RuSource
the rural information network

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Briefing 1327

Pollinators and agriculture

Summary

The honey bee is the primary pollinator for fruit crops; however solitary bees, bumble bees and other insects are also important. Most farm crops are wind- or self pollinated but oilseed rape yields can be increased by up to 30% by pollination. Arguments that there is a 'pollination crisis' are drawn from extrapolating local and temporary pollinator declines. Nevertheless there is an overall European decline in pollinator populations though some species have strong and growing populations. Conservation measures should not only be driven by the attention afforded to more popular species, in particular those belonging to the bird and attractive animal classes.

This briefing is taken from the European Crop Protection Association publication *'Pollinators and Agriculture'* which can be accessed at:
http://www.ecpa.eu/files/attachments/pollinators_013_final_LQ.pdf

The benefits of biotic pollination for agriculture

The most produced crops (Table 1) in Europe show a high diversity in pollination requirements. Cereal crops such as wheat, rice, and corn are either wind or self-pollinated, they do not require insect pollination. Crops such as potato, sugar beet, spinach and onions do not require pollination.
Insect pollination can increase yields in cherry and plum crops by 80% and 30% respectively. The honey bee is the primary pollinator for these fruit crops; however solitary bees, bumble bees and other insects are also important contributors. Oilseed rape yields are increased by up to 30% by pollination.

Table 1 Agricultural production of the most prominent staple crops in the European Union, 2008[5]

Crop	1,000s of tons	Reliance on biotic pollination
Cereals	313,759	not required
Sugar beet	97,299	not required
Potatoes	61,614	not required
Fruit	50,271	essential
Vegetables	45,161	partial
Rape	18,936	improves yield

The benefits of agriculture for pollinators

The growth of agriculture in Europe has provided a patchwork of 'cultural' (diverse and multifunctional) habitats, offering a variety of sources of pollen, and including open spaces such as meadows and field boundaries where wild flowers and other non-crop vegetation thrive. Cultural landscapes also offer plentiful options for nesting and breeding space.

Is there a pollination crisis?

To determine the existence or extent of a 'pollination crisis' there are many questions to answer, for example:

- How many pollinating insects are required to maintain a crop, wild plant society, habitat, or landscape?
- Which pollinator species are required; honey bees and / or other hymenopterans, and / or other insects?
- To what extent can one pollinator species fulfil the pollination role of another?
- Are negative trends in pollinator populations exhibited in all pollinator species?
- Are population trends the same for both wild (e.g. butterflies) and farmed (e.g. honey bee) pollinators?

The complexity of the issue, and the relatively recent interest it means that reliable data is scarce, and a grasp of the 'complete picture' currently escapes us.

Those who support the pollinator crisis hypothesis warn of future large-scale losses of agricultural productivity due to the decline of pollination services. In most cases these conclusions are drawn from extrapolating pollinator declines observed at local level and exhibiting only temporary impact.
Many do not support the pollinator crisis hypothesis but recognise the importance of pollination services and biodiversity, support continued research and monitoring so that any problems can be verified and appropriate mitigation can be devised.

Nevertheless there is strong evidence of an overall European decline in pollinator populations and individual pollinator insects. Nearly one third of Europe's 435 butterfly species are reported to be in decline; however some pollinator species are exhibiting strong and growing populations.

Ways forward

Pollinators face a diversity of challenges and opportunities in European agricultural landscapes; species can thrive in one area and struggle to survive in another but agriculture can continue to implement and improve measures which protect and enhance pollinator populations.

The honey bee

The parasitic *Varroa* mite remains the main cause of colony health problems, and it is generally accepted that more could be done to control the impact of the mite on European bee hives. There are already several tools at the disposal of beekeepers, such as synthetic and natural chemical treatments, including modern application technologies where developments are ongoing. The physical removal of heavily infested (often drone) cells is a common intervention.

The basis of all of these measures is a precise monitoring of the *Varroa* infestation rate by the beekeepers. However, the ideal solution would be the identification and successful breeding of a *Varroa* resistant honey bee.

The mutual benefits brought by bees to beekeepers and farmers should be incentive for cooperation. Beekeepers often move their hives during the seasons to improve honey bee access to forage. Cooperation with farmers can make this process more efficient if beekeepers are alerted to crop flowering regimes and, for instance, given permission to use access roads and set aside land.

Other pollinators

All adult pollinators depend on flowers, but most of them require additional habitats during the larval stage; quite often relying on a very select group of plant species as forage or on specific habitat elements. Habitat conservation programmes could be more considerate of the needs of pollinator species, and promote flower strips, perennial and annual plants and an agricultural landscape that accommodates a suitable green infrastructure. Conservation measures should not only be driven by the attention afforded to more popular species, in particular those belonging to the bird and attractive

animal classes. Given the importance of pollination for agriculture, diversifying the suite of crop pollinating species has been proposed as an appropriate management response.

Agricultural practices

There are several options to improve conditions for pollinators, most of which including:

- Flower rich meadows
- Orchards
- Managed grassland with fruit trees
- Fallow land and green cover
- Hedges
- Flowering crops such as rape and sunflower fields
- Field margins and buffer strips

Protecting soil with cover crops can improve the quality of the soil and also produce flowers for pollinators.

Some insecticides are the subject of special use instructions because of known effects on honey bees when used incorrectly.

More land for flowers

Areas like waysides, railroad and highway embankments, set-aside, areas of different kinds near roads and bicycle paths, and field strips within agricultural land all provide potential space for flowers and habitats of value to pollinators.

Technical innovations

Modern pesticide application technologies reduce spray drift; this helps prevent pesticide residues in non-target areas. Seed treatment technologies can also be applied. Seeds treated with the active ingredient can be planted using special seed drills with deflectors, which minimises dust during planting. Seed treatments provide an environmental benefit by reducing the need for spraying during crop growth.

Alan Spedding, 17 July 2011

RuSource briefings provide concise information on current farming and rural issues for rural professionals. They are circulated weekly by email and produced by Alan Spedding in association with the Arthur Rank Centre, the national focus for the rural church. Previous briefings can be accessed on the Arthur Rank Centre website at http://www.arthurrankcentre.org.uk/projects/rusource_briefings/index.html

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