

Crop pollination by wild and managed insects: Why diversity matters

A diverse and abundant pollinator community is needed to maintain stable and high quality crop yields, as well as maintaining healthy and diverse wild ecosystems.



**Living With Environmental Change
Policy and Practice Notes**

Note No. 19 – Insect Pollinators Initiative
August 2015

The Living With Environmental Change Partnership brings together 22 public sector organisations that fund, carry out and use environmental research and observations. They include the UK research councils, government departments with environmental responsibilities, devolved administrations and government agencies. The private sector is represented by a Business Advisory Board.

Pollination is the movement of pollen between the male (anthers) and female (stigma) parts of flowers and is essential for successful crop production and wild plant reproduction. The majority of plant species rely on flower-visiting insects for this pollination. Insect pollinators include wild bees, flies, butterflies and beetles, but managed honeybees also play an important role. Abundant and diverse pollinator communities are essential for maintaining healthy ecosystems, stable crop production, and to ensure effective pollination services in the face of continued land use and climate change.

Why are pollinators important?

- Insect pollinators are important for crop production, maintaining and improving the yield and quality of many fruit and vegetable crops worldwide, including the apples, strawberries, raspberries, cherries, beans and oilseed rape grown in the UK.
- Crop pollination by insects is worth at least £630M (2012 figures) annually to the UK agricultural industry and our reliance on these crop pollination services is growing with increasing demand for fruit and biofuel crops.
- Globally, about 78% of temperate wild flowering plant species rely fully or partly on insect pollinators for reproduction. Pollinator declines would threaten the long-term existence of these plant species and other animal species which depend upon them for food and shelter.
- Pollinators and the flowers they pollinate have an intrinsic value to society and contribute to the richness of life on Earth. Some pollinator species, including many butterflies and bumblebees, are iconic and have a prominent place in the public consciousness, as do some wildflowers including national emblems such as the Scottish thistle.
- Honeybees also provide additional benefits including honey and other hive products (eg wax). Keeping honeybees is a widely practised hobby and the British Beekeepers Association has more than 24,000 members. A small number of commercial beekeepers have large numbers of hives from which they earn their livelihoods through selling pollination services and honey.

What part do honeybees play in pollination?

Honeybees are an important economic and iconic species:

- In the UK, there is a single species of honeybee, *Apis mellifera*, which is primarily managed for products including honey and beeswax, but also for the pollination service they provide. Honeybees in the UK are managed; wild populations or escaped feral colonies struggle to persist due to disease impacts.
- Honeybees can be abundant and effective pollinators of some crops, including apples and oilseed rape, improving crop yield and quality.
- Although the honeybee remains an important pollinator, the number of managed honeybees has declined significantly in the UK since the mid 1980s. In England alone the number of honeybee hives fell by 54% between 1985 and 2005, although a recent upsurge in the number of beekeepers is encouraging.
- In the UK there are currently only about a quarter of the honeybee colonies needed to pollinate our insect-dependent crops. This is due to increasing demand for insect-pollinated crops and declining honeybee numbers.

Why is it important to maintain diverse pollinator populations?

Pollinator diversity is needed because:

- Different crops are pollinated by different insects and so many pollinator species are needed to meet the demands of the variety of crops that we grow. For example, beans rely on wild bumblebees for high yields, while good apple pollination depends on certain solitary bee species. Furthermore, some crops, such as tomatoes and peppers, require a specialist behaviour called “buzz pollination” which bumblebees and some solitary bees are capable of, but which honeybees are unable to carry out.
- Some wild plant species are dependent on one, or a few rare, species of pollinator. Parallel declines in pollinators and the plant species they visit have been recorded, so there is a risk this may continue and lead to wider ecological changes.
- While honeybees can be effective pollinators of certain crops, it is dangerous to rely on this single pollinator species, which is vulnerable to pests and diseases, and whose numbers and availability are influenced by socio-economic factors affecting beekeeping.
- Diversity ensures good pollination of many different crops and wild plants in variable weather conditions and across different landscapes. A diverse pollinator community provides “insurance” against pollination failure from one year to the next. For instance, should a pollinating species be lost locally due to extreme weather or habitat loss, then a diverse community is more likely to have another similar species available to fill the gap.
- Due to our changing environment and market forces, the types of crops that we grow is continually changing. It is important we have diverse and abundant pollinator populations in the UK so the future demands for pollination of these new crops can be met.

What are the pressures on pollinator diversity?

Pollinators are under threat from multiple pressures and as a result the diversity of pollinators is declining:

- Modern agriculture practices have significantly changed the landscape which is now dominated by cropped and grazed land with few areas of natural habitat. Only a minority of pollinator species are able to thrive in this landscape.
- Agricultural intensification and the use of agrochemicals can have negative effects on many different pollinator species and reduce the availability of wild plants on which diverse pollinator communities rely.
- Socio-economic factors, as well as pests and diseases, mean the number of honeybees in the UK has declined, so there are fewer available to provide crop and wildflower pollination.
- Natural habitats like low input grassland, heathland and ancient woodland provide essential food and shelter for a range of pollinators and these have declined significantly over the last century.
- There is a lack of monitoring and information about changing species diversity and abundance and about how pollinators are responding to multiple pressures.

What actions do policymakers and land managers need to take?

To support a diverse pollinator population for crop production and healthy wild ecosystems:

- Habitats for pollinators should be protected through designation of nature reserves and other protected areas, and management plans should consider practices to help support pollinators.
 - Agri-environment schemes to incentivise management practices, such as provision of wildflower field margins and reduced hedgerow cutting which can help boost pollinator populations, should continue to be funded, while being monitored, refined and targeted to improve their effectiveness.
 - Farmers need support to be less reliant on the use of chemical controls, and should continue to be encouraged to practise integrated pest management through farmer advice and extension services.
- Support and advice should be provided to farmers through beekeeper and farmer organisations, so they can better access honeybee pollination services, particularly in situations where wild pollinators may be lacking, and beekeepers should be appropriately remunerated for the services they provide.
 - Local and national planning authorities should be provided with clear guidance on how to implement Green Infrastructure in order to enhance the quality of the built landscape for pollinators.
 - Government support for a systematic pollinator monitoring scheme is needed to effectively detect any declines in pollinator abundance and diversity so appropriate actions can be taken.

Further information

This policy and practice note was written by Michael Garratt, Simon Potts and Adam Vanbergen and draws on research carried out by the “Sustainable pollination services for UK crops” project as part of the Insect Pollinators Initiative.

Useful resources:

Sustainable Pollination Services for UK Crops: www.crop-pollination.co.uk
Status and Trends of European Pollinators: www.step-project.net
The Wildlife Trusts: www.wildlifetrusts.org/bees-needs
Natural England Environmental Stewardship funding information: www.gov.uk/environmental-stewardship
Insect Pollinators Initiative: <https://wiki.ceh.ac.uk/display/ukipi/home>
Bees Wasps and Ants Recording Society: www.bwars.com
National Bee Unit: www.nationalbeeunit.com
British Beekeepers Association: www.bbka.org.uk
Bee Farmers Association: www.beefarmers.co.uk
European Commission Red List of Bees: <http://ec.europa.eu/environment/nature/conservation/species/redlist/bees/status.htm>

European Commission “What is Green Infrastructure?”: ec.europa.eu/environment/nature/ecosystems/index_en.htm
What is causing the decline in pollinating insects? LWEC Policy and Practice Note No 9: www.lwec.org.uk/sites/default/files/attachments_biblio/15742%20LWEC%20PP%20Note%2009_web.pdf
The benefits of managing pollinators for crop production LWEC Policy and Practice Note No 13: www.lwec.org.uk/sites/default/files/attachments_biblio/LWEC_PPNote13_WEB.pdf
Protecting insect pollinators from pesticide risk LWEC Policy and Practice Note No16: www.lwec.org.uk/sites/default/files/attachments_biblio/LWEC%20PP%20Note%2016_WEB_0.pdf
How are pests and diseases affecting pollinating insects? LWEC Policy and Practice Note No 17: www.lwec.org.uk/sites/default/files/attachments_biblio/LWEC%20PP%20Note%2017_WEB.pdf
Contact: Michael Garratt, email: m.p.garratt@reading.ac.uk
Series editor: Anne Liddon, Newcastle University
Series coordinator: Jeremy Phillipson, Newcastle University