinators by providing nesting sites and food.

Creating multi-purpose EIP Operational Groups will highlight the multiple positive outcomes related to pollinator-friendly farming. These can include positive outcomes for the environment (e.g. climate, biodiversity, soil, water etc.), economy and society.

Figure 9. Challenges, solutions and barriers related to multi-purpose EIP-AGRI Operational Groups.



Source: European Commission.

Collaboration, cooperation and coordination at all levels (i.e. farmers, advisors, research and policymakers) can help overcome the barriers, as outlinedabove. To increase the value of hedgerows to pollinators they should be cut on rotation i.e. not cut annually.

Small farms with big benefits for biodiversity

Small family farms are known to have high biodiversity value. Smaller farms may have smaller plots and therefore more permanent field edges. However, in the absence of nature conservation payments, small farms must first use their entire area for food production and, in some cases, increase intensity to be profitable. Rewarding farmers for the wide range of values they deliver to society, like protecting pollinators, has the potential to stimulate farmer action in managing farmlands for biodiversity [31]. Every farm has some value for biodiversity, but some farms offer more than others. The focus should however be on results achieved and efforts made by the farmer rather than the characterisation of being a small or a large farm. Support is required to help farmers do this. Support can be in the form of facilitating knowledge exchange and providing training. In some cases, this support may be through providing materials or funding if the required management is cost- and/or labour-intensive.

[24] Grange, G., Finn, J. A. & Brophy, C., *Plant diversity enhanced yield and mitigated drought impacts in intensively managed grassland communities,* J. Appl. Ecol. 58, 2021, p. 1864-1875.

[25] Cummins, S. *et al., Beneficial effects of multi-species mixtures on N20 emissions from intensively managed grassland swards,* Sci. Total Environ, 792, 148163, 2021.

[26] Ikoyi, I., Grange, G., Finn, J. A. & Brennan, F. P., *Plant diversity enhanced nematode-based soil quality indices and changed soil nematode community structure in intensively-managed agricultural grasslands,* Eur. J. Soil Biol, 118, 103542, 2023.

[27] Wallace, E. E. *et al., The effect of hedgerow wild-margins on topsoil hydraulic properties, and overland-flow incidence, magnitude and water-quality,* Hydrol. Process., 35, e14098, 2021.

[28] Bishop, G. A., Fijen, T. P. M., Desposato, B. N., Scheper, J. & Kleijn, D., *Hedgerows have contrasting effects on pollinators and natural enemies and limited spillover effects on apple production,* Agric. Ecosyst. Environ., 346, 108364, 2023.

[29] Rodríguez, E. *et al., Aphid suppression by natural enemies in hedgerows surrounding greenhouses in southern Spain,* Biol. Control, 177, 105126, 2023.

[30] Biffi, S., Chapman, P. J., Grayson, R. P. & Ziv, G., *Planting hedgerows: Biomass carbon sequestration and contribution towards net-zero targets,* Sci. Total Environ., 892, 164482, 2023.

[31] Lomba, A. *et al., Back to the future: rethinking socioecological systems underlying high nature value farmlands,* Front. Ecol. Environ., 18, 2020, p. 36-42.

Figure 10. Challenges, solutions and barriers for small farms with big benefits for biodiversity.

Source: European Commission.

Clear and tailored **communication** with farmers is essential to ensure they understand the concepts and science behind the benefits of areas on the farm that improve pollinator populations e.g. creating nest sites for solitary bees close to flowers along with proper reward structures. Farmers have different attitudes towards biodiversity and pollinator-friendly farm management, so reward structures need to be compatible with sociocultural norms and work processes [32]. Communication needs to be tailored to the norms that different farmers associate with biodiversity. Farm level examples are required on managing existing pollinator-friendly areas that are not labour intensive and can be achieved with little or no cost. This could include cutting farmland hedges on a three-year rotation instead of each year. To achieve this, farmers and farm advisors need **training** to show how this can be achieved and what the benefits are **for the farm**. Additional support could also be provided, for example information graphics.

Using a 'pollinator-friendly farm' label is another approach that can **incentivise** farmers to protect biodiversity and acknowledge farmers' engagement and effort. For example, the apples produced by farmers in Switzerland participating in the Obstgarten Farnsberg Bird Life Project [33] were branded with a 'Hochstamm Suisse' logo. This logo allowed farmers to market their apples at a higher retail value and indicated that a contribution to the diversity and ecology of the cultural landscape was made on their farm.

Increasing food for pollinators

By monitoring flower species, richness and abundance, and combining these monitoring data with existing data on flower distributions (e.g. the Global Biodiversity Information Facility (GBIF), flower gaps in the landscape can be identified. These gaps can be filled by planting or seed sowing to enhance connectivity and increase the diversity of flowering plant species. This will enhance pollinator species richness. Seed can be harvested from species-rich grassland fields and farmers can also be paid for these services. Communication and knowledge transfer is key to achieving this positive outcome. These combined data can also ensure that flowers are available throughout a pollinator's flight period.

Figure 11. Challenges, solutions and barriers to increasing food for pollinators on the farm.

Source: European Commission.

There is a low availability of native seeds from local sources. Sowing wildflower strips for pollinators using prevalent seed mixes can be a threat as they often contain non-native species [34] and there is a risk of accidentally bringing invasive species onto the farm [35]. Importing non-local genetic strains and placing them in proximity to natural populations of the same species risks contaminating

[32] Kernecker, M., Seufert, V. & Chapman, M., *Farmer-centered ecological intensification: Using innovation characteristics to identify barriers and opportunities for a transition of agroecosystems towards sustainability,* Agric. Syst., 191, 103142, 2021.
[33] Bird Life Schweiz (2021), *Obstgarten Farnsber:* http://obstgarten-farnsberg.ch/.
[34] Barry, C. & Hodge, S., *You Reap What You Sow: A Botanical and Economic Assessment of Wildflower Seed Mixes Available in Ireland,* Conservation 3, 2023, 73-87.
[35] Teagasc (2021), *Beware of wild flower mixes as you might get more than you paid for,* https://www.teagasc.ie/news--events/news/2021/blackgrass.php.

the genetic integrity of the established populations and distorting biogeographic patterns. By reducing cutting, grazing or allowing natural regeneration, important flowers like dandelion, clovers, self-heal and bird's-foot trefoil grow at no additional cost each year.

Annual cutting of all farm hedges is not good for pollinators as no flowers can bloom. Cutting or trimming in rotation will give hedges more flowering potential. Likewise, natural meadows need some management and patience. It can take up to seven years for areas of grass to develop into a stable flower-rich meadow. An annual cut or graze in September or October is essential to reduce soil fertility and allow the wildflower seeds in the soil to compete with the grass.

Knowledge gaps and research needs from practice

Six key research needs from practice for facilitating pollinator-friendly farming were identified. Participants also identified a number of ideas for future OGs and gaps in the research. Linking in with this discussion, research programme officer Vincent Tchedry from the Research and Innovation Unit at DG AGRI gave an overview of past and ongoing research projects and calls within European programmes, including Horizon 2020, Horizon Europe and LIFE calls.

Co-benefits of pollinator conservation actions

A **challenge** for farmers in relation to pollinator-friendly farming is a perceived risk of losing productive land, along with concerns about extra time commitments and increased management costs. However, pollinator-friendly farming practices can provide numerous co-benefits to **farmers.**

To overcome these perceptions, **evidence-based research** is necessary to support farmers through **knowledge exchange** and **training, demonstrating** the co-benefits of pollinator conservation actions. This will empower farmers to make informed decisions about managing their land. This research should also include a **cost-benefit analysis** of pollinator-friendly farming conducted at a **European level,** ensuring **relevance** to all farm types.

Globally, bees are the most important pollinators because they visit flowers to collect pollen for their larvae and feed exclusively on nectar as adults. Hence, the entire life cycle of pollinating bees is dependent on interactions with flowering plants. While adult hoverflies feed mainly on nectar and pollen, the larvae of many species are voracious predators of aphids and other pests. As a result, hoverflies contribute to both pollination and pest control. Some farmers are working to enhance biological control on their farms by increasing habitats for natural pest predators. For example, creating habitats for hoverflies to help maintain aphid populations. Many farmers reduce pesticide application when it can reduce input costs [36]. Some European farmers seek alternatives to chemical weed management as it can lead to unnecessary costs and negatively impact biodiversity. Some farmers now realise that the 'tidy up' attitude and elimination of weeds can be an unnecessary cost and that using herbicides can harm biodiversity. Farmers are now conducting aphid counts in their crops and only treating with aphicides if necessary, while past treatment with aphicides would have been used as a precaution.

Knowledge of pollinators and pollination ecology

Bees are considered the dominant pollinators in many habitats across the world [37], although non-bee pollinators (e.g. flies, beetles, moths and butterflies) also play an important role [38]. **Hoverflies, butterflies** and **moths** are particularly important non-bee pollinator groups in Europe. Despite their numerous roles, their conservation is often overlooked and neglected. **Knowledge** of the ecology of **lesser-known** pollinator groups is essential to implementing conservation strategies, offering evidence-based recommendations and successful case studies to protect, promote and restore hoverflies and moths and their habitats in Europe.

To address the challenge of knowledge gaps in relation to pollinators and pollinator ecology, we need to:

- expand and disseminate knowledge on wild bee populations in terms of nesting and floral requirements, **plant-pollinator interactions** and pollination service delivery;
- improve understanding of **hoverflies** and other lesser-known pollinator populations;
- improve knowledge of **at-risk pollinators;** and
- improve understanding of the **interactions between managed and wild pollinators.**

This research needs to be conducted at a local, regional and **European level.**

[36] European Commission, *Trends in the use and risk of chemical pesticides and in the use of more hazardous pesticides,* https://food.ec.europa.eu/plants/pesticides/sustainable-use-pesticides/farm-fork-targets-progress/eu-trends_en.
[37] Wilmer, P. *Pollination and Floral Ecology,* Princeton University Press, New Jersey, 2011.
[38] Rader, R. *et al., Non-bee insects are important contributors to global crop pollination,* Proc. Natl. Acad. Sci., 113, 2016, p. 146-151.

Increasing flowers for pollinators

A challenge of **flower gaps** exists in farming landscapes and throughout the flight season of pollinators. Pollinators have different flight periods and flower preferences, and need diversified food resources throughout their flight periods. These gaps need to be identified to enhance flowering resources for pollinators. **Flower gaps in the landscape** can be identified by monitoring flower species, richness and abundance, and combining this with existing data on flower distributions (e.g. GBIF). Once identified, these gaps can be filled by planting or seed sowing to enhance connectivity and increase the diversity of flowering plant species. This will in turn enhance pollinator species richness. Seeds can be cost intensive but help provide additional food resources for pollinators. Despite sowing a diversity of seeds, over time, certain species dominate over others. The opposite can be the case regarding natural regeneration. Initially, there can be a dominance of some species over others, but diversity increases over time. The results of a recent study indicate that tolerating the injurious weed species within the agricultural environment may be of greater benefit to flower-visiting insects than sowing 'wildflower mixes' [39]. Seed can be harvested from locally sourced species-rich grassland fields and farmers can be paid for these services. **Communication** and **knowledge transfer** is key to achieving this positive outcome. Flower distribution data can also be used to ensure that flowers are available throughout a pollinator's flight period. Because of pollinator groups' varying flight distances, this would need to be considered at the **field, farm and landscape scale,** must be conducted at a **European level** and is **relevant** to all farms.

Farmer support for pollinator-friendly farming practices

The challenge exists in providing the necessary **support** for **farmers** to enable them to adopt pollinator-friendly farming practices. Support is required in the form of guidance (e.g. knowledge transfer and knowledge sharing), financial rewards and accreditation. Farmers have concerns that adopting pollinator-friendly farm management practices may lead to a reduction in productive land and require additional time and financial investment. Annually, farmers across the EU receive a basic payment for the area of farmed land they hold (own or rent) and there is a perception that pollinator-friendly farming practices may lead to a reduction in basic farm payments. When accounting for pollinator-friendly farm management, farmers want to know they are doing the right thing. They also want continuity in the practices they are being asked to adopt. There is a need to **increase farmer understanding** of pollinator-friendly management practices and their benefits, as well as the **removal and dissolution of barriers and constraints** preventing more pollinator-friendly management on the farm [40, 41].

[39] Balfour, N. J. & Ratnieks, F. L. W., *The disproportionate value of 'weeds' to pollinators and biodiversity,* J. Appl. Ecol., 59, 2022, p. 1209-1218.

[40] Lomba, A. *et al., Back to the future: rethinking socioecological systems underlying high nature value farmlands,* Front. Ecol. Environ., 18, 2020, p. 36-42.

[41] Moran, J. *et al., Management of high nature value farmland in the Republic of Ireland: 25 years evolving toward locally adapted results-orientated solutions and payments,* Ecol. Soc., 26, 2021.

Specific actions include:

- considering pollinator-friendly areas when calculating eligible land for CAP direct payments;
- promoting **locally-led** community engagement through citizen science by encouraging the local communities to participate in monitoring and mapping activities (e.g. biodiversity Monitoring by farmers in Austria [42], the BIMAG (Boeren Insecten Monitoring Agrarische Gebieden) project in the Netherlands [43] and the Farmer Moth Monitoring Project in Ireland [44]);
- providing **training** to advisors and policymakers to integrate more functional biodiversity information into farmer training;
- facilitating peer-to-peer learning with trials where benefits can be observed and recreated; and
- introducing **policies** that reflect farmers' capacity to implement pollinator-friendly farming actions.

Locally led multi-actor partnerships, such as the Burren Programme in Ireland and various EIP Operational Group Projects, have successfully used results-orientated solutions to protect and manage farmland biodiversity [45, 46]. The results-based agri-environment payment schemes (RBAPS) are different from the prescription-based agri-environment schemes (AES). Payments are based on positive environmental results delivered by the farmers and not based on compliance with measures irrespective of the outcome [47]. Successful RPAPS have been piloted in several European countries, including England [48], Ireland [49, 50], Romania [51] and Spain [52].

Using a pollinator scorecard and a results-based payment measure for pollinators to recognise pollinator-friendly farms and reward these farmers for their contributions (e.g. the 'Protecting Farmland Pollinators EIP Scorecard') can help restore pollinator-friendly habitats. Farmer accreditation for their efforts is another possible measure e.g. 'Farming for Nature' ambassadors. Farmer support in the form of knowledge, time, accreditation and/or finance needs to be provided across all Member States.

There is a clear need for capacity-building and training programmes to showcase best practices for pollinator-friendly farming.

Multi-actor monitoring for long-term observation of pollinators on farmland

The monitoring **challenge** is a lack of data on pollinator diversity and abundance across Europe. One of the central missions of the **EU Pollinator Initiative** is to address the lack of data on pollinator diversity and abundance across Europe. Without these data, it is impossible to know the **status** or **decline** of pollinator species. Based on a legal requirement under the Nature Restoration Regulation, efforts are being undertaken to design and set up an **EU wide pollinator monitoring system** (EU-PoMS) with standardised monitoring protocols. Starting from 2026/2027, Member States will be required to implement EU-PoMS on an annual basis, which is aimed at quantifying national trends in pollinator species and population levels. EU-PoMS will also complement the European Butterfly Monitoring Scheme (eBMS), which is based on a citizens' science approach. In addition, using **multi-actor monitoring** and including farmers and farmland in monitoring schemes is essential as this will allow the observation of local trends and the effectiveness of locally applied conservation and restoration measures. State-sponsored pilot studies and ground truthing of novel non-lethal monitoring technology, compatible with the **EU-PoMS,** are required for all **Member States.** Such a project could address the challenge of acquiring data to determine priority actions for pollinator-friendly farming practices at **farm and landscape levels.** Collaboration between farmers and researchers would be required. The Farmer Moth Monitoring EIP Operational Group project is a positive example of farmers monitoring pollinators directly. This could build on the SPRING project (Strengthening pollinator recovery through indicators and monitoring) which is currently working to support the preparation for the implementation of the EU Pollinator Monitoring Scheme (EU PoMS) for wild bees, butterflies, hoverflies and moths.

[42] Österreich forscht (2021), *Biodiversity monitoring by farmers,* https://www.citizen-science.at/en/projects/biodiversity-monitoring-by-farmers.

[43] De Vlinderstichting (2020, *Boeren tellen zelf vlinders,* https://www.vlinderstichting.nl/bimag.

[44] National Biodiversity Data Centre (2022), *Farmer Moth Monitoring EIP Project Report.*

[45] Moran, J. *et al., Management of high nature value farmland in the Republic of Ireland: 25 years evolving toward locally adapted results-orientated solutions and payments,* Ecol. Soc., 26, 2021.

[46] Dunford, B. & Parr, S., *Farming for conservation in the Burren in Farming for Nature: The Role of Results-based Payments* (eds. O'Rourke, E. & Finn, J. A.), 2020, p. 1-155 (Teagasc and National Parks and Wildlife Service, Dublin).

[47] Keenleyside, C. *et al., Results-Based Payments for Biodiversity Guidance Handbook: Designing and Implementing Results-Based Agri-Environment Schemes 2014-20. Prepared for the European Commission, DG Environment, Institute for European Environmental Policy,* 2014.

[48] Chaplin, S. P., Mills, J. & Chiswell, H., *Developing payment-by-results approaches for agri-environment schemes: Experience from an arable trial in England,* Land use policy 109, 105698, 2021.

[49] Larkin, M. & Stanley, D. A., *Impacts of management at a local and landscape scale on pollinators in semi-natural grasslands,* J. Appl. Ecol., 58, 2021, p. 2505-2514 (2021).

[50] McLoughlin, D., *Pilot Results-Based Agri-Environment Measures in Ireland and Navarra; End of Project Technical Synthesis Report. A Report Published for the European Forum on Nature Conservation and Pastoralism,* 2018.

[51] Page, Nathaniel Constantinescu, Mihai Demeter, Laszlo Keenleyside, Clunie Popa, R. & Sutcliffe, L., *On-Technical Summary: Results-Based Agri-Environment Schemes for Support of Broad Biodiversity at Landscape Scale in Transylvanian High Nature Value Farmland, Romania,* 2019. Report Prepared for the European Union, Agreement No. *07.027722/2014/697044/SUB/B2.*

[52] McLoughlin, D., *Pilot Results-Based Agri-Environment Measures in Ireland and Navarra; End of Project Technical Synthesis Report. A Report Published for the European Forum on Nature Conservation and Pastoralism,* 2018.

Effectiveness of conservation actions for pollinator populations and communities

A need exists to increase knowledge of the effectiveness of pollinator conservation actions. One solution that requires research is developing a simple tool to assess the benefit of pollinator conservation actions (e.g. meadows, parks, designated sites, no-mow lawns and Buglife's B-lines) in terms of providing floral resources and nesting habitats. This could be conducted at a **European level** but led at a **national level.** Expertise at a national level is required, as is multi-actor stakeholder engagement.

Ideas for EIP-AGRI Operational Groups

RBPAPs for pollinators: Combining the public and private sectors to reward farmers for pollinator-friendly farming practices

One solution to help farmers enhance pollinator-friendly farm management is offering **results-based payments.** There is an existing **'Pollinator Scorecard'** developed in Ireland [53] that could be easily adapted and trialled in other European countries. The scorecard could be evaluated with non-lethal **pollinator monitoring** or monitoring of proxies (such as flower density and diversity) instead of the pollinators themselves.

Future farmers – Intergenerational knowledge sharing

Pollinator-friendly farming depends on knowledge being retained. Using a multi-disciplinary approach to knowledge sharing, by bringing an ageing community together with the next generation of farmers will enable this to ensue. The key to achieving this is using a locally-led approach and ensuring that there is something in it for farmers. If you show farmers you are there to help them, they will engage with you. By facilitating knowledge transfer and knowledge sharing, farmers gain an understanding of other aspects of land management like habitat restoration.

Multi-purpose EIP-AGRI Operational Groups

Identifying and highlighting co-benefits of pollinator-friendly farming actions can be placed into a knowledge hub tailored for farmers and policymakers and widely disseminated to farmers, advisors and local communities. Examples of co-benefits include:

- Buffer and other protection zones, whether woodland, grassland or a mixture, provide habitat for diverse pollinator species [54] while improving water quality.
- Mixed species swards can also help mitigate the negative effects of drought [55] and provide additional environmental benefits [56]. Flowering mixed sward species supports **improved** livestock productive **efficiency, reduces dependency** on expensive chemical nitrogen and provides a selection of needed minerals, thereby potentially reducing supplement costs.
- Clover and other nitrogen-fixing legumes are natural substitutes for nitrogen fertiliser and can keep farm input costs low. A reduction in nitrogen fertilisation can at least partly be compensated by increased effects of pollination on yield [57].
- Implementing these practices fosters community engagement and creates increased awareness about biodiversity. This can help promote a **sense of stewardship** among local populations and enhance collaboration between farmers and their communities.

Value chain connections

There is great potential for **commercial operators** to **reward farmers** for the additional efforts involved in pollinator-friendly farming. It would be beneficial if the **agri-food industry** facilitated producer visibility, showing consumers the added value of biodiversity, such as showcasing how they protect pollinators in the production of food. The challenge is to identify a measurable way to recognise how pollinator-friendly a farm is and how to market this to consumers. This is applicable to all Member States but needs national management.

[53] Kavanagh, S. *et al., Protecting Farmland Pollinators: Whole Farm Scorecard - Experiences and Recommendations,* J. Pollinat. Ecol., 34, 2023, p. 312-328.

[54] Cole, L. J., Brocklehurst, S., Robertson, D., Harrison, W. & McCracken, D. I., *Riparian buffer strips: Their role in the conservation of insect pollinators in intensive grassland systems,* Agric. Ecosyst. Environ., 211, 20215, p. 207-220.

[55] Grange, G., Finn, J. A. & Brophy, C., *Plant diversity enhanced yield and mitigated drought impacts in intensively managed grassland communities,* J. Appl. Ecol. 58, 2021, p. 1864-1875.

[56] Cummins, S. *et al., Beneficial effects of multi-species mixtures on N2O emissions from intensively managed grassland swards,* Sci. Total Environ, 792, 148163, 2021.

[57] Marini, L. *et al., Crop management modifies the benefits of insect pollination in oilseed rape,* Agric. Ecosyst. Environ., 207, 2015, p. 61-66.

Knowledge networks

Pollinator-friendly farming could benefit from a **forum** to stimulate and foster **knowledge exchange** and integrate research and good practices. Knowledge networks would connect **farmers, foresters, beekeepers, researchers, advisors** and **policymakers** and disseminate information on pollinators, pollination services and pollinator-friendly farming. These knowledge networks could help raise awareness of lesser-known pollinating insect groups and facilitate knowledge transfer so that advisors, farmers and policymakers can better understand pollinator ecology. By increasing knowledge across all stakeholder groups, connections between pollinator life cycles and farm management practices could be made, which could also help inform policy initiatives better. Locally led networks can help to ensure farmer engagement. This applies to **all European countries.**

2.7 Future collaboration opportunities

European meadow networks

Native hay meadow networks exist in Slovenia, Ireland and other Member States. These species-rich grasslands are in greater abundance in Eastern Europe than in Western Europe.

Currently, there is a drive to intensify farmland in Eastern European countries. Creating a European network of hay meadows has great potential to enhance pollinator species richness and abundance. In Ireland, the Great Irish Grasslands project is working towards sharing information about semi-natural grasslands (hay meadows) and published a 'Grasslands Trail' booklet. The booklet contains information on semi-natural grasslands in Ireland, including features on all nine trail sites and key principles for management.

Sharing knowledge across Member States and showcasing best practices will ensure these sites are managed and restored. Using a multidisciplinary approach can have added benefits for the farmer, such as eco-tourism. If farmers are incentivised to restore hay meadows using a local approach, communities can benefit by working together, thus creating added social benefits for farmers. Farmers with species-rich meadows can profit by selling seeds.

Pollinator-friendly demonstration farm network

A network of demonstration farms throughout Europe could showcase best practices by identifying inspirational case studies of pollinator-friendly farms. Farmers participating could receive **accreditation** for their efforts. These farms could be linked with living labs or a European meadow network.

3. Wrapping up

Closing words were given by Klavdija Ramsak-Noemi, policy officer at DG AGRI. Before that, Antanas Maziliauskas, deputy team leader at the Support Facility for Innovation and Knowledge exchange | EIP-AGRI gave an overview of their activities. Antonia Gamez Moreno summarised the event and highlighted the main outcomes. At the end of the workshop, all attendees were asked to complete an evaluation report. The responses were all very positive. The participants liked the opportunities to network with new people and learn about new ideas from inspirational projects. The quality of the workshop presentations and the relevance of the field visits were highlighted as successes of the workshop. Some participants commented that they had learnt more about identifying and reducing gaps between scientific knowledge and farm practice. They highlighted the need to take into account farmers' concerns and perspectives and to also consider the social sustainability of farms with high biodiversity value (e.g. small family farms). Participants enjoyed the good atmosphere and the type of platform that was created during the workshop to facilitate discussions and collaborations between participants.

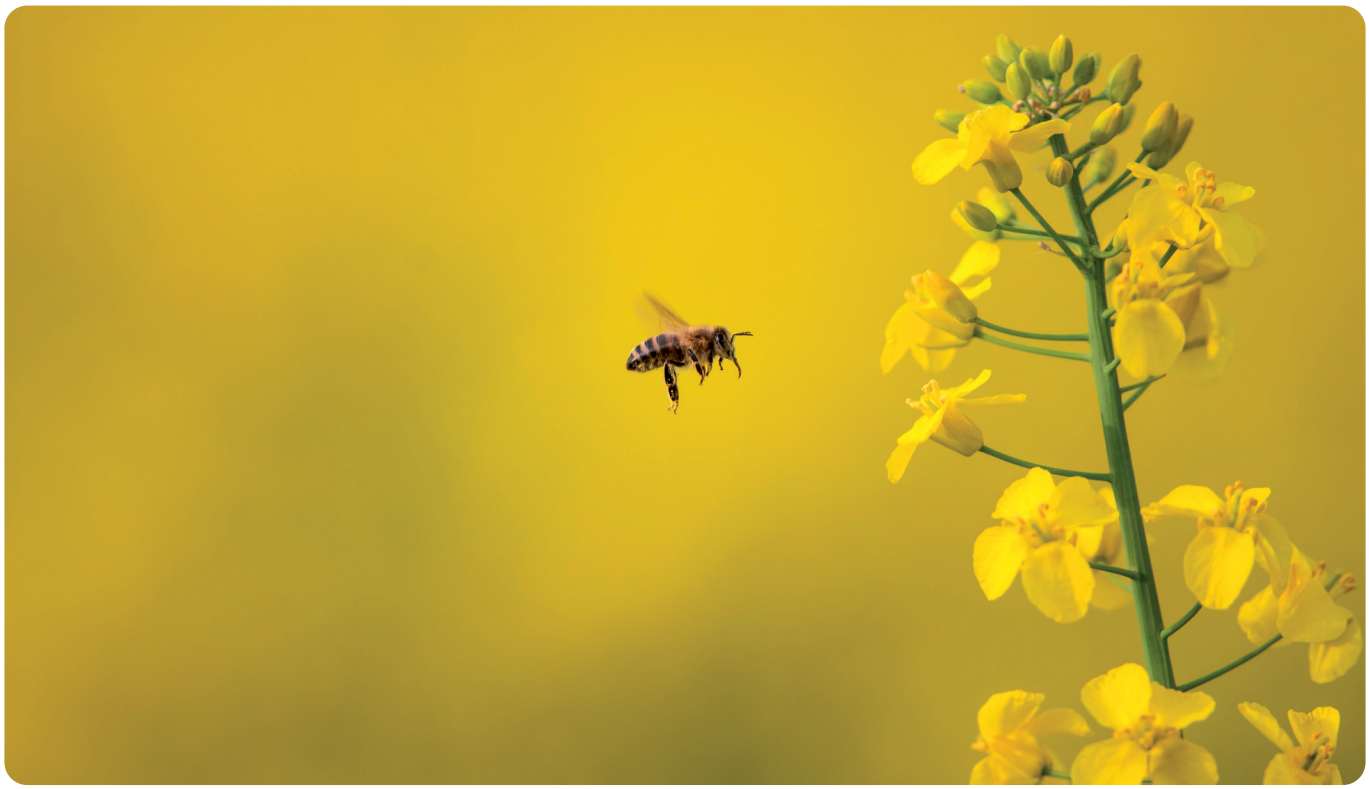
The Commission representatives thanked all participants, speakers, the Slovenian Ministry of Agriculture, Forestry and Food, and the Slovenian National Rural Network for hosting and supporting the event, and the EU CAP Network team for organising the workshop. They also invited the participants to stay in touch and share innovations through the Support Facility for Innovation and Knowledge exchange | EIP-AGRI.

Picture 9. Presenters from day two. Copyright: European Commission

4. Conclusion

Up until the 1980s, agriculture in Europe was much less intensive, mainly comprising widespread pollinator-friendly hay meadows. Pollinator-friendly farming is not about returning to that – it is about achieving a better balance between productivity and its coexistence with nature, and how this benefits a farm. There is a risk of squeezing nature out entirely from intensive farmland and jeopardising the public good that it provides, which society often takes for granted. Pollinators can be returned to all farmland without negatively impacting productivity, but it requires many farmers to take small actions and for policies to complement and support them. It also requires farmer buy-in at a whole-farm and landscape scale. Pollinators need food and shelter on farmland from early spring to late autumn. Individual measures in isolation will have minimal impact and are not cost-effective. The important role of measures under the CAP encouraging the protection of pollinators and adequately rewarding farmers for their conservation cannot be underestimated. Pollinator-friendly farming can be integrated into any farming system. However, it is suggested to focus on a whole farm approach compared to a field-by-field approach because this will more likely fit within farming systems and gain broader farmer support. The whole farm approach is also consistent with the goal of creating habitat connectivity and heterogeneity across farming landscapes.

The Commission is committed to halting and reversing pollinator decline and the Nature Restoration Law specifically addresses pollinators, establishing new rules that aim to reverse pollinator decline and increase populations by 2030 and requiring pollinator monitoring across all Member States. This 'Pollinator-friendly farming' workshop was organised by the EU CAP Network. Its aim was to focus on the main challenges for halting and reversing pollinator decline and to exchange knowledge, best practices and innovative ideas in relation to pollinator-friendly farming. The importance of using the whole farm approach was highlighted, along with the necessity of involving farmers in the discussions to ensure that simple and practical actions to halt and reverse pollinator decline are tailored to the context and needs of farmers.



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