Food and Agriculture Organization of the United Nations

Protecting pollinators from pesticides
Urgent need for action

Required citation:
FAO. 2022. *Protecting pollinators from pesticides – Urgent need for action.* Rome. https://doi.org/10.4060/cc0170en

ISBN 978-92-5-136246-4

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Pollinators are vital to food production and human well-being

Pollinators are essential for fruit, vegetable, oilseed and forage production, as well as for the production of seed for many root and fibre crops. In addition to being essential to food security and quality, pollinators contribute to the production of medicines, biofuels (e.g. canola and palm oil), fibres (e.g. cotton and linen) and construction materials such as timber. Livelihoods based on beekeeping and honey hunting are embedded in many rural economies.

The large importance of pollinators for both wild and cultivated plants, means they are fundamental to maintain ecosystem services and uphold global biodiversity.

87 of 115 of the **top global crops depend**, to some degree, on animal pollinators, such as **bees, birds and bats**.

5 to 8% of **current global crop production** would be lost without animal pollination, representing an annual **market value of 235–577 billion USD.**

Almost 90% of the **world's flowering wild plants** *(approximately 308 000 species)* depend, to varying degrees, on animal pollinators for their reproduction.

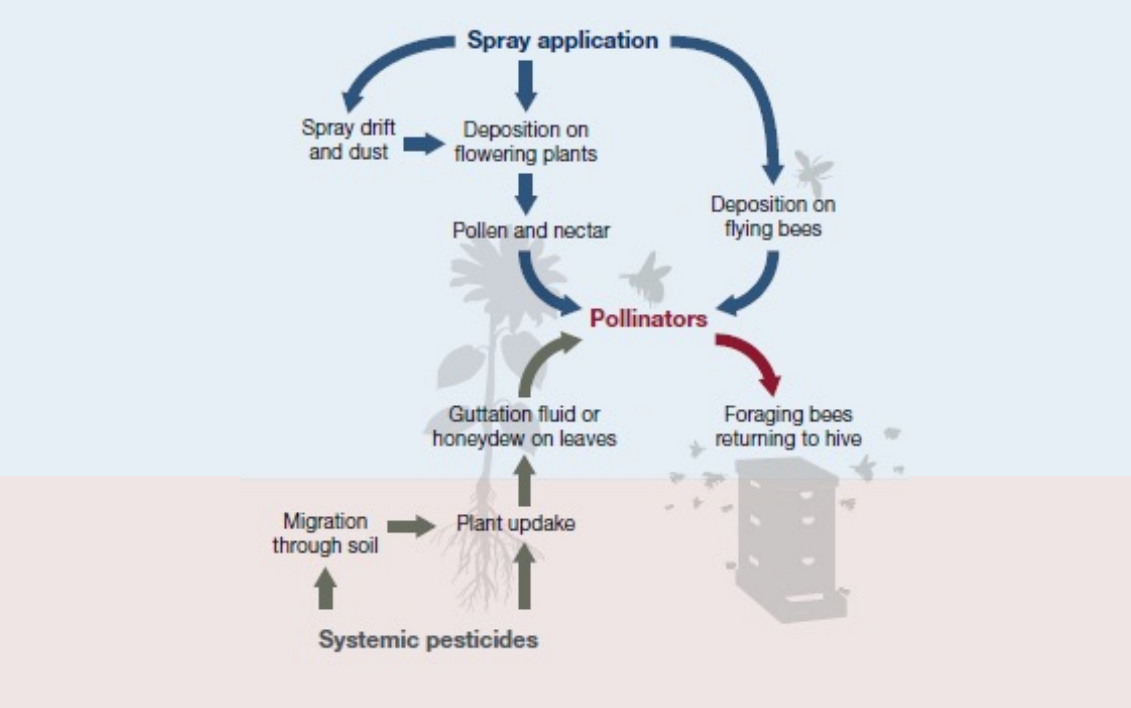
40% of these crops would lose **40 to >90%** of production in the absence of pollinators.

Pesticides adversely affect insect pollinators

Bees and insect pollinators can be exposed to pesticides used in agriculture or disease vector control in various ways, including direct overspraying, ingestion of contaminated pollen, nectar or honeydew, and contact with residues on foliage or flowers (see graphic). Pesticides have also shown a broad range of lethal and sublethal effects on insect pollinators, and in particular on bees. These consist of direct mortality of the insects, but also adverse sub-lethal effects such as impaired foraging, reduced brood success, or perturbed homing ability.

Not surprisingly, insecticides are generally found to pose the highest risks to insect pollinators. However, the use of fungicides and acaricides may also result in toxic effects on bees. Most herbicides are generally not directly toxic to bees, but they can have substantial indirect effects on pollinators through the removal of nectar and pollen sources or of nest sites.

Pesticide use has been considered to be among the top-3 drivers of pollinator decline in almost all parts of the world, together with habitat destruction and intensive (agricultural) land management.



Key routes of exposure of honeybees to pesticides applied as sprays, soil treatments and seed treatments. Similar routes are likely for other bees (IPBES, 2016)

National policies to protect pollinators are needed

In 2018, the Convention on Biological Diversity adopted its *Plan of Action 2018–2030 for the International initiative on the conservation and sustainable use of pollinators*. A key element of the plan is that countries develop and implement coherent and comprehensive policies that enable and foster activities to safeguard and promote wild and managed pollinators.

In spite of the adoption of several supranational pollinator initiatives (e.g. in Africa, Europe, North America and Oceania), this has not yet been translated into many concrete national strategies, polices or action plans to promote and protect pollinators.

Elaborating, adopting and implementing such national policies is greatly needed.

Bees are the main pollinators of crops

Pollinators make up a diverse group of animals, including birds and bats, but are dominated by insects, among which bees are the most important group.

More than 20 000 bee species are known globally. Only a few of those are managed, including honeybees, some bumble bees and stingless bees, and a few solitary bee species. However, the vast majority of bees are wild.

Crop yield and quality depend on the abundance and the diversity of both wild and managed bees. A diverse community of bees generally provides more effective and stable crop pollination compared to one species alone. This is even the case when managed species, such as honey bees, are present in high abundance.

For that reason, both managed bees and wild bees need to be protected from pesticides.

Squash bee on pumpkin flower

Honey bee on melon flower

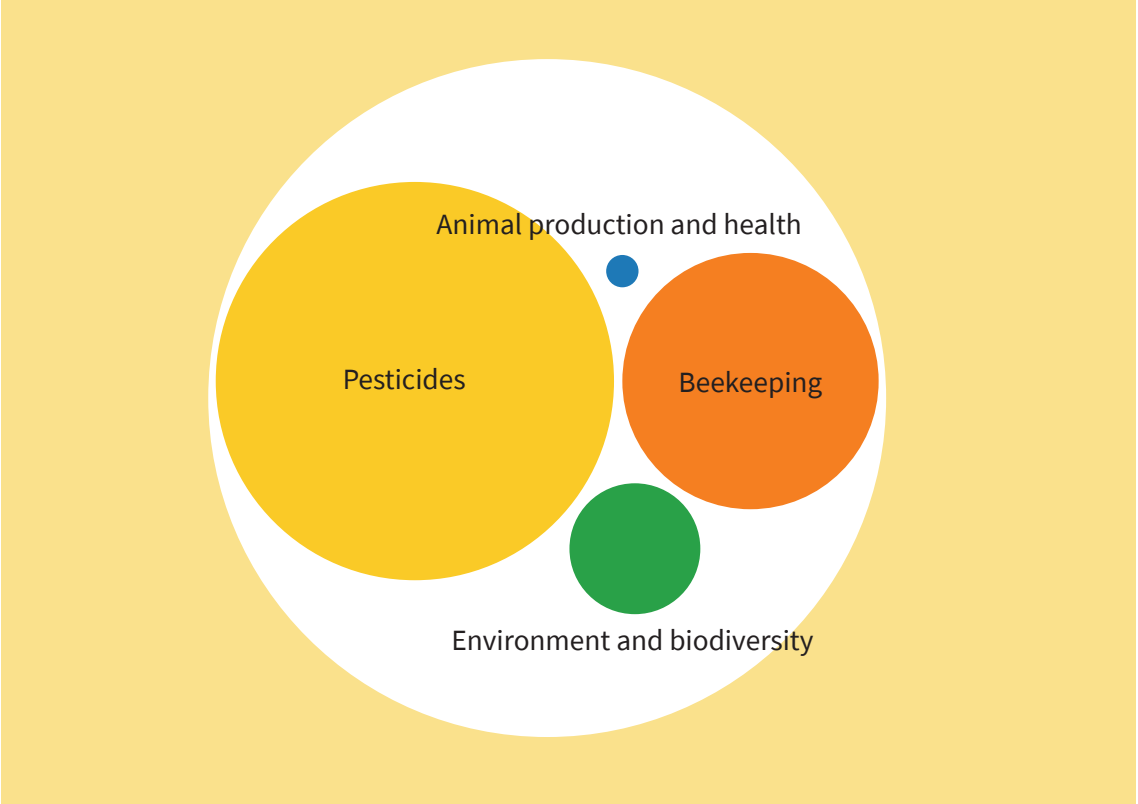
Carpenter bee on beans

Strengthening regulations is essential to reduce pesticide risks to pollinators

Legislation is one among several tools that can be used to influence pest management and pesticide use, safeguard beekeeping activities, and protect pollinator diversity.

Through specific requirements for the authorization and use of pesticides, legislation can contribute to protecting pollinators from risks posed by pesticides. For instance, before registering a pesticide product for use, specific risk assessment methods for pollinators can be followed, and risk mitigation measures can be put in place when using a pesticide. Similarly, animal production or beekeeping legislation may determine under which circumstances pesticides can be applied in the vicinity of beekeeping activities. And biodiversity and/or habitat legislation may include specific provisions to minimize exposure of domestic and wild pollinators to pesticides, which can indirectly protect pollinators from pesticides.

In many countries, legislation which aims to protect pollinators from pesticides is limited to pesticides and/or on beekeeping; environmental or biodiversity legislation tends to be applied less frequently for this purpose (see graphic). Furthermore, current legislation concentrates on managed honeybees, and much less if at all on wild bees. Especially in low-annd middle-income countries, legal mechanisms to protect pollinators from the adverse impact of pesticides are still inadequate.



Relative importance of four legislative domains to protect pollinators from pesticides across 14 countries studied by FAO (2022), regulating pesticides, beekeeping, environment and biodiversity, and animal production and health.

FAO Global seminar

On 23 and 24 February 2022, FAO organized the online *Global seminar on strengthening regulations to protect pollinators from pesticides*. Almost 700 participants from all corners of the world took part in the event, and together with 21 speakers and 3 expert panels, in 2 plenary and 4 parallel sessions, presented and deliberated on pollinator protection policies, legislation, risk assessment and risk mitigation.

Priorities for action to reduce pesticide risks to pollinators, discussed during the seminar, are summarized in this policy brief.

More information about the Global seminar, including presentations and recordings, can be found on the FAO website: https://www.fao.org/in-action/building-capacity-environmental-agreements/activities/global/pollinator-seminar/en/

Pollinator protection legislation in Tanzania

The legal framework to protect pollinators from pesticides in the United Republic of Tanzania consists of a range of provisions found in the pesticide as well as the beekeeping domains. Pesticides are regulated under the Plant Health Act (2020) while the Beekeeping Act (2002) addresses managed bees. In addition, a National Beekeeping Policy was adopted already in 1998.

Pesticide legislation requires that the registration authority considers the effects of pesticides on pollinators when approving or rejecting a pesticide. It also allows a pesticide to be banned or restricted because of risks to pollinators.

Beekeeping legislation allows both national and local governments to declare important pollinator habitats as wild pollinator reserves where activities potentially harmful to pollinators are restricted. Furthermore, the law permits the establishment of managed beekeeping zones which benefit from special protection from the effects of pesticide use. This includes conducting an environmental impact assessment for pesticide use that may impact pollinators, requiring certain minimum distances between managed pollinator activities and areas where pesticides are applied, requiring that advance notice be provided to beekeepers prior to the application of potentially harmful pesticides, and promoting joint integrated pest management (IPM) practices with beekeepers and pesticide users collaborating.

As such, the United Republic of Tanzania uses both dedicated policy and legislation to minimize effects of pesticides on pollinators and safeguard beekeeping and pollination.

FAO, Solyambingu (2022)

Reducing risks of neonicotinoid insecticides to pollinators

The use of neonicotinoid insecticides has been associated with significant risks to bees and other insect pollinators. As a result, authorities around the world have taken regulatory measures to minimize these risks. Measures range from the cancellation of all registrations of the insecticide(s), to severe restrictions of their uses, to mandatory management measures and labelling.
Some examples are:

Canada

In 2019, Health Canada cancelled many uses of neonicotinoids on bee-attractive crops (e.g. orchard trees), and prohibited spraying of some crops before or during bloom (e.g. berries and fruiting vegetables). Furthermore, certain application rates were reduced and unsprayed buffer zones increased.

European Union

- In 2013, the European Union severely restricted the use of clothianidin, imidacloprid and thiamethoxam and prohibited their use on bee attractive crops.
- In 2018, based on additional risk assessments, the European Union banned all outdoor uses of the 3 neonicotinoids while only the use in permanent greenhouses remained possible.
- In 2019 and 2020, the approval of the 3 pesticides expired since the applicants did not renew their applications; they are not allowed for crop protection anymore.
- Another neonicotinoid, acetamiprid, was found to pose a low risk to bees, and remains authorized.

Fiji

In 2020, Fiji banned all uses of imidacloprid, due to its harmful effects on beekeeping.

United States of America

In January 2020, the Environmental Protection Agency (EPA) released proposed interim decisions for acetamiprid, clothianidin, dinotefuran, imidacloprid and thiamethoxam. Regarding the risks to pollinators, EPA is proposing:

- hazard statements for pollinators on the label;
- management measures to help keep pesticides on the intended target and reduce the amount used on crops;
- restrictions on when pesticides can be applied to blooming crops.

Priorities for action

Governments are invited to review the current regulatory measures that are in place to reduce the risks posed by pesticides to insect pollinators and put into effect relevant activities. The following national actions were identified as priorities.

POLICY

- Develop policies which set ambitious targets for the protection and promotion of both managed and wild pollinators. Such policies, among others, could aim to:

  - Engage all relevant stakeholders to play an active role in the design, implementation and monitoring.
  - Promote pest management approaches which rely less on pesticides posing risks to pollinators, and more on biological control, agroecology and integrated pest management.
  - Optimally combine legally binding regulations with non-legal elements, such as information provision, education and training, behaviour change strategies, promotion of low-risk alternatives to pesticides, and economic and non-economic incentives.
  - Facilitate dialogue and mediation between farmers, beekeepers and other actors.
  - Support the mainstreaming of pollinator protection within the broader goal of sustainably increasing agricultural productivity through ecological intensification and/or agroecology and diversification.

LEGISLATION

- Strengthen national legislation to protect pollinators from pesticides to:

  - Ensure that legislation with respect to agricultural development, crop protection, pesticide authorization and use, beekeeping, environment and biodiversity are comprehensive and complementary, in regard to the protection of pollinators from risks posed by pesticides.
  - Include concrete pollinator protection goals, risk assessment and risk mitigation measures in the procedures for pesticides registration and authorizations for use.
  - Establish legal powers and processes to support the reduction in the use of and progressively phase out of pesticides which are harmful to or present an unacceptable risk to pollinators.
  - Assign responsibility to introduce measures which can incentivize good practices in the use of pesticides with respect to pollinators.
  - Comprise specific focus on pollinator-rich habitats when protecting and promoting biodiversity.
  - Develop specific comprehensive legislation on beekeeping, including the protectionof managed bees and mechanisms for ensuring liability and compensation in case of pesticide-induced damage to beekeeping.

RISK ASSESSMENT

- Assess the types of pollinators which are present in key cropping systems, as well as their role in and importance for pollination and agrobiodiversity.

- Apply existing basic (lower tier) risk assessment methods for western honeybees, as a surrogate for tropical, subtropical, and semi-arid bees, to screen pesticides submitted for registration.

- Develop robust risk assessment methods for pollinators in tropical, subtropical, and semi-arid agroecosystems.

- Establish mechanisms for regional networking and information exchange and work sharing on pollinator risk assessment between pesticide regulators.

RISK MITIGATION

- Prescribe pollinator risk reduction measures that can realistically be applied in the country, taking into consideration the local conditions of use of the pesticide, as well as the capacities for regulatory monitoring and enforcement.

- Establish or strengthen national or local communication and information exchange mechanisms between pesticide users and beekeepers.

- Facilitate the use of pest management approaches which rely less on pesticides posing risks to pollinators, and more on biological control, agroecology and integrated pest management.

MONITORING AND INCIDENT REPORTING

- Establish effective reporting systems for bee mortality incidents and ensure feedback into the pesticide regulatory system.

- Monitor the long-term trends of both managed and wild bee populations.

A more comprehensive list of priority actions, also addressing the possible involvement of other stakeholders, such as international and regional organizations, is available at the Global Seminar's website.

Taking action

While many different measures can be taken to reduce the risks of pesticides to pollinators, not all have to be implemented at the same time.

One option is to elaborate a comprehensive policy for the conservation and sustainable use of pollinators, which includes measures to reduce the effects of pesticides. The policy will provide a plan for the progressive implementation of all necessary measures and activities. Guidance to develop such inclusive policies for pollinators and pollinations services is provided by FAO https://www.fao.org/3/i4242e/i4242e.pdf

Alternatively, a country can choose to initially identify a limited number of actions which are relatively easy to implement and/or likely to contribute most to the protection of pollinators. A pragmatic 3-step process could then be followed:

1
ASSESS THE CURRENT SITUATION

A rapid assessment can be carried out of current measures that are in place to protect pollinators from pesticides: policies, regulations, projects, collaborations, public and private initiatives, specific activities, etc. Strong and weak points of these measures can be assessed and gaps identified.

2
IDENTIFY PRIORITY ACTIONS

On the basis of the situation analysis conducted under 1), priority actions that are most likely to reduce risks of pesticides to pollinators in the country can be identified. This is best done by consulting all relevant stakeholders, e.g. farmers, beekeepers, regulators, researchers, private sector, civil society groups, Indigenous Peoples, etc. A “top-3” set of priorities could, for instance, be identified for immediate action.

3
PLAN IMPLEMENTATION

Implementation of the priority actions can then be planned, by identifying key actors for all activities, selecting a lead actor for each of them, defining financial or legal requirements, and setting timelines for conducting the activities. A pragmatic mechanism to monitor progress will help to identify successes and constraints.

References

CBD. 2018. *Conservation and sustainable use of pollinators. Updated plan of action 2018-2030 for the international initiative on the conservation and sustainable use of pollinators*. Annex I to Decision 14/6 of the 14th meeting of the Conference of Parties to the Convention on Biological Diversity. Sharm El-Sheikh, Egypt, 17-29 November 2018. https://www.cbd.int/doc/decisions/cop-14/cop-14-dec-06-en.pdf

CGRFA. 2021. *Sustainable use and conservation of invertebrate pollinators, including honey* Item 11.1 of the Provisional Agenda. Eighteenth Regular Session, 27 September – 1 October 2021. Commission on Genetic Resources for Food and Agriculture (CGRFA), FAO, Rome, Italy.
https://www.fao.org/3/ng879en/ng879en.pdf

Dicks, L.V., Breeze, T.D., Ngo, H.T., Senapathi, D., An, J., Aizen, M.A., Basu, P., Buchori, D., Galetto, L., Garibaldi, L.A., Gemmill-Herren, B., Howlett, B.G., Imperatriz-Fonseca, V.L., Johnson, S.D., Kovács-Hostyánszki, A., Kwon, Y.J., Lattorff, H.M.G., Lungharwo, T., Seymour, C.L., Vanbergen, A.J. & Potts, S.G. 2021. A global-expert assessment of drivers and risks associated with pollinator decline. *Nature Ecology and Evolution,* 5: 1453–1461. https://doi.org/10.1038/s41559-021-01534-9

ESA. 2021. ESA Position Statement on Pollinator Health. *Annals of the Entomological Society of America,* 114(1): 93–95. doi: 10.1093/aesa/saaa031

FAO. 2021. *Review of existing legislation to protect pollinators from pesticides in selected countries.* Food and Agriculture Organization of the United Nations, Rome, Italy. [temporary link]

FAO. 2022. *Strengthening regulations to protect pollinators from pesticides: Experience from Tanzania.* Presentation made at the Global seminar on strengthening regulations to protect pollinators from pesticides, 23-24 February 2022. FAO, Rome.
https://www.fao.org/3/cb8855en/cb8855en.pdf

Gemmill-Herren, B., Garibaldi, L.A., Kremen, C., Ngo, H.T. 2021. Building effective policies to conserve pollinators: translating knowledge into policy. *Current Opinion in Insect Science,* 46: 64-71.
https://doi.org/10.1016/j.cois.2021.02.012

IPBES. 2016. *The assessment report of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services on pollinators, pollination and food production.* Potts, S.G., Imperatriz-Fonseca, V. L., and Ngo, H. T. (eds). Secretariat of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, Bonn, Germany. https://zenodo.org/record/3402857

Krahner, A., Alkassab, A.T., Jütte, T., Lüken, D.J., Wirtz, I.P. & Pistorius, J. 2022. *Review of approaches to the environmental risk assessment (ERA) for bees and other pollinators*. Institute for Bee Protection, Julius Kühn Institute (JKI) – Federal Research Centre for Cultivated Plants, Braunschweig, Germany.
https://www.openagrar.de/receive/openagrar_mods_00077352

Vanbergen, A.J. 2021. A cocktail of pressures imperils bee. *Nature*, 596: 351-352.
https://doi.org/10.1038/d41586-021-02079-4

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CC0170EN/1/05.22