



‘PROFIT THROUGH POLLINATION’ – A DEMONSTRATION FARM PROJECT

SUMMARY

This two-year project engaged farmers in the North East of Scotland with the benefits of pollinators, increased and shared knowledge and raised confidence in trying new approaches and decision making. Preliminary results suggest that improving pollinator habitats can increase populations, A preliminary report of the findings is attached to this document.

RATIONALE

Insects play a vital role in farming: pollinating insects are vital for the yield of many economically important crops (including oilseed rape, soft fruit, and beans); and beneficial insects can decrease crop pest numbers. Recent research indicates that improving habitat for pollinators can enhance yields, with one study showing an 8% increase in yield across the 7-year whole farm crop rotation. However, in the last few decades the number of insects has severely declined, with a recent study finding a greater than 75% reduction of flying insects in Germany.

The North East of Scotland is one of the most prominent areas of arable crop production in Scotland growing 15.5k ha wheat, 119k ha barley, 9.3k ha of oilseed rape, and 165 ha of soft fruit and orchards. The North East is the largest contiguous area of arable cropping North of Yorkshire, with agriculture and associated industries being an important part of the rural economy, supporting jobs in both primary production and in secondary added value processing.

Scottish farmers are currently facing the future support, trading, and regulation uncertainties associated with Brexit; as well as the impacts of a changing climate. This project will look at practical, regionally appropriate practices that farmers in Aberdeenshire can carry out to increase business resilience and provide reliable and locally appropriate information to make informed decisions.

PROJECT OUTLINE

Profit Through Pollination was a research and demonstration project which looked at insect populations and their effect on arable crop yields on a pair of farms in Aberdeenshire, during 2018 and 2019. The project has specifically focussed on pollinators and beneficial pest predator species. On one farm, insect-friendly habitats were created, while on the control farm no changes were made. Numbers of insects were monitored on each farm by researchers and support team from SRUC. Crop yields were also monitored, to explore whether increased insect populations had an impact on crop yield. This project has provided important data specific to Aberdeenshire, where flowering and

insect activity timings are different to the rest of the country. This data, and the other work of the project, will give farmers in Aberdeenshire relevant local information through facilitated knowledge exchange and demonstration events and promoted digital media.

SCHEDULE OF WORK

An extensive schedule of work was carried out over 2018 and 2019 to collect the required data

Site	2018	2019
Environmental improvement farm	<p>Sow wildflower mix into EFA Fallow and EFA buffer strips</p> <p>Alter management of EFA Fallow to optimise floristic diversity</p> <p>Plant willow trees (if selected)</p> <p>Monitor pollinator numbers and diversity in field margins and adjacent fields following the methodology as 2017</p> <p>Hold demonstration meeting on how farmers can monitor their own pollinator levels and the benefits that pollinators have on arable crops</p> <p>Record yield of all arable crops within the rotation using combine yield meter and weighbridge tickets from grain sales</p>	<p>Manage of EFA Fallow and buffer strips to optimise floristic diversity</p> <p>Monitor pollinator numbers and diversity using the same methodology as 2017</p> <p>Record yield of all arable crops within the rotation using combine yield metres and weighbridge tickets from grains sales</p> <p>Collate data from trial and produce a report with findings (to be completed in 2020)</p>
Control Farm	<p>Monitor pollinator numbers and diversity using the same methodology as 2017</p> <p>Record yield of all arable crops within the rotation using combine yield metres and weighbridge tickets from grains sales</p>	<p>Monitor pollinator numbers and diversity using the same methodology as 2017</p> <p>Record yield of all arable crops within the rotation using combine yield metres and weighbridge tickets from grains sales</p>

ACTIVITIES

- Habitat creation: wildflower seed and establishment costs, topping and removal costs*
Areas of insect-friendly habitats were established in field margins on the study farm; and demonstrated to other farmers and the public.
- A lead researcher's, and two research assistants', time and travel expenses*
This enabled qualified experts to monitor and assess the insect populations on the farms throughout the project.
- Dissemination: on-farm and digitally*
Dissemination was carried out in two ways: two on-farm demonstration meetings for local farmers; and through digital resources including video logs and online blogs which were promoted to those farmers unable to attend demonstration meetings due to time or geographical constraints. Promotion of the digital resources is still ongoing during 2020.



AIMS AND OBJECTIVES

The project aimed to explore the following points:

- Whether providing insect habitats on a farm in Aberdeenshire increases the abundance and diversity of pollinators and other beneficial insects
- Whether and how providing insect habitats on a farm in Aberdeenshire affects arable crop yield
- Which beneficial insects are found on two arable farms in Aberdeenshire

The data collected suggest that pollinator and predator populations **both increased** as a result of environmental improvement.



1. Providing an on farm-research site in the heart of the North East, enabling on the ground demonstration of research concepts and findings, from an Aberdeenshire farm to Aberdeenshire farmers.
2. Undertaking specific habitat improvement measures at the farm scale.
3. Enabling an SRUC researcher with the expertise required for this project to travel to, and undertake, surveying in the North East. This not only provided additional research locations to make the resultant data more robust, but also ensured that management recommendations generated from the research are directly applicable to the North East. Without funding, this research would have been carried out at different sites, generating results that are less relevant to Aberdeenshire farmers.

Providing additional dissemination of material to those who could not attend events due to being tied to a farm, or costs associated with leaving the farm. This means that the information gained from the project can impact more farming businesses; and may help enable and interest other farmers in the future to engage with research projects and events.

PROJECT OUTCOMES

During the project we engaged Aberdeenshire farmers with:

- The concept of ‘win-wins’: practices that benefit their businesses and the environment
- The practicalities of establishing and managing habitats on farms

PROJECT OUTPUTS

The project engaged with a wide range of people in the following ways:

- Two video logs that a wide range of farmers and land managers can access, detailing:
 1. How to manage habitats for pollinators and beneficial insects on their farmland (using an arable farm in Aberdeenshire as an example, providing specific advice for farmers in this region)
 - *Increasing Pollinators on Arable Farms Part 1: Habitats*
www.youtube.com/watch?v=-mjOgSov MM
 2. How to identify and monitor pollinators (engaging them with citizen science)
 - *Increasing Pollinators on Arable Farms Part 2: Monitoring*
www.youtube.com/watch?v=bsjC-dxHnug
- At least one on-farm demonstration meeting to highlight how insect habitats can be created and managed within arable farming systems in Aberdeenshire, with little change to the existing production system; and be done in a way that minimises cost and maximises benefit.
- A report on the research findings, arising from the three-year study. The attached report *Impact of Enhancing Environmental Performance on Wildlife and Ecosystem Services: A Pollinator Demonstration Farm*, details findings from the data that has been analysed to date (see Annex 3). Final analysis was due to be carried out in early 2020 but has been delayed by the impacts of Covid-19. A final version of the report is expected to be published later in 2020. Additional activity: The project has also contributed to a range of additional activity delivered by several organisations including SRUC and Farm Advisory Service (FAS), which is listed in Table 1 below.

TABLE 1: KNOWLEDGE EXCHANGE AND ADDITIONAL ACTIVITIES

Stakeholder	Activities
<p>Farmers, land managers</p>	<p><u>Practical guides</u></p> <ul style="list-style-type: none"> • Cole, LJ, McKnight, G. 2018. Practical Guide: Why and how to increase pollinators on your farm. FAS, Edinburgh. <p><u>Farm meetings</u></p> <ul style="list-style-type: none"> • Soil Association Scotland: Profit from Pollination, July 2018, Inverurie • Soil Association Scotland: Buzzing About Grassland, Summer 2018, various locations • Farm Advisory Service: IPM and beneficial insects, June 2018, Angus • SRUC-AHDB Cereals & Oilseeds Winter Agronomy Roadshow January 2018, Lauder, Scottish Borders, Scone Palace Park, Perth, Inverurie, Aberdeenshire, Old Perth Road, Inverness <p><u>Videos</u></p> <ul style="list-style-type: none"> • Soil Association Scotland: Increasing Pollinators on Arable Farms: Part 1 Habitats - www.youtube.com/watch?v=-mjOgSov_MM • Soil Association Scotland: Increasing Pollinators on Arable Farms: Part 2 Monitoring - www.youtube.com/watch?v=bsjC-dxHnug • Farm Advisory Service: Helping pollinators on your farm • Farm Advisory Service: The benefits of pollinators for oilseed rape <p><u>Blogs</u></p> <p>Soil Association Scotland: Measuring pollinators benefit on crop yields https://www.soilassociation.org/news/2017/april/18/a-bee-utiful-spring-day-measuring-pollinators-benefit-on-crop-yields/</p> <p>Soil Association Scotland: Profiting from Pollination https://www.soilassociation.org/our-work-in-scotland/scotland-news/2018/july/profitting-from-pollination/</p>
<p>Farmers, Researchers, Policymakers</p>	<p><u>Workshops</u></p> <ul style="list-style-type: none"> • SRUC: Sustainable Agriculture in Scotland: New Research Ideas. January 2018, Kings Building, Edinburgh • SRUC: Innovative Arable and Mixed Farming Systems for a Sustainable Future. October 2019, Oatridge, Midlothian
<p>Policymakers</p>	<ul style="list-style-type: none"> • Feedback Pollinator Strategy for Scotland: 2018 Progress Report • Feedback Pollinator Strategy for Scotland: 2019 Progress Report • Feedback SNH Terrestrial Invertebrate Strategy • Rural Policy Centre: Recommendations to ensure the CAP post-2020 supports insect pollinators (in preparation)
<p>Researchers</p>	<p><u>Publications</u></p> <ul style="list-style-type: none"> • Cole, L.J., et al. (2020). A critical analysis of the potential for EU Common Agricultural Policy measures to support wild pollinators on farmland. <i>Journal of Applied Ecology</i>. • Cole L., et al. (2019) Farmers and Beekeepers Can Work Together to Deliver Sustainable Pollination, <i>Beefarmer</i>, 12, 11-13. • Breeze, T. et al. (2019) Linking farmer and beekeeper preferences with ecological knowledge to improve crop pollination; <i>People and Nature</i> 1:562–572 • Cole et al. (2018). The potential for nitrogen-fixing crops to deliver foraging resources for insect pollinators, <i>Aspects of Applied Biology</i> 138, 109-114

Presentations

- Robertson & Cole The potential for nitrogen-fixing crops to deliver pollinator resources Advances in Legume Science and Practice (March 2018) Jurys Inn, Glasgow
- Super-B (March 2018) Kleijn et al. 2018 Factors affecting the implementation of measures mitigating pollination loss. (March 2018) Leiden, The Netherlands

IMPACT

Telling people about what we are doing is a key part of this project. Soil Association Scotland delivers knowledge transfer events across Scotland, and this project ensured additional activity in Aberdeenshire by providing relevant data collected from, and specific to, Aberdeenshire. The findings from the project, as well as the practicalities of carrying it out, have been shared with local farmers and other land managers to give a better understanding of how pollinators and beneficial insects can benefit arable crops in Aberdeenshire. Farming with Nature ran an on-site knowledge transfer events in 2018 and two satellite events to highlight how insects can be beneficial, how to identify farmland pollinators, how farmers can monitor their own fields for pollinators, and ways to increase pollinator habitat at minimum cost.

In addition to the farm events, funding enabled us to produce additional material to disseminate key findings for those unable to attend events. This was in the form of two video logs (vlogs), produced with SRUC, accessible by farmers and land managers online on computers, tablets, or smartphones. This will particularly target younger farmers (<41 years of age), who have a higher interaction rate with social media than their older counterparts. The grant award also allowed us to:

1. Hire a professional film maker for 1 day each year, who recorded footage using high quality sound and film equipment
2. Fund editing of the footage, with additional infographics and voiceovers to supporting the practical information corded in the fields

The vlogs have been promoted by both SRUC and Soil Association Scotland through e-newsletters, social media channels, and at events, as well as two written blogs about the project.

