Halting Insect Pollinator Declines

Thursday 12th December, 2.00-4.00pm.

Attlee Suit, Portcullis House.

Pollinating insects are in decline globally, due to multiple and interacting pressures, such as habitat loss, pests and disease, agricultural practices and climate change. The pollination services they provide are important for the functioning of our ecosystems and food security, estimated to be worth £513 million to UK agriculture in 2009. Pollination in the UK is undertaken by a wide variety of insect species, such as bees, hoverflies, flies, beetles, butterflies and moths. In July 2013, the English Government announced it was to develop a national pollinator strategy and the Welsh government released its Pollinator Action Plan, both with the aim of protecting pollinating insects and the services they provide.

Action to reverse pollinator declines requires both an understanding of trends in the populations of different types of insects and the factors driving these trends. This seminar reviewed the threats facing insect pollinators and recent research on the subject, identifying important gaps in knowledge and exploring the strategies available to reverse declines. POST held this seminar to allow parliamentarians to discuss with experts the evidence of for insect pollinator decline and their causes, and the current options for reversing this decline. The seminar was chaired by **Sarah Newton MP for Truro and Falmouth** and attendees heard presentations from four speakers:

Dr Lynn Dicks, Research Associate and NERC Knowledge Exchange Fellow, Cambridge University.

Professor Bill Kunin, Professor of Ecology, Leeds University.

Matt Shardlow, Chief Executive, Buglife, The Invertebrate Conservation Trust

Simon Potts, Professor of Biodiversity and Ecosystems Services, Reading University – DEFRA's Pollinator External Expert Group.

Slides and audio from each presentation are available on the POST website at http://www.parliament.uk/mps-lords-and-offices/offices/bicameral/post/post-events/halting-insect-pollinator-decline/. Summaries of each talk are given below.

Dr Lynn Dicks, Research Associate and NERC Knowledge Exchange Fellow, Cambridge University.

A variety of wild insects act as pollinators, but their general order of importance is; solitary bees, bumble bees, hoverflies, other flies, beetles, wasps, butterflies and moths. However, importance will vary a lot with location and time of year. The first evidence of pollinator decline in the UK was reductions in the distribution of many bumblebee species. Subsequently evidence for declines has been found for solitary bees, hoverflies, moths, butterflies and managed honeybee colonies across Europe. In general, where we have data on the number of pollinator species in a region we see declines.

There is increasing evidence that wild pollinator species are important for crop production, and different crops are dependent on pollinators to different extents. Oil seed rape yield is 25% dependent, apples are 40-90% and kiwis more than 90%. A global study found that there was a increase in fruit set for crops with an increase in the number of insect visitors, but this effect was stronger for wild pollinators that for honeybees.

Dr Dicks' Pollinator Conservation Delivery Group, as part of the UK Insect Pollinator Initative, has used stakeholder workshops involving academics, government agencies, business, NGO and farmer to identify priorities for pollinator research. This has generated a list of 35 priorities for pollinator research and policy, including identifying how important the diversity of wild pollinators to pollination services. Natural England is also developing a new, science based, agri-environment scheme package for pollinators.

Professor Bill Kunin, Professor of Ecology, Leeds University.

Research into pollinator declines is complicated due to both the diversity of pollinating insect species and the numerous factors that may be contributing to their decline; for instance pest and disease, pesticides, loss of floral resources and climate change. Changes in several factors relating to pollinators need to be quantified – their abundance (numbers of individuals of a species), the diversity of species and the pollination services they provide (how effectively do different insects pollinate plants).

In 2009, the £10m UK the Insect Pollinator Initiative (IPI) was launched, funded by various organisations and composed of 9 research projects. Projects have a mixture of foci, from the honeybee to a spectrum of wild pollinators, and from single to multiple pressures faced by pollinating insects. In a year's time, a lot of studies will start being published, but some have already come through. These suggest that neonicotinoids can have important sublethal effects, such as disrupting foraging ability and that combined exposure to a neonicotinoic and pyrethroid pesticides causes more negative impacts than exposure to one alone. In honeybees, the gut parasite Nosema increases likelihood of death, but the black wing virus alone has no effect. However, when honey bees are exposed to both the effect is much worse than either alone. Exposure to a neonicotinoid at a non-lethal dose is also worse when combined with either disease. These results all highlight the need for research into how different pressures on pollinators are interacting.

Another IPI project, Agriland, has selected 96 focal sites around the country – chosen to differ in complexity for various factors, such as habitat availability and pesticide usage. Preliminary data collected for solitary bee nests show that a diversity of habitats is beneficial, and honeybee keeping in the area also seems to have a positive effect. The presence of pesticides did not effect the colonisation of nests, but higher mortality among bee larvae was found in landscape where pesticides are used.

There is an urgent need for effective and systematic monitoring of pollinators, as all the evidence we have on pollinator declines and changes in their diversity come from data that were not collected for these purposes, but rather as part of other monitoring schemes. Though this data has proved invaluable, for the majority it tells us little about two important aspects of pollinator populations – how species are changing in abundance and how pollination services are changing.

Matt Shardlow, CEO of Buglife

Wild invertebrates are important for the UK crops, and are equally important abroad. A widely quoted statistic is that one in every three mouthfuls of the food we eat depends on pollinators. Ninety percent of the worlds crop species depend on pollinators, and pollination services are worth

£510m per annum in the UK (30% of UK agricultural services). UK landscapes and habitats are also dependent on pollinators, and pollinator and plant relationships are complex.

The more species of pollinators we lose over time, the less reliable pollination services become. There have been declines in both the number of species and abundance of pollinators; the recently published 'State of Nature' report concluded that greater than 60% of pollinator species are in decline. Such declines will eventually leads to species becoming threatened with extinction, and 250 species of pollinator are currently on the UK Biodiversity Action Plan list. In Europe, insect pollinated plants are already declining faster than wind and water pollinated.

Environments could be managed more effectively for pollinators, for instance, local council could stop cutting roadside verges (which would also save money) and manage parks to be pollinator friendly. Brownfield sites can also act as "reservoirs for pollinators in the countryside" and this could be integrated this into planning legislation. Buglife has conceived the 'B-lines' project, after considering the conclusions of the Lawton report that landscapes need to be connected and evidence that wildflower grassland should be targeted into a linear areas to "enable much better flow of biological material through the countryside". B-lines envisages a network of lines of wildflower habitats, roughly speaking – 300m wide, and around 500km of them across the countryside. With funding from the Co-op, a pilot project has been launched, involving local authorities and Natural England. 10 farmers on these B-lines have started delivering wildflower habitats.

In 2009, Buglife produced a report on the dangers of neonicotinoid pesticides to insects. There is now more scientific evidence for their impacts; for instance, research from Holland and the Environmnet Agency of water contamination. 94% of published studies show higher environmental risk than tests done for pesticide companies and research published so far indicate that there is higher risk to solitary bees and bumblebees. The House of Commons Environmental Audit Committee decided that current risk assessments conducted by industry are not fit for purpose, as they are not transparent nor statistically robust enough.

Simon Potts, Professor of Biodiversity and Ecosystems Services, Reading University – DEFRA's Pollinator External Expert Group

There are clearly reported declines in pollinators in the UK; the number of honey bee colonies halved between 1985 and 2005 and for other insect pollinators in half the places we have data there has been a decline in species since the 1980s. Some of the most sensistive species have already been lost, leading to areas becoming more similar in the species they have present (homogenised). There is a huge amount of convincing evidence that habitat loss, fragmentation and degradation have caused declines, and pathogens are clearly important for honey bee losses, with data suggesting they may also be important for wild pollinators. Agrochemicals such as insecticides, but also herbicides, are also a problem. Climate change is causing shifts in when and where pollinators are found, with some species benefiting but others losing out. Invasive plants may be drawing pollinators away for native plants and invasive predators such as the Asian Hornet could also present a threat. Interactions between different of pressures is an emerging major concern, with pairs and triplets of drivers acting on pollinators at the same time. There are mitigation options; for example,

agri-environment schemes can work incredibly well for abundance and diversity, but we don't know if this translates into sustained effects on populations. There are many tools we could use to benefit pollinators in landscapes– urban planning, road verges, amenity grassland management and railway verges.

Defra's pollinator expert group has been set up to support, advise and challenge it's chief scientific adviser. This group is currently identifying gaps in knowledge, finding crucial research questions and building a strategy to gather evidence to fill these gaps. They are also developing a landscape scale study to look at the effects of neonicotinoids. To support the development of a National Pollinator Strategy, the group has reviewed current knowledge on the status and trends of pollinators in England.

The Government's National Pollinators Strategy aims to develop a vision for England 10 plus years into the future, by identifying key actions which will then be convened and co-ordinated by multiple stakeholders. A set of performance indicators, both biological and economic, are also being devised with which to assess the effectiveness of these actions. An evidence policy workshop for stakeholders to get involved will also be organised to feed into a draft strategy, which will be open for contributions in October, to be published in April 2014.

To reverse pollinator declines we need to understand much better the status and trends of decline for particular taxa and how this varies geographically. We also need to better understand the economic and biodiversity impacts, and how multiple drivers are interacting. Mitigation/ adaptation strategies will also involve improving management and the protection of honey bees and other managed pollinator, but the key question is how we draw this all together into a cohesive strategies.

For Neonicotinoids there is currently no consensus what lethal and sublethal impacts are occurring at a landscape scale. This needs an independent and rigorous study, and the pollinator expert group currently have developed a framework for how this could be done. A systematic review of neonicotinoids is also being carried out. The study would focus on oil seed rape (OSR), as this is the crop that most neonicotinoids are applied to in England. A "business as usual" treatment of seed coating OSR will be compared against no insecticide control and a second control, using what would be the choice substitution being used by farmers. Such a study will need a lot of replication and, as pollinators are very mobile, a large amount of separation will be needed between replicates. Most likely the study will require round 8-10 triplets of sites, will need to last 3-5 years and needs to cover typical UK landscapes. Its implementation will, however, be complicated by the EU moratorium on neonicotinoids. There are two options as to what the study could monitor ; 1) Use standardised introduced pollinators and them through time – making sure metrics are same as EFSA. 2) Sampling wild pollinators, as well as non-pollinators and pest species. Pollinator services also need to be monitored, by measuring crop yields and crop quality. Finally, other agriculture inputs will need to regulated and quantified. Overall understanding of the full costs and benefits of these different treatments is needed.

Discussion

The Government's response to Environmental Audit Committees conclusion was raised, particularly its rejection of monitoring of pesticides and it was asked whether the new pollinator strategy will involve more monitoring.

Professor Kunin pointed out that although the Governments position was that Britain has some of the best data for wild bee populations in the world, this data is still haphazard and biased and suggested it would not take much effort to make monitoring more systematic.

The question of how much of a problem the EU moratorium on three neonicotinoids would present to the implementation of a large scale field experiment on the effects of neonicotinoids was raised, as their application is prohibited under the ban, but necessary for an experiment to be conducted.