Protecting Farmland Pollinators Annual Report

January 2021

Key achievements 2020

Many challenges faced the project in 2020 but despite these challenges, we managed to achieve a lot in a short space of time. We would like to take this opportunity to reflect on the exciting accomplishments of the year and to thank all those who have participated in and contributed to the project.

- For the first-time farmers have received a results-based payment depending on how pollinator-friendly their farm is.

- A whole farm pollinator score was calculated for each of the 40 participant farms. There was immense variation of pollinator points. The median score was 22,067 pollinator points (range 1,020 to 248,946).

- The payments were based on a whole farm pollinator score generated by assessing their existing value for pollinators.

- Pollinator-friendly habitat was identified on each of the 40 farms and farmers were given examples on how to increase their pollinator score for next year.

- Extensive insect and plant surveys were carried out to gather data to test whether farms that have higher scores have more pollinators (bees, hoverflies) and more biodiversity generally.

- This project will demonstrate how this scoring system could be rolled out on a national scale as an eco-scheme or other agri-environment programme.

- Participant tillage farmer Andrew Bergin gave an inspiring presentation at the Halting the Loss of Pollinators Conference, in Brussels.

- Over 300 bare soil solitary mining bee nesting sites were created by participant farmers and after just a couple of weeks, nests were occupied on 16 farms. Early results suggest that seven different species of solitary mining bee have set up home across the newly created nesting sites. If you build it, they will come!

- Participant farmers have also put up over 130 bee boxes for our cavity nesting bees. Four different cavity bee species are nesting in the newly created bee boxes.

- A Farm Family Newsletter was published in May 2020.

- We published six, monthly Newsletters to keep farmers up to date on the progress of the project.

- The project to date demonstrates that farmers have a huge interest in learning about biodiversity and want to know how to protect and enhance biodiversity on their farms while having a productive farming system. We hope to provide answers to this important question.

Background

The Protecting Farmland Pollinators Project is about small actions that will allow biodiversity to coexist within a productive farming system. We want to help encourage all farmers to provide small wildlife habitats for pollinators, in terms of food, safety, and shelter, on their farms.

Pollinators are important for a myriad of reasons. For growing insect-pollinated crops, fruits, and vegetables; for marketing our produce abroad; for the health of our environment; for their cultural significance and for the economy. Farmers recognise this importance, but farmland has experienced wide-scale loss of wild pollinators over the last 50 years. In Ireland, one third of our 98 wild bee species are threatened with extinction.

This project aims to work with farmers to develop a whole farm pollinator scoring system and identify what management practices on Irish farmland benefit pollinators. The whole farm pollinator score is based on the five criteria listed in Figure 1. This score will help farmers to understand how pollinator-friendly their farm is, and identify what simple, low-cost actions they can take to work towards improving their score in a way that does not negatively affect productivity.

This five-year project is working with a group of 40 farmers, across farm types (beef, dairy, mixed, and tillage) and intensities (high, medium, and low) in Co. Kildare and neighbouring counties.

It is built on evidence-based actions and a results-based payment model. Within the project, farmers receive an annual payment based on their overall farm pollinator score, which is calculated based on the quantity and quality of pollinator-friendly habitat on the farm - the higher the pollinator score of the farm, the more the farmer will be paid annually.

In taking action to protect pollinators, we start a chain reaction that has positive benefits for the general health of our environment, our mental health, and the wellbeing of future generations. We hope to enable all farmers to understand how pollinator-friendly (or not) their farm is, and what simple, low-cost actions they can take to work towards improving their whole farm for pollinators and other biodiversity in a measurable way that does not impact on productivity.

The Protecting Farmland Pollinators EIP project began in July 2019 and will run until the end of 2023.
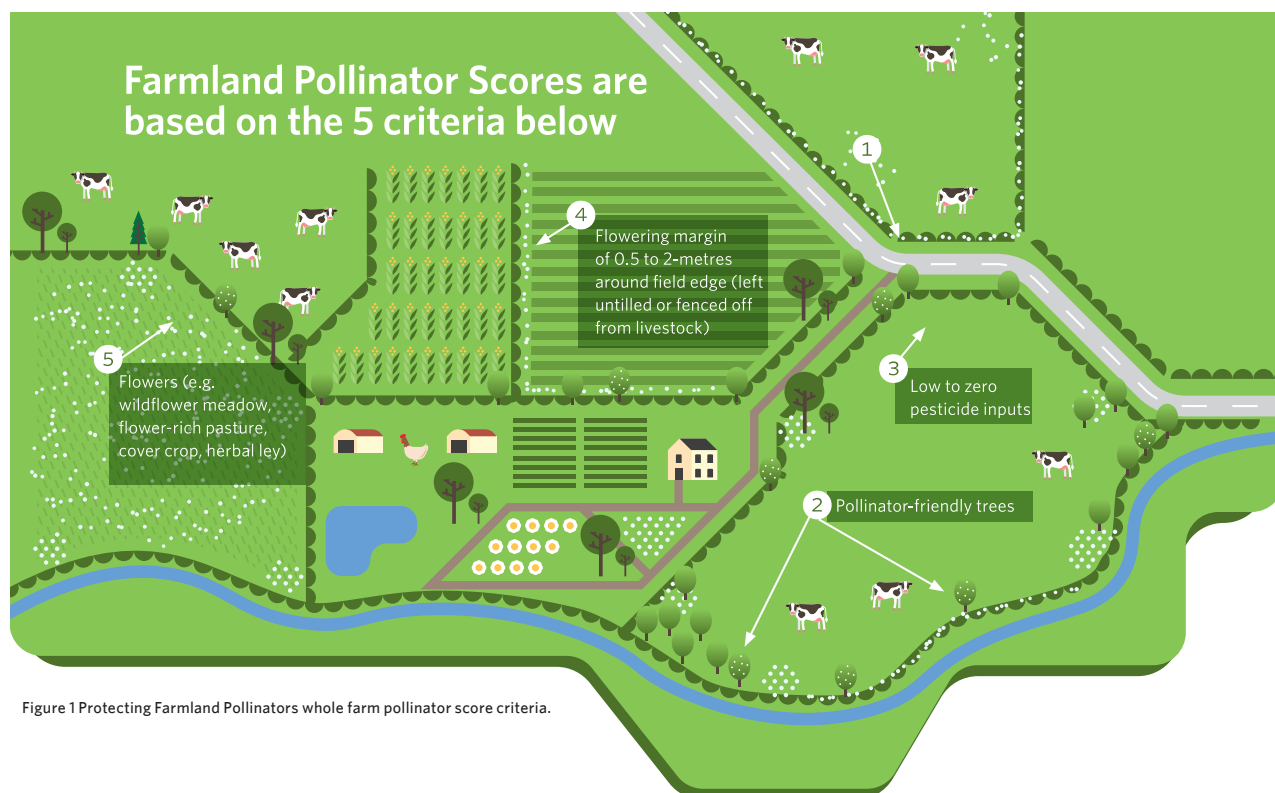

Farmland Pollinator Scores are based on the 5 criteria below

4 Flowering margin of 0.5 to 2-metres around field edge (left untilled or fenced off from livestock)

5 Flowers (e.g. wildflower meadow, flower-rich pasture, cover crop, herbal ley)

3 Low to zero pesticide inputs

2 Pollinator-friendly trees

Figure 1 Protecting Farmland Pollinators whole farm pollinator score criteria.

Who is working on the Project?

The Protecting Farmland Pollinators Project is co-ordinated by the National Biodiversity Data Centre. The Data Centre is the National Centre for the collection, collation, management, analysis, and dissemination of data on Ireland's Biodiversity. The project Manager (Dr Saorla Kavanagh) manages the day-to-day running of the project. Dr Úna Fitzpatrick is the project Co-Ordinator and Chair of the Operational Group. Both Úna and Saorla are employed by the National Biodiversity Data Centre. Paulina Furmaniak and Cathy Walsh are the Financial Managers for the project and are employed by Compass Informatics.

Dr Neus Rodriguez-Gasol, Niamh Phelan and Shannon O'Brien worked on the Ecological Survey Team for 6-months between March and August 2020.

The National Biodiversity Data Centre is an Initiative of the Heritage Council and is operated under a service level agreement by Compass Informatics. The Data Centre is funded by the Department of Culture, Heritage and the Gaeltacht, and the Heritage Council.

Protecting Farmland Pollinators is a European Innovation Partnership (EIP) project funded by the Department of Agriculture, Food, and the Marine (DAFM) under the Rural Development Programme 2014-2020. Aspects of the Project are subject to change in response to participant feedback and project monitoring.

Operational Group

The Operational Group consists of:

● The National Biodiversity Data Centre

● Five Champion Farmers

● Bord Bia

● Glanbia

● HEINEKEN Ireland

● Macra na Feirme

● Teagasc

● Trinity College Dublin

The group is locally led by the five Champion Farmers across types (beef, dairy, mixed and tillage). It has been put together to ensure scientific expertise in pollinator requirements, project design and data analyses (National Biodiversity Data Centre, Trinity College Dublin); farmer engagement and knowledge transfer (Teagasc, Macra na Feirme, Champion Farmers); and to advise on future practical recommendations with respect to agri-environment (Teagasc) and biodiversity/sustainability schemes from a commercial perspective (Bord Bia, Glanbia and HEINEKEN Ireland). The Operational Group is further supported by the 16-member steering group of the All-Ireland Pollinator Plan, which includes representatives from both The Department of Agriculture, Food and the Marine and the Department of Agriculture, Environment and Rural Affairs.

Figure 2 Participant farmers and their families at the Project launch on the 2nd March 2020. Also pictured are the Ecological Surveyors, Project Manager, and the Project Co-Ordinator.

Celebrating the launch of the project in March

Margaret Murray from the DAFM launched the Project on 2nd March in the Clonard Court Hotel, Athy. Approximately 90 people attended the event. The attendees included the participant farmers, their families (Figure 2), members of the Operational Group, the Ecological Survey Team, representatives from the DAFM, National Biodiversity Data Centre, All-Ireland Pollinator Plan (AIPP) Steering Group, Teagasc and the Irish Farmers Association as well as representatives from other regional and national stakeholder organisations.

What does the project aim to do?

This programme has four key objectives:

1. To test the effectiveness of a range of pollinator measures across different farm types in Ireland and to identify those that have most impact and that are most cost-effective.

2. To test the impact of these pollinator measures on broader biodiversity.

3. Based on the pollinator measures, to develop a simple farm-scale pollinator scoring system that uses a habitat matrix approach to quantify how pollinator-friendly the entire farm is.

4. To develop a simple results-based payment method that encourages and assists farmers in attempts to improve their whole farm pollinator score.

"To develop a simple results-based payment method that encourages and assists farmers in attempts to improve their whole farm pollinator score."

How does it work?

How does the results-based system work?

A results-based payment structure is used to score the 40 farms. Payment scales are linked to the whole farm Pollinator Score which depends on the farmer's management practices.

Within the overall score, each action is weighted relative to the others and then further refined by the quality of the resource using a range. For example, a high-quality hay meadow (i.e., higher plant diversity) will score more than a low-quality meadow (i.e., lower plant diversity).

Before the farmer can score his or her farm, they must create solitary bee nesting habitat for mining and cavity nesting solitary bees. Of the 99 bee species in Ireland, 77 are solitary bees. Solitary bees prefer to live alone (hence their name) instead of in the big colonies associated with honey and bumblebees. Solitary bees are harmless and not aggressive and are excellent pollinators. They nest in two main ways; mining bees burrow into the ground, while cavity nesting bees use existing holes in hollow stems, wood or stone walls.

The project manager in consultation with the farmer assessed the quantity and quality of each action on the scorecard and calculated an overall pollinator score for his or her farm. This score is linked to the payment structure. The more a farmer does, the more they will be rewarded i.e., the higher the Farm Pollinator Score the higher the farmer's annual monetary reward. The sum of farmer payments for the farming year 2019/2020 was €63,209.57. Next year, it is hoped that the farmer can complete the scorecard quickly without consultation with the project manager. The farmer will be required to fill in the approximate amount section on the scorecard for each of the actions he or she has taken in the farming year. An example of a scorecard can be seen in Table 1, page 10.

What kinds of actions are considered when generating the farm-scale pollinator score?

In the last year, farmers received pollinator points for providing food, shelter, and safety for pollinators under the following 18 headings:

1. Flowering hedgerow with a maximum cut once every 3-5 years with a 1.5-2m margin or understory fenced from grazing or untilled. **This is one of the most beneficial actions for pollinators on farmland.** For every metre of this hedgerow type on the farm the farmer receives 5 points. If you have 100 metres your points can range from 500-2500 points (€25-€125). The range depends on the number of different plant species within the hedge and margin (hedgerow quality).

Figure 3 Double hedge cut every 5 -7 years, fenced from livestock with a 2-3 metre understory. Photo credit: Mireille McCall

2. Flowering hedgerow cut once every 2-5 years with at least 0.5m margin fenced from grazing or untilled. By allowing a small margin next to your hedge you can double the number of food resources (flowers) available for pollinators.

3. Flowering hedgerow cut once every two years (no margin). Depending on the plant species within a hedge it may be more suitable to cut a hedge every two years. For example, if there is ash within a hedge a flail may not be suitable for a 3-year rotation cut. By cutting a hedge on a two-year rotation you will increase the number of flowers within the hedge. This is not the best option for pollinators, but it is an action worth taking.

4. Pollinator-friendly flowering trees (up to a maximum of 500). Trees can be stand alone or growing within a hedge. Trees provide food and shelter for pollinators. This action is measured by simply counting the number of trees on your farm. The following trees should not be included in the count: conifers / evergreen, ash, beech, and oak. If a hedge is overgrown and is now more of a treeline it is better to include the trees in the tree count as opposed to including them in action 5 below (Other pollinator-friendly field boundary).

Figure 4 Holly tree (*Ilex aquifolium*) growing within a hawthorn/ whitethorn (*Crataegus monogyna*) hedge with a 0.5 metre margin.

5. Other pollinator-friendly field boundary. This is a new action to the scorecard, and it incorporates several pollinator-friendly farm boundary features including buffer strips, untilled strips, road margins, road frontage, drains, and overgrown and unmanaged hedgerows. The margins must contain flowers but cannot be sprayed with herbicides. If a hedgerow has been left unmanaged / uncut it will be included in this action.

6. Native wildlife/hay meadow (maximum cut once a year or grazed once or twice a year). This is a particularly high scoring feature on the scorecard. A species rich pasture can be converted into a meadow by simply decreasing the grazing pressure. Depending on the number of native plant species within the meadow, and the management practices the pollinator points can range from 6,000 -30,000 for one hectare (equivalent to 300 - 1,500).

Figure 5 Native hey meadow.

7. Herbal ley ('Herbal' Grazing Ley) allowed to flower / sown wildflower area. This action and actions 8 and 9 are measured in hectares. Herbal leys are currently not common practice in Ireland. They are a mix of grass, legume, and herb seeds. They bring a range of benefits to livestock health, soil fertility and provide food for pollinators. Sown wildflower area is a sown mix of seeds that are not native Irish plant species. These plants do provide food resources for pollinators, but the points are not as high compared to sowing a native seed mix (Native wildlife/hay meadow).

8. Clover pasture / mixed species sward allowed to flower. Clover pasture can be made up of red or white clover and can only be included on the scorecard if the plants produce flowers. Mixed species swards are common in Ireland and can be beneficial to livestock health and soil fertility.

Figure 6 Clover pasture.

9. Bird Cover Crop / Poly-crop: Both bird cover and poly crop are a mixture of grain and wildflower seeds (usually non-native). Apart from providing a food source for pollinators and birds it can also provide cover on the land which reduces soil erosion and leaching.

10. Non-farmed areas (e.g., around gates, field margins, lanes, roads) unmanaged to allow grass and wildflowers to grow naturally. Once an un-farmed area is not sprayed with herbicides and produces flowers, it is included in the scorecard no matter how small the area.

Figure 7 Examples of pollinator-friendly non-farmed land.

11. Flowering pollinator-friendly catch or companion crop allowed to flower. Once a cover crop is sown mid-August, it will provide two weeks of flowers in September.

Figure 8 Flowers found growing in cover crops.

12. Eliminated herbicides, fungicides, and insecticides from whole farm.

13. Eliminated herbicides, fungicides, and insecticides from whole farm excluding livestock.

14. Eliminated insecticides and fungicides from tillage crops.

15. Eliminated insecticides from whole farm.

16. Eliminated herbicides from whole farm.

17. Herbicides used to spot spray noxious weeds (chickweed, ragwort, giant hogweed) as opposed to blanket spraying using a boom sprayer.

18. Herbicides used on crops and not used to "tidy-up" the farm.

Pollinator Score

An example of a Pollinator Score for a beef farm (Farm 4) dairy farm (Farm 10) mixed farm (Farm 35), and a tillage farm (Farm 2) can be found in the appendix (Tables 3-6). The maximum any farmer will be able to draw down in any year is limited to €4,000. The farmer is required to fill in the 'approximate amount' section (grey shaded area) on the scorecard (Table 1 example below), the Project Team then calculate the score based on the amount submitted by the farmer. Actions are weighted, so that those actions that are more beneficial to pollinators score more. Scores are also further adjusted for quality. The scoring system and associated weighting is under constant development and will slightly change annually as we move through the project and generate data that allow us to finetune the system. Farm maps showing the pollinator-friendly habitat on each of the 40 farms were created. The farm map associated with the scorecards in the appendix can be seen in Figures 9-11. Annually on-farm inspections will be conducted on at least 10% of the farms.

Table 1 Whole Farm Pollinator Scorecard – left blank for farmers entry.

	No.	Action	Units of Measurement	Approximate Amount
Food and Shelter	1	Flowering hedgerow max. cut once every 3-5 years with a 1.5-2m margin or understory fenced from grazing or untilled	meters	
	2	Flowering hedgerow cut once every 2-5 years with at least 0.5m margin fenced from grazing or untilled	meters	
	3	Flowering hedgerow cut once every two years (no margin)	meters	
	4	Other pollinator-friendly field boundary	meters	
	5	Pollinator-friendly flowering trees (up to max 500)	number of trees	
	6	Native wildlife/hay meadow (maximum cut or grazed once a year)	ha	
	7	Herbal ley allowed to flower / sown wildflower area	ha	
	8	Clover pasture / mixed species sward allowed to flower	ha	
	9	Bird cover / Poly-crop	ha	
	10	Non-farmed areas (e.g., around farmyard, lanes, roads) unmanaged to allow grass and wildflowers to grow naturally	m^2	
	11	Flowering pollinator-friendly catch, companion or cover crop allowed to flower	ha	
Safety	12	Eliminated herbicides, fungicides, and insecticides from whole farm	Yes or No	
	13	Eliminated herbicides, fungicides, and insecticides from whole farm excluding livestock	Yes or No	
	14	Eliminated insecticides and fungicides from tillage crops	Yes or No	
	15	Eliminated insecticides from whole farm	Yes or No	
	16	Eliminated herbicides from whole farm	Yes or No	
	17	Herbicides – spot spray only noxious and invasive plants (Chickweed, Ragwort, Giant Hogweed, and other invasive plants)	Yes or No	
	18	Herbicides - only used on crops and not used to "tidy-up" the farm	Yes or No	

Figure 9 Farm Map for farm 4 highlighting the Pollinator-friendly habitat on the farm. The farm boundary (red), other pollinator-friendly field boundary (green), hedge 3 (dark blue), non-farmed area (yellow), mixed species sward (pink), clover pasture (purple) and sown meadow (turquoise) are all highlighted. * Final scores are adjusted by weighting and quality assessment.

No.	Action	Units of Measurement	Approximate Amount	Final Score*	Monetary reward
3	Flowering hedgerow cut once every two years (no margin)	meters	87.6	328.50	€16.43
4	Other pollinator-friendly field boundary	meters	720.9	216.27	€10.81
5	Pollinator-friendly flowering trees (up to max 500)	number of trees	93	2325.00	€116.25
7	Herbal ley allowed to flower / sown wildflower area	ha	0.0199	79.60	€3.98
8	Clover pasture / mixed species sward allowed to flower	ha	12.14	14568.00	€728.40
10	Non-farmed areas (e.g., around farmyard, lanes, roads) unmanaged to allow grass and wildflowers to grow naturally	m²	3990	957.60	€47.88
16	Eliminated herbicides from whole farm	Yes or No	36.1	722.00	€36.10
			Total	19196.97*	€959.85

Figure 10 Farm Map for farm 43 highlighting the Pollinator-Friendly habitat on the farm. The farm boundary (red), hedge 3 (dark blue), other pollinator-friendly field boundary (green) and clover pasture (purple) * Final scores are adjusted by weighting and quality assessment.

No.	Action	Units of Measurement	Approximate Amount	Final Score*	Monetary reward
3	Flowering hedgerow cut once every two years (no margin)	meters	2330.2	8738.25	€436.91
4	Other pollinator-friendly field boundary	meters	1019.7	305.91	€15.30
5	Pollinator-friendly flowering trees (up to max 500)	number of trees	250	5000.00	€250.00
7	Herbal ley allowed to flower / sown wildflower area	ha	0.00159	2.54	€0.13
8	Clover pasture / mixed species sward allowed to flower	ha	7.82	6256.00	€312.80
16	Eliminated herbicides from whole farm	Yes or No	76.6	1532.00	€76.60
			Score	21834.70	€1,091.74

Figure 11 Farm Map for farm 35 highlighting the Pollinator-Friendly habitat on the farm. The farm boundary (red), pollinator-friendly field margin (green), the clover pasture (purple), mixed species sward (pink), herbal ley (turquoise), native meadow (peach), non-farmed area (yellow) and cover crop (orange) are all highlighted. * Final scores are adjusted by weighting and quality assessment.

Legend:
- Other pollinator-friendly field boundary
- Clover pasture
- Mixed species swards
- Herbal ley
- Native meadow
- Non-farmed areas
- Cover crop
- Farm boundary 93.5 ha

No.	Action	Units of Measurement	Approximate Amount	Final Score*	Monetary reward
4	Other pollinator-friendly field boundary	meters	504	151.20	€7.56
5	Pollinator-friendly flowering trees (up to max 500)	number of trees	250	6250.00	€312.50
6	Native wildlife/hay meadow (maximum cut or grazed once a year)	ha	0.26	3120.00	€156.00
7	Herbal ley allowed to flower / sown wildflower area	ha	1.96	4704.00	€235.00
8	Clover pasture / mixed species sward allowed to flower	ha	26.62	21296.00	€1,064.80
10	Non-farmed areas (e.g., around farmyard, lanes, roads) unmanaged to allow grass and wildflowers to grow naturally	m²	8092.3	1942.15	€97.11
11	Flowering pollinator-friendly catch, companion or cover crop allowed to flower	ha	8.11	3244.00	€162.20
			Total	**40707.35***	**€2,035.37**

Legend:
- Hedge 2
- Hedge 3
- Non-farmed areas
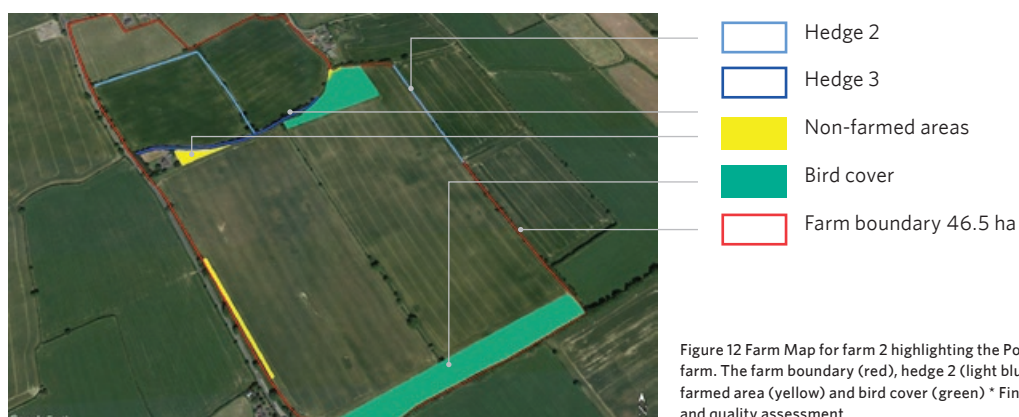- Bird cover
- Farm boundary 46.5 ha

Figure 12 Farm Map for farm 2 highlighting the Pollinator-Friendly habitat on the farm. The farm boundary (red), hedge 2 (light blue), hedge 3 (dark blue), non-farmed area (yellow) and bird cover (green) * Final scores are adjusted by weighting and quality assessment.

No.	Action	Units of Measurement	Approximate Amount	Final Score*	Monetary reward
2	Flowering hedgerow cut once every 2-5 years with at least 0.5m margin fenced from grazing or untilled	meters	765	1912.50	€286.88
3	Flowering hedgerow cut once every two years (no margin)	meters	394	1477.50	€73.88
5	Pollinator-friendly flowering trees (up to max 500)	number of trees	120	3000.00	€150.00
9	Bird cover / Poly-crop	ha	3	4800.00	€240.00
10	Non-farmed areas (e.g., around farmyard, lanes, roads) unmanaged to allow grass and wildflowers to grow naturally	m²	2527	606.48	€30.32
15	Eliminated insecticides from whole farm	Yes or No	46.5	2325.00	€116.25
			Score	**17946.48***	**€897.32**
			Score minus GLAS	**13146.48***	**€657.32**

Results to date

Farm Scores

The whole farm pollinator scores for the 2019-2020 farming year (year one of the results-based payments), ranged from 1,020 pollinator points to 248,946 pollinator points (Median = 22,067 ± 49,292 standard deviation). The scoring system has worked and is showing the expected range for the pilot group of 40 farms that were chosen to reflect differing farm types and intensities. The distribution of farm scores across the four farm types (beef, dairy, mixed, and tillage) can be seen in Figures 13 and 14

Figure 13 shows the whole farm pollinator score for each of the 40 farms. Each bar represents an individual farm score. The scores are arranged by farm type, beef (purple), dairy (red), mixed (green) and tillage (blue). The highest score overall came from a beef farm (248,946 pollinator points), the second highest came from a mixed farm (192,190 pollinator points) and the third highest from a tillage farm (108,176 pollinator points).

The box plot in Figure 14 shows the distribution of pollinator points across the four farm types beef (purple), dairy (red), mixed (green), and tillage (blue). The maximum, minimum, median and mean pollinator score for the four farm types are shown. Mixed farms have the highest average pollinator points overall and tillage farms had the lowest. The box plot shows how spread out the pollinator points are within each farm type (with beef having the largest spread).

Figure 13 The whole farm pollinator score for each of the farm types beef (purple), dairy (red), mixed (green) and tillage (blue).
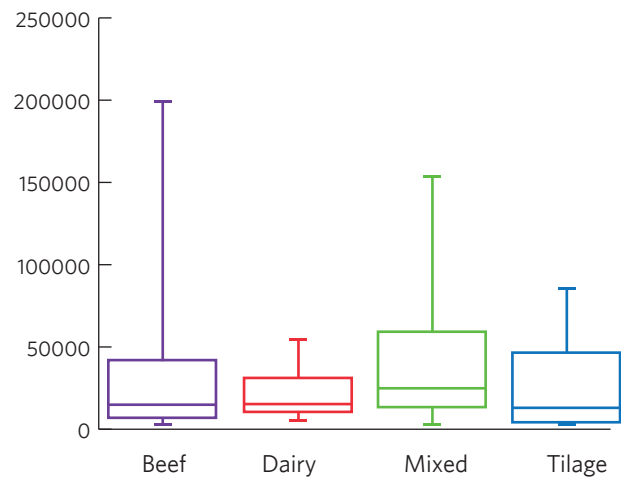

Figure 14 Box plot showing the distribution of farm scores within each farm type, beef (purple), dairy (red), mixed (green) and tillage (blue). The maximum (top line/x outside the box), minimum (bottom line/x outside of the box), median (line inside the box) and mean (small square inside the box) pollinator score for the four farm types are represented.

Most popular action on farmland

The number of pollinator-friendly trees is the most frequently used action on the 40 participating farms. The number of trees on an individual farm range from 12 to 500 plus. The second most popular action on the scorecard was mixed species sward / clover pasture (32 of the 40 farms) (Table 2). Thirty-one farms contained pollinator-friendly non-farmed area. Some of these areas were biodiversity 'hotspots' on the farms.
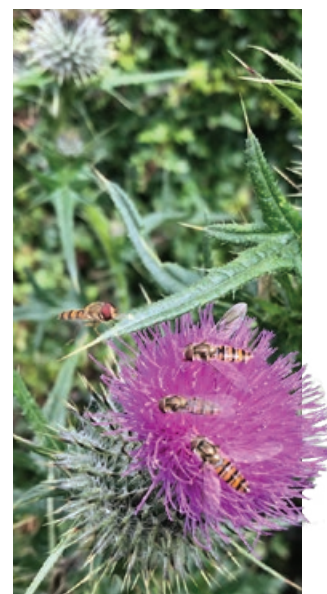

Figure 15 Plants and pollinators found in non-farmed areas.

Table 2 Scorecard actions used on the 40 participant farms that provide food and shelter for pollinators. The actions are in order of frequency of use. * The number of trees is an underestimation as the cut off for number of trees in 500.

Action	Number of participant farms	Quantity
Trees	40	9078 trees*
Clover pasture / mixed species sward	32	640.18 ha
Non-farmed area	31	30.33 ha
Other Field Boundary	25	40699.70 m
Flowering hedgerow	24	37740.4 m
Herbal ley / sown wildflower area	12	28.04 ha
Native wildlife / hay meadow	9	18.9178 ha
Bird cover / Poly-crop	6	19.17 ha
Cover Crop	4	127.10 ha

"Thirty-one farms contained pollinator-friendly non-farmed area. Some of these areas were biodiversity 'hotspots' on the farms."

On farm biodiversity surveys in 2020

It is important to show that those farms that have a higher pollinator score do have more pollinators and more biodiversity. This will create a clear evidence-based for the approach. Surveys were carried out in 2020 to test this.

- ✔ Forty farms were surveyed twice between May and July and a further 20 were surveyed in August. The 40 farms make up a total area of 2,774.70 ha. Surveys were conducted to assess each of the features on the scorecard and to get a sense of pollinator/invertebrate/floral diversity for the whole farm.

- ✔ Plant and pollinator transects were carried out on 80 hedgerows and 54 farm features.

- ✔ Over 16,200 meters of hedgerow were assessed for plants pollinators and structure.

- ✔ Four hundred and seventy-four pan traps were set to gather data on farm pollinator abundance and diversity and 50 Malaise traps were set to record the invertebrate diversity on each of the farms. Solitary bee nest sites were checked for occupancy on each of the 40 farms and hedgerow structural data was also recorded.

- ✔ We generated a huge data set, and it will provide invaluable information on how best to help pollinators on farmland.

Figure 16 The Survey Team, Niamh Phelan, Neus Rodriguez-Gasol, Shannen O' Brien and Saorla Kavanagh.

The weather was against us in August and 20 farms instead of 40 were surveyed. Surveying continued until the end of September. We thank each of the farmers for facilitating the survey and for their kindness and support over the past year. Amazing pollinators were seen on the farms. *Bombus muscorum* (the large carder bee) was observed on two farms in Co Kildare and in Co Laois.

Figure 17 Some of the fabulous pollinators observed on the farms.
Photo credits: S. Kavanagh, A. Bergin, C. Flynn and N. Rodrigueiz-Gasol.

"A wonderous amount of biodiversity was also observed. Damselflies, dragonflies, flowers, spiders, ladybirds, flies, butterflies, and birds to name a few."

Solitary Bee Nest Sites

Over 300 bare soil sites and 130 bee boxes were created by the 40 participant farmers to date. Some of these are already occupied. After just a couple of weeks, on 16 farms the created nest areas were occupied. Early results suggest that seven different species of solitary mining bee have set up home across the newly created nesting sites. Four different cavity bee species are nesting in the newly created bee boxes.
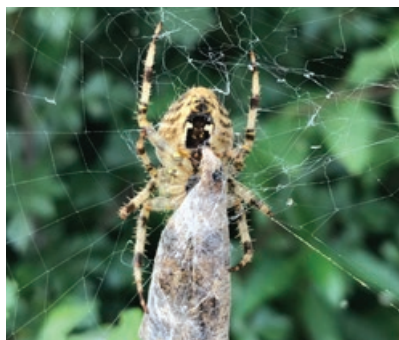
Figure 18 Large red damselfly (Ovington Farm), Azure damselfly (Greene farm), Viola (Matuschka Farm), Hairy shield bug, unknown spider (McCann Farm), Bottle fly (Bergin Farm), Comma butterfly (Greene Farm), Pyramidal orchid (Green Farm) and Viola ordata (Green farm).

Communication and engagement

Presentations

Andrew Bergin (participant tillage farmer) presented the project at the *"Halting the Loss of Pollinators Conference in Brussels"*.

Figure 19 Andrew Bergin presenting at the Halting the Loss of Pollinators Conference n Brussels.

Saorla Kavanagh (project manager) presented the project at a Tillage Industry Ireland meeting in January 2020. The project was also presented at a Clare Biodiversity Training workshop, an AIPP consultation meeting at the Ulster Beekeepers Association Annual Conference in February 2020, the Burren Winterage School, October 2020 and at a Teagasc Tillage Training workshop in December 2020.

Articles and Blog posts

Three articles were published after the project launch:

- ✔ The Farmers Journal https://www.farmersjournal.ie/ farmers-taking-part-in-new-pollinator-project-530842
- ✔ The Kildare Nationalist https://kildare-nationalist. ie/2020/03/10/new-project-aims-to-get-farms-buzzing-again/
- ✔ The Irish Times https://www.independent.ie/ business/farming/tillage/helen-harris-how-does-biodiversity-drive-square-with-the-demand-for-cheap-food-39029208.html

Neus Rodriguez-Gasol (ecological survey team member) wrote a blog describing the different methods being used to assess Farmland Biodiversity. It is available at: https://www. biodiversityireland.ie/measuring-farmland-biodiversity/
A short blog was published by the AIPP for Pollinator week: 'Working together with farmers to help pollinators' https://pollinators.ie/working-together-with-farmers-to-help-pollinators/

Interviews

Participant beef farmer Kim McCall and Dr Úna Fitzpatrick (Project Co-ordinator) were interviewed about the project on Nationwide on 27th May. The coverage of the project is available at: https://www.youtube.com/ watch?v=VFQltrWUGh4&feature=emb_logo.
The project manager participated in an interview with 'Midlands Science' for an online TV series for children funded by Science Foundation Ireland: https://www.youtube.com/ watch?v=mA8pQNs_8MQ&feature=youtube.

Other

A monthly project newsletter was established in June 2020 and is distributed to the participant farmers, the Operational Group, and other interested parties. The newsletters are available to download on the National Biodiversity Data Centre's website: https://www.biodiversityireland.ie/ projects/protecting-farmland-pollinators/news/
The first edition of an annual Children's Farming Newsletter was published in May 2020 and is available here: https:// www.biodiversityireland.ie/wordpress/wp-content/ uploads/Newsletter-Farming-Kids-EIP-Pollinators-Issue-1. pdf.
A WhatsApp group was set up for the 40 participant farmers and their families.
The Project website was launched in February 2020 https://www.biodiversityireland.ie/projects/protecting-farmland-pollinators/
The Project manager is disseminating the project through Twitter (@SaorlaKK, #FarmlandBiodiversty) and is further supported by the AIPP and Data Centre's Twitter accounts (@PollinatorsIreland and @BiodiversityIreland). Biodiversity Ireland's Facebook page is also used to disseminate the Project updates.
The Protecting Farmland Pollinators Project is featured on the new European Results based Payments Network website, which was launched on 7th May https:// www.rbpnetwork.eu/country-infos/ireland/protecting-farmland-pollinators-17/
The project manager also joined a European Innovation Partnership (EIP) webinar working group. The webinars are organised by the European Forum on Nature Conservation and Pastoralism with support from the Heritage Council and in collaboration with Galway-Mayo Institute of Technology. The webinars aim to bring together the broader land management /agri-environment EIP projects within Ireland.

Plans for 2021

Development of resources to support farmers

Training

Training will be available on-line and on farm in accordance with government guidelines. Training will be made available to all 40 farmers. Some ideas for 2021 include:

- ✔ Planting a hedge for pollinators
- ✔ Filling in the Farm Pollinator Scorecard as accurately as possible
- ✔ Creating and maintaining pollinator-friendly habitats on the farm (Hedgerows, native hay meadows, herbal leys)
- ✔ Solitary bee nest site monitoring
- ✔ Identification workshops (plants, bumblebees)

Data analysis

Large amounts of data on the biodiversity present on each of the 40 test farms were successfully collected between May-August 2020 and will now be fully analysed. The data generated from the farm surveys will be used to answer the following questions:

1. Do farms that score higher have a greater abundance and/or diversity of pollinators (wild bees/hoverflies)?

2. Do farms that score higher have a greater abundance and/or diversity of biodiversity?

3. Which of the pollinator measures are most effective in Ireland?

4. Where nesting habitat is created – is it used and what drives this if this is the case?

5. How does pollinator diversity and abundance vary by farm type and what actions are most effective in each farm type?

Guidance document

A guidance document will be produced to explain the whole farm pollinator scorecard and will provide examples to farmers on how best to manage their farm for pollinators and wider biodiversity without negatively affecting productivity. This document will be produced in consultation with farmers and will be based upon the AIPP 'Farmland Guidelines'. This document will ensure the greater protection of farmland pollinators across the participant farms and will help to improve awareness and understanding of the project. It will include lots of real-life examples to make it as easy as possible for farmers to understand the features on their farm that are most beneficial for pollinators and how to maximise their scores if they wish.

Farmer profile

John McHugh is an organic, dairy, tillage, beef, and pig farmer in Co Laois. He is the 5th generation farmer of the land. He graduated from University College Dublin with a degree in Agriculture in 2001 and inherited the farm from his parents (Clondarig Farm).

John is trying to reconnect his farm with the local community, building bridges that can be beneficial and empowering to all involved. The farm is mostly in grass with some spring oats as well. Since 2015, he has sown multi species swards and herbal leys. He manages the fields in a way that is enabling the natural, native diversity back on the farm. He achieves this by having long grazing intervals and by reducing grazing pressure, which in turn allows pastures to flower and seed, enabling natural succession and helping pollinator populations in the process. "Having long grazing intervals and reduced grazing pressure is allowing more natural diversity back into the farm". He has converted pastures to agroforestry and planted cow access roadways with fruit and nut trees. He introduced pigs to the farm to help break the dominance of perennial rye grass and create opportunities for other plants. Oats are sown to provide the straw and grain requirements for the animals, and the surplus is sold to Flahavans for organic porridge. His milk is sold to Glenisk.

Figure 21 John's son on the cow access roadway (right) and one of his herbal leys (above).

Figure 20 John McHugh with his daughter on his farm.

John cuts most of his hedges on a 3-5-year rotation, he has moved the fence out to allow for a 2-metre margin on some hedges and has wide ditches acting as margins on others. His hedgerows are a haven for pollinators providing both food and shelter.

Up until 2015, he was an intensive dairy, derogation famer, milking 160 cows with plans to expand. He realised how his inputs were controlling the way he farmed and wanted to create a more resilient farm that his children could carry on. He analysed his figures and profit margins and realised that he could create a more resilient farm, with lower financial risk, that he can pass on to his children. He has been studying regenerative and restorative farming practices and implementing these practices on his farm. John believes that *"Diversity drives the resilience in nature".* In 2015, he sowed his first herbal ley. This went against all his previous beliefs on what was the 'best' food for cows. Grass is the food with the highest 'quality', or is it? Is it more like giving the cows chocolate cake or a steak dinner all the time? John believes *"we need to reassess the way we perceive quality and waste when it comes to feeding livestock".*

He practices holistic grazing and holistic and regenerative management. He is trying to *"create a resilient farm to deal with the inevitable storm that is coming".* He has the freedom to experiment to find out what works best for him on his farm. That is what is important for every farmer "To identify what works best for you, and to farm the way that suits you. At the end of the day, it is up to the individual to decide what they should do."

John received 192,189 pollinator points for the farming year 2019/2020. He is the highest scoring mixed farmer in the project and has the second highest score overall.

Appendix

Table 3 Pollinator Scorecard 2019/2020 for Farm 4 (Farm type: Beef, 26 Ha.
Must have 6 locations of bare soil and 2 bee boxes). Total score = 19,196.97 Pollinator Points.

	No.	Action	Units of Measurement	Approx. Amount	Proposed Weighting	Score	Range 1-5	Final Score
Food and Shelter	1	Flowering hedgerow max. cut once every 3-5 years with a 1.5-2m margin or understory fenced from grazing or untilled	meters	0	5	0	0	0.00
	2	Flowering hedgerow cut once every 2-5 years with at least 0.5m margin fenced from grazing or untilled	meters	0	2.5	0	3	0.00
	3	Flowering hedgerow cut once every two years (no margin)	meters	87.6	1.25	109.5	3	328.50
	4	Other pollinator-friendly field boundary	meters	720.9	0.10	72.09	3	216.27
	5	Pollinator-friendly flowering trees (up to max 500)	no. of trees	93	5	465	5	2325.00
	6	Native wildlife/hay meadow (maximum cut or grazed once a year)	ha	0	1000	0	0	0.00
	7	Herbal ley allowed to flower / sown wildflower area	ha	0.0199	800	15.92	5	79.60
	8	Clover pasture / mixed species sward allowed to flower	ha	12.14	400	4856	3	14568.00
	9	Bird cover / Poly-crop	ha	0	400	0	0	0.00
	10	Non-farmed areas (e.g., around farmyard, lanes, roads) unmanaged to allow grass and wildflowers to grow naturally	m2	3990	0.08	319.2	3	957.60
	11	Flowering pollinator-friendly catch, companion or cover crop allowed to flower	ha	0	200	0	0	0.00
Safety	12	Eliminated herbicides, fungicides, and insecticides from whole farm	Yes or No	0	100	0	0	0.00
	13	Eliminated herbicides, fungicides, and insecticides from whole farm excluding livestock	Yes or No	0	80	0	0	0.00
	14	Eliminated insecticides and fungicides from tillage crops	Yes or No	0	60	0	0	0.00
	15	Eliminated insecticides from whole farm	Yes or No	0	50	0	0	0.00
	16	Eliminated herbicides from whole farm	Yes or No	36.1	20	722	1	722.00
	17	Herbicides – spot spray only noxious and invasive plants (Chickweed, Ragwort, Giant Hogweed, and other invasive plants)	Yes or No	0	10	0	0	0.00
	18	Herbicides - only used on crops and not used to "tidy-up" the farm	Yes or No	0	5	0	0	0.00
		Total Score				**6559.71**		**19196.97**

Table 4 Pollinator Scorecard 2019/2020 for Farm 43 (Farm type: Dairy, 76.6 Ha.
Must have 18 locations of bare soil and 7 bee boxes). Total score = 21,834.70 Pollinator Points.

	No.	Action	Units of Measurement	Approx. Amount	Proposed Weighting	Score	Range 1-5	Final Score
Food and Shelter	1	Flowering hedgerow max. cut once every 3-5 years with a 1.5-2m margin or understory fenced from grazing or untilled	meters	0	5	0	0	0.00
	2	Flowering hedgerow cut once every 2-5 years with at least 0.5m margin fenced from grazing or untilled	meters	0	2.5	0	0	0.00
	3	Flowering hedgerow cut once every two years (no margin)	meters	2330.2	1.25	2912.75	3	8738.25
	4	Other pollinator-friendly field boundary	meters	1019.7	0.10	101.97	3	305.91
	5	Pollinator-friendly flowering trees (up to max 500)	no. of trees	250	5	1250	4	5000.00
	6	Native wildlife/hay meadow (maximum cut or grazed once a year)	ha	0	1000	0	0	0.00
	7	Herbal ley allowed to flower / sown wildflower area	ha	0.00159	800	1.272	2	2.54
	8	Clover pasture / mixed species sward allowed to flower	ha	7.82	400	3128	2	6256.00
	9	Bird cover / Poly-crop	ha	0	400	0	0	0.00
	10	Non-farmed areas (e.g., around farmyard, lanes, roads) unmanaged to allow grass and wildflowers to grow naturally	m2	0	0.08	0	0	0.00
	11	Flowering pollinator-friendly catch, companion or cover crop allowed to flower	ha	0	200	0	0	0.00
Safety	12	Eliminated herbicides, fungicides, and insecticides from whole farm	Yes or No	0	100	0	0	0.00
	13	Eliminated herbicides, fungicides, and insecticides from whole farm excluding livestock	Yes or No	0	80	0	0	0.00
	14	Eliminated insecticides and fungicides from tillage crops	Yes or No	0	60	0	0	0.00
	15	Eliminated insecticides from whole farm	Yes or No	0	50	0	0	0.00
	16	Eliminated herbicides from whole farm	Yes or No	76.6	20	1532	1	1532.00
	17	Herbicides – spot spray only noxious and invasive plants (Chickweed, Ragwort, Giant Hogweed, and other invasive plants)	Yes or No	0	10	0	0	0.00
	18	Herbicides - only used on crops and not used to "tidy-up" the farm	Yes or No	0	5	0	0	0.00
		Total Score				**8925.99**		**21834.70**

Table 5 Pollinator Scorecard 2019/2020 for Farm 35 (Farm type: Mixed, 93.5 Ha.
Must have 21 locations of bare soil and 8 bee boxes). Total score = 40,707.35 Pollinator Points.

	No.	Action	Units of Measurement	Approx. Amount	Proposed Weighting	Score	Range 1-5	Final Score
Food and Shelter	1	Flowering hedgerow max. cut once every 3-5 years with a 1.5-2m margin or understory fenced from grazing or untilled	meters	0	5	0	0	0.00
	2	Flowering hedgerow cut once every 2-5 years with at least 0.5m margin fenced from grazing or untilled	meters	0	2.5	0	0	0.00
	3	Flowering hedgerow cut once every two years (no margin)	meters	2330.2	1.25	2912.75	3	8738.25
	4	Other pollinator-friendly field boundary	meters	1019.7	0.10	101.97	3	305.91
	5	Pollinator-friendly flowering trees (up to max 500)	no. of trees	250	5	1250	4	5000.00
	6	Native wildlife/hay meadow (maximum cut or grazed once a year)	ha	0	1000	0	0	0.00
	7	Herbal ley allowed to flower / sown wildflower area	ha	0.00159	800	1.272	2	2.54
	8	Clover pasture / mixed species sward allowed to flower	ha	7.82	400	3128	2	6256.00
	9	Bird cover / Poly-crop	ha	0	400	0	0	0.00
	10	Non-farmed areas (e.g., around farmyard, lanes, roads) unmanaged to allow grass and wildflowers to grow naturally	m2	0	0.08	0	0	0.00
	11	Flowering pollinator-friendly catch, companion or cover crop allowed to flower	ha	0	200	0	0	0.00
Safety	12	Eliminated herbicides, fungicides, and insecticides from whole farm	Yes or No	0	100	0	0	0.00
	13	Eliminated herbicides, fungicides, and insecticides from whole farm excluding livestock	Yes or No	0	80	0	0	0.00
	14	Eliminated insecticides and fungicides from tillage crops	Yes or No	0	60	0	0	0.00
	15	Eliminated insecticides from whole farm	Yes or No	0	50	0	0	0.00
	16	Eliminated herbicides from whole farm	Yes or No	76.6	20	1532	1	1532.00
	17	Herbicides – spot spray only noxious and invasive plants (Chickweed, Ragwort, Giant Hogweed, and other invasive plants)	Yes or No	0	10	0	0	0.00
	18	Herbicides - only used on crops and not used to "tidy-up" the farm	Yes or No	0	5	0	0	0.00
		Total Score				8925.99		21834.70

Table 6 Pollinator Scorecard 2019/2020 for Farm 2 (Farm type: Tillage, 46.5 Ha.
Must have 11 locations of bare soil and 4 bee boxes). Total score = 17,9646.48 Pollinator Points.

	No.	Action	Units of Measurement	Approx. Amount	Proposed Weighting	Score	Range 1-5	Final Score
Food and Shelter	1	Flowering hedgerow max. cut once every 3-5 years with a 1.5-2m margin or understory fenced from grazing or untilled	meters	0	5	0	0	0
	2	Flowering hedgerow cut once every 2-5 years with at least 0.5m margin fenced from grazing or untilled	meters	0	2.5	0	0	0
	3	Flowering hedgerow cut once every two years (no margin)	meters	0	1.25	0	0	0
	4	Other pollinator-friendly field boundary	meters	504	0.1	50.4	3	151.2
	5	Pollinator-friendly flowering trees (up to max 500)	no. of trees	250	5	1250	5	6250
	6	Native wildlife/hay meadow (maximum cut or grazed once a year)	ha	0.26	6000	1560	2	3120
	7	Herbal ley allowed to flower / sown wildflower area	ha	1.96	800	1568	3	4704
	8	Clover pasture / mixed species sward allowed to flower	ha	26.62	400	10648	2	21296
	9	Bird cover / Poly-crop	ha	0	400	0	0	0
	10	Non-farmed areas (e.g., around farmyard, lanes, roads) unmanaged to allow grass and wildflowers to grow naturally	m2	8092.3	0.08	647.38	3	1942.15
	11	Flowering pollinator-friendly catch, companion or cover crop allowed to flower	ha	8.11	200	1622	2	3244
Safety	12	Eliminated herbicides, fungicides, and insecticides from whole farm	Yes or No	0	100	0	0	0
	13	Eliminated herbicides, fungicides, and insecticides from whole farm excluding livestock	Yes or No	0	80	0	0	0
	14	Eliminated insecticides and fungicides from tillage crops	Yes or No	0	60	0	0	0
	15	Eliminated insecticides from whole farm	Yes or No	0	50	0	0	0
	16	Eliminated herbicides from whole farm	Yes or No	0	20	0	0	0
	17	Herbicides – spot spray only noxious and invasive plants (Chickweed, Ragwort, Giant Hogweed, and other invasive plants)	Yes or No	0	10	0	0	0
	18	Herbicides - only used on crops and not used to "tidy-up" the farm	Yes or No	0	5	0	0	0

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