



# POLLINATORS IN PRACTICE

A collaboration with  
farmers and researchers  
to connect crops and  
pollinators for practical  
on-farm solutions

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 **BASF**  
We create chemistry

# INTRODUCTION

## Agriculture can make a measurable difference to the UK's biodiversity

When BASF first began exploring the link between arable production and pollinator health, the prevailing narrative was that agricultural activities would inevitably pose challenges for populations.

Working closely with growers we knew that the picture was more nuanced and, in many cases, biodiversity could thrive alongside productive cropping systems.

About twenty years ago, driven by the growing recognition of the need for advocacy and for evidence, we launched a long-term partnership with the Pitts family at The Grange, a commercial arable farm in Northamptonshire. Our aim was to demonstrate, through rigorous data collection and collaborative practice, how diverse habitats and modern farming can coexist.

Grange Farm has become a living laboratory. Over the years, we have amassed data on pollinator abundance, habitat quality and crop yields that speaks to the real-world impacts of environmental and agronomic decision-making.

Our research has attracted regulators, policy makers, farming organisations and, most importantly, farmers themselves, turning a single farm into a catalyst for conversation and change.

The core of this success has been collaboration. Marek Nowakowski, a renowned authority on pollinators, brought unparalleled knowledge and scientific rigour to our work. William Pitts, the farmer who co-manages The Grange, provided the ground level perspective and unwavering commitment. Together they bridged the gap between science and practice, demonstrating that hedgerow preservation, wildflower meadow rotation and other habitat enhancements are not novel ideas, but proven strategies that can be incorporated into commercial farming with tangible benefits.

This book distils our collective learning. It offers evidence that sustainable practices are compatible with robust crop yields. We do not aim to reinvent the wheel; rather, we hope to inspire more conversations, and importantly,

action. The information and encouragement presented here are meant to show that agriculture can make a measurable difference to the UK's biodiversity.

Beyond the numbers and graphs, this project has filled us with pride and joy. Standing in a field buzzing with pollinators, witnessing the harmony of ecosystem and enterprise, has reminded us that science, stewardship and ambition can indeed coexist. We invite you to read on and join us in shaping a future where farming and biodiversity flourish together.

**Alice Johnston & Rob Gladwin**

**Alice Johnston**  
Agricultural Sustainability Manager,  
BASF Agricultural Solutions UK & Ireland



**Rob Gladwin**  
Head of Technical Management,  
BASF Agricultural Solutions UK & Ireland

**Marek Nowakowski**  
Independent Wildlife Expert



Marek Nowakowski was an agronomist for 30 years before becoming an award-winning farmland ecologist and conservation pioneer. Today, he's over five decades of practical, hands-on experience bridging the gap between profitable agriculture and environmental science. Marek's deep domain expertise is recognised at the highest levels of British environmental policy and scientific research. As the founder and sole trader of the Wildlife Farming Company, Marek has dedicated his career to habitat creation, policy influencing and translating complex science into practical, on-farm deliverables. In 2016 Marek with Prof Richard Pywell (UKCEH) wrote a book *Habitat creation and management for pollinators* which is a practical guide to habitat creation and management.

# BRINGING BACK THE BUZZ



## Securing the future of our ecosystems and food production

Pollinators provide vital ecosystem services and are essential for global food security. They are responsible for the reproduction of around 75% of staple crop plants<sup>1</sup> and nearly 90% of wild flowering plants<sup>2</sup>.

But in the UK pollinators are largely in decline. The latest evidence from long-term national monitoring schemes suggests that across the UK, 33 of our 58 butterfly species (57%) declined in abundance over the last 10 years<sup>3</sup>. 14 of the 22 UK bumblebee species monitored declined in abundance in 2025 compared to their average between 2010 and 2024<sup>4</sup>. Several other pollinating insect groups remain under threat<sup>5</sup>.

However, there is evidence that with understanding, time and effort, pollinators can recover. 25 butterfly species (43%) have increased<sup>3</sup>, often in response to local habitat restoration.

It is why BASF, alongside William and Marek spent eight years monitoring, recording and analysing pollinators at The Grange.

*"Much has been made of the catastrophic decline in pollinating insects on farmland. The need to put back our missing flowers has been the cornerstone of agri-environment schemes for many years, and the efficacy of such new habitats in boosting the flying insects of summer is now abundantly proven. But the flying season is long and continuity is everything – poorly timed gaps in flower provision can be disastrous for pollinators."*

*"And what is the role of our own indigenous wayside and hedgerow plants in providing an unbroken floral supply? Few have tried to address this supremely simple question. The authors here attempt this, on a single farm over several years, with a field study in the best traditions of observational natural history. The work has produced abundant insights into what farmers need to do to return our flying insects to their farms, and the authors share these generously here."*

**Bill Meek, Independent Ecologist**

*"The Grange Pollinator Surveys are an outstanding example of targeted whole-farm habitat management and long-term monitoring of outcomes for both insects and plants. Driven by the farm team, in collaboration with expert ecologists, the project demonstrates how a deep understanding of insect ecologies and life cycles can be applied to create and manage a range of suitable habitats throughout the year."*

*"Importantly, Marek and the team have generated an impressive dataset from repeated annual surveys across the farm. It is encouraging to see recognition of the often-forgotten smaller solitary bees, many of which are notoriously difficult to identify in the field."*

*"We hope this publication will inform and inspire other farms to follow suit."*

**Dr Claire Carvell and Prof. Richard Pywell,  
UK Centre for Ecology & Hydrology (CEH)**

# INTRODUCTION TO THE GRANGE

In the eyes of William Pitts, food and biodiversity can coexist very happily with modern technology, and the right mindset.

**W**illiam Pitts farms alongside his brother, Andrew, at The Grange. The 850ha farm is in Mears Ashby in Northamptonshire and has been part of the BASF European Farm Network since 2009.

“The Grange has been transformed in recent decades. While it very much continues to be a commercial farm, today biodiversity is woven into the fabric of every decision we make.

When I first returned to the farm, I inherited a legacy focused on maximum productivity. My father had dedicated his life to best practices of his era: intensification and high yields. For years, that was The Grange’s definition of success.

But the farm is larger than its field yields. It is a complex ecosystem facing new realities - the unpredictable climate, shifting government policy, a volatile global landscape and a deep, global decline in our wildlife.

As my brother and I became increasingly aware of the farming challenges ahead and a growing recognition of the fundamental role of biodiversity, we realised that our trajectory had to change.

Today, I am proud to say that The Grange is a great working example of how food production and ecological richness can coexist.

## From high input to resilience

When this project began, our rotation was wheat → wheat → oilseed rape (OSR). We considered ourselves classic high input, high output farmers. Our first wheats yielded, on average, 10–11t/ha, second wheats, 9.5t/ha, and our OSR 3.7–4t/ha.

But resilience requires investment beyond crops.

14 years ago, The Grange entered into a 10-year Higher Level Stewardship (HLS) agreement. It took 15% of the farm out of production and sparked an interest in soil health. In 2016, we decided to try minimum tillage which led to the adoption of wider regenerative practices in 2020.

The crop rotation started to reflect the expanded vision. Today, alongside the wheat, we grow barley, pulses, and hybrid rye. We manage over 200 hectares of dedicated cover crops, grazed each winter by more than 1,000 sheep - a mosaic of life that speaks to systemic change.

The results have been transformative: we have been able to maintain yields while cutting nitrogen fertiliser use by 15%. More profoundly, the organic matter in our soil has risen from 2.5% to 6% over the last two decades—a slow, deliberate, and fundamental improvement. We’ve also reduced our fuel consumption across the farm by 60–70%.



## Measuring impact and making ripples

During the HLS agreement, we welcomed BASF, GWCT and the RSPB to survey the farm and monitor the impact of the change in practices. The data collected drew the interest of policy makers, conservationists and farming groups. Years later, the team turned its attention to another important group of indicator species which, like birds, are equally embedded in our culture and hearts.

## Pollinators: the perfect partner

Estimated to contribute £680 million annually to the UK agricultural economy, fertilising everything from oilseed rape to strawberries, pollinators are a thread connecting our food supply to our natural environment.

The government, through Defra, recognises this vital link, considering pollinators a primary indicator of environmental quality and a core driver of long-term agricultural productivity. Protecting and supporting pollinators is a principle that underpins the Sustainable Farming Incentive (SFI).

## The system challenge and our role

I welcome Defra’s position on pollinators. Government schemes can make a significant difference. One example at The Grange is the HLS - it was pivotal in establishing the high bird numbers we cherish today.

However, there are gaps in government policies. Many of the schemes in place today operate on short timescales that don’t allow habitats to fully mature. They also expect farmers to establish and maintain wildlife habitats. We are food producers, not ecological managers, and delivering truly diverse, high performing habitats requires a different knowledge base and skill set.

That is, in part, what this project has been about – walking the path alongside those who deeply care about the future of our landscapes including wildlife expert Marek Nowakowski, the team at BASF and CEH. Together we have been finding the practical pitfalls and providing signposts to show other farmers how to navigate the path.



## Follow in our footsteps

The Grange still firmly operates as a commercial farm, focused on the bottom line. Today, however, every decision is underpinned by a commitment to consider biodiversity. For me, it is an investment in future resilience.

I would be lying if I said this journey has been easy. Change is always hard. It is harder still when there is so much political, financial and environmental uncertainty.

But every opportunity - through the SFI or another scheme - deserves earnest effort, whether that is sourcing native cultivars when selecting wildflower mixes, cutting and removing vegetation from wildflower meadows, or rotating the cutting of hedgerows.

I wish I could show everyone with a stake in British agriculture around The Grange. Being immersed in a landscape that pulses with life reminds you that agriculture can coexist with nature.

No two farms are the same, we all have different soil types and weather challenges, but every farmer has a responsibility to protect our landscape, and the nature that calls it home, for both our current and future generations. It is also fundamental for our health and wellbeing, farming can be tough, but I can guarantee there is not a single farmer who won’t smile when they hear a wildflower meadow buzzing with life.

By sharing the insights gleaned during the eight-year project in this book, I hope we encourage just a few of you, to take some more steps down the path of enhancing biodiversity. And with its signposting, we help you avoid some of the pitfalls.

“Food and biodiversity can coexist very happily with modern technology, and the right mindset.”

William Pitts, The Grange

# HABITAT TYPES AND MANAGEMENT

Map Location	Habitat	Management	Transect Lengths
Meadow	Sown flowering-plant rich meadow The meadow was a top-quality mix of grasses and flowers sown in 2013 and still contains the widest range of plant species on the farm	Spring and autumn cut. Occasional autumn grazing	270m
A	Farmyard and sandstone buildings. Mown grass field with flower margin on one side.	Infrequently cut flower margins	427m
B,C, D	Sown flowering-plant margin next to arable land B was established in 2020 C & D were established in 2014	Occasional autumn cut	B: 321m C: 231m D: 164m
1	Tall mixed hedge and track by arable land with 6 to 10 metres of regeneration margins that are full bramble and blackthorn suckers	Uncut throughout surveys	435m
2,3	Tall wide encroaching hedge with wide bramble strips	Suckers and bramble cut in 2022	2: 143m 3: 454m



## About the farm

The Grange is 850 hectares of heavy soil in the village of Mears Ashby in Northamptonshire. It is predominantly an arable farm with two small areas (10ha) of herbal leys. Its manager, William, has a longstanding interest in wildlife especially farmland birds. As a result, approximately 15% of the land is actively managed for biodiversity.

Fields are on the smaller side, between 7.2 and 8ha, and are surrounded by tall diverse hedges which receive little management. Many have developed 8-10m wide margins of regenerated brambles and scrub.

Within the farm there is also a sown flower rich meadow and many sown flower rich margins.

The traditional stone farm buildings surrounding the yard are adjacent to areas of grass and bramble. A pair of barn owls occupy a box in the farm buildings.

## Method

Like many farms, The Grange has a wide range of habitats. In order to understand and contrast their roles, areas of the farm were divided up, and a small 'representative' section was taken as a 'transect'.

From 2018 to 2024, starting in March and ending in September, Marek conducted a field survey every 3-4 weeks (weather permitting), recording the insects and flowers present as he walked each transect.

## Transects

A transect was defined as an imaginary 'tunnel' 5m wide and 5m tall, which included the vertical surface of the adjacent hedgerow, where present.

There were seven field margin transects, one transect through the flower meadow and another, alongside the farm buildings.

## Timing

For consistency and to maximise the likelihood of obtaining an accurate representation of the insect population distribution field surveys were predominantly conducted under the following conditions:

- Air temperature above 16C
- Sunshine with no more than 50% cloud cover
- Wind speed less than 20mph<sup>6</sup>

There were occasions when these conditions were not all met. In some field surveys, conditions changed during the assessment.

In total, Marek conducted 46 field surveys.

## Data capture

For each survey three separate criteria were recorded for each transect:

- Plant species in flower
- All bees and butterflies in flight through the transect
- All bees and butterflies visiting flowering plants

With the aim of understanding the relationship between pollinating insects and a plant's flowering window, the presence of all plant species in bloom was recorded<sup>7</sup> alongside whether they had been purposely sown<sup>8</sup>.

All pollinating insects seen were identified and counted, and when they visited flowers, the species of the flower was recorded.

A few insects could not be confidently assigned to a species, and some visually similar species were grouped for analysis. Records were compiled for all wild bees - both solitary bees and bumblebees - as well as for honeybees, in addition to butterflies and day flying moths.

**“Managing wildlife habitats requires different knowledge and skills to farming.”**

William Pitts, The Grange



# PLANTS IN FLOWER

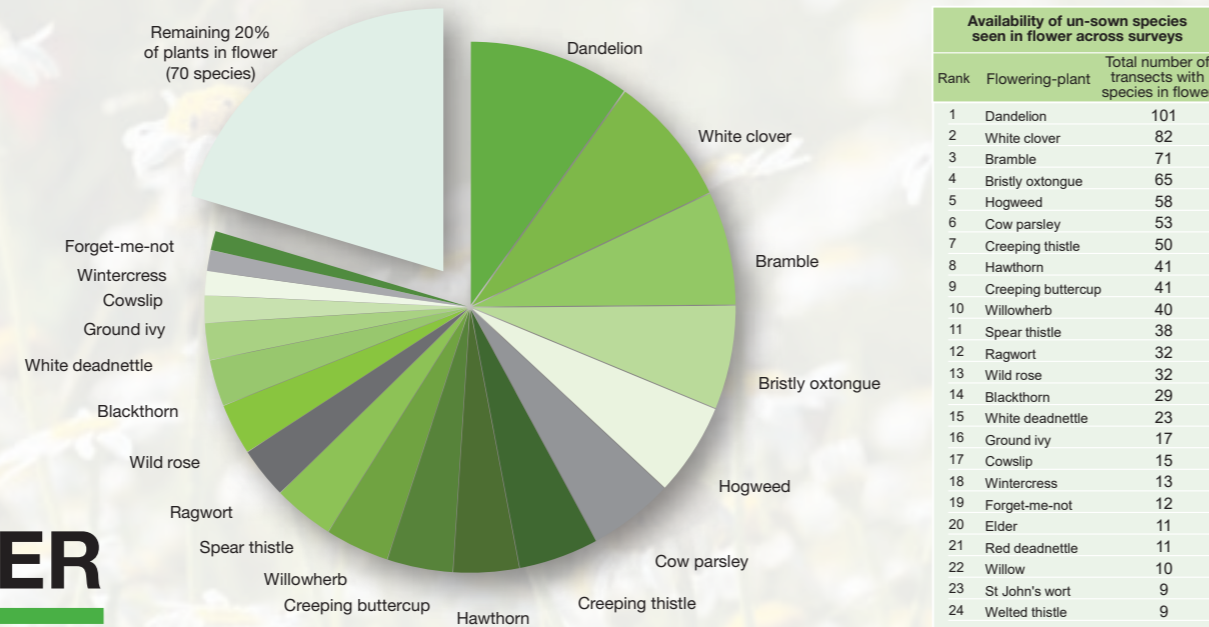
## What plants flowered at The Grange?

By combining the flowering periods of sown and unsown species, land managers can create an unbroken supply of pollen and nectar from March to August.

One aspect of the study was to pinpoint when pollinators might encounter a hungry gap, so that measures could be taken to alleviate it.

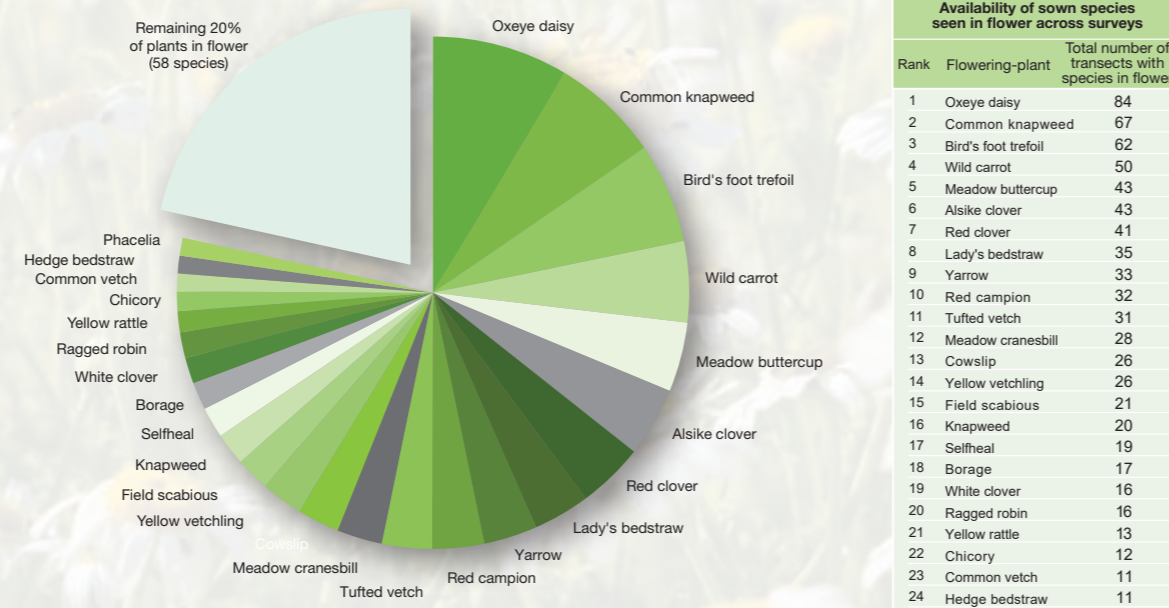
The intention was to record the presence of a species in flower to ascertain its 'flowering window', and therefore the availability of that species to pollinators. No information was collected on the abundance of each flower species, however, all pollinating insects seen were identified and counted, as well as when they visited flowers and the species of flower.

Percentage of **unsown** plants seen in flower throughout all surveys



Availability of un-sown species seen in flower across surveys		
Rank	Flowering-plant	Total number of transects with species in flower
1	Dandelion	101
2	White clover	82
3	Bramble	71
4	Bristly oxtongue	65
5	Hogweed	58
6	Cow parsley	53
7	Creeping thistle	50
8	Hawthorn	41
9	Creeping buttercup	41
10	Willowherb	40
11	Spear thistle	38
12	Ragwort	32
13	Wild rose	32
14	Blackthorn	29
15	White deadnettle	23
16	Ground ivy	17
17	Cowslip	15
18	Wintercress	13
19	Forget-me-not	12
20	Elder	11
21	Red deadnettle	11
22	Willow	10
23	St John's wort	9
24	Wetted thistle	9

Percentage of **sown** plants seen in flower throughout all surveys



Availability of sown species seen in flower across surveys		
Rank	Flowering-plant	Total number of transects with species in flower
1	Oxeye daisy	84
2	Common knapweed	67
3	Bird's foot trefoil	62
4	Wild carrot	50
5	Meadow buttercup	43
6	Alsike clover	43
7	Red clover	41
8	Lady's bedstraw	35
9	Yarrow	33
10	Red campion	32
11	Tufted vetch	31
12	Meadow cranesbill	28
13	Cowslip	26
14	Yellow vetchling	26
15	Field scabious	21
16	Knapweed	20
17	Selfheal	19
18	Borage	17
19	White clover	16
20	Ragged robin	16
21	Yellow rattle	13
22	Chicory	12
23	Common vetch	11
24	Hedge bedstraw	11

### Unsown (wild) plants seen in flower during the surveys

Across The Grange, 89 different unsown plants were seen in flower. Of these, 19 species made up 80% of the total unsown plants seen in flower across all surveys. 70 species accounted for the remaining 20% of unsown plants in flower.

### Sown (pollinator mixes) plants seen in flower during the surveys

During the surveys at The Grange, a total of 83 different sown plant species were observed in flower. 25 of those species comprised 80% of all the flowering sown plants recorded, while the remaining 58 species made up the remaining 20%.

## Conclusions

The comparison between flower diversity in the sown mixes and the unsown plots reveals notable differences in variety and dominance.

A small number of unsown species dominate the overall floral landscape of the farm. Many of these unsown plants flower in early spring, which is well before the sown species, helping to fill the spring hungry gap (see table overleaf). In contrast, sown mixes offer a slightly broader core group of dominant species.



**“It is so tempting to leave a wildflower meadow when it looks fabulous in late summer and autumn and the barn owls fly overhead. I’m guilty and now some of my meadows are degrading.”**

William Pitts, The Grange

# THE HUNGRY GAP

The hungry gap refers to the period generally from late February to early May when there is a shortage of pollen and nectar available for pollinators. Many insects, including bees, begin foraging as early as March and rely on unsown flowering plants to sustain them.

At this stage, solitary bees and bumblebees, which have no store of food, are particularly vulnerable as they must find pollen and nectar immediately after emerging, or they will not survive. In contrast, honeybees maintain food stores to help them through winter, but these reserves can run low by early spring, making additional forage essential.

Why it matters:

- Early spring is a critical time for pollinator survival.
- Lack of forage can lead to death or weakened colonies and reduced pollination services.

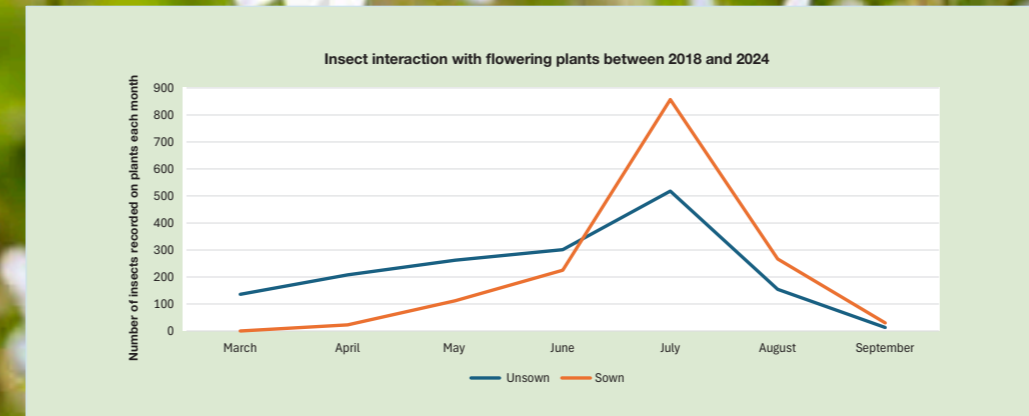
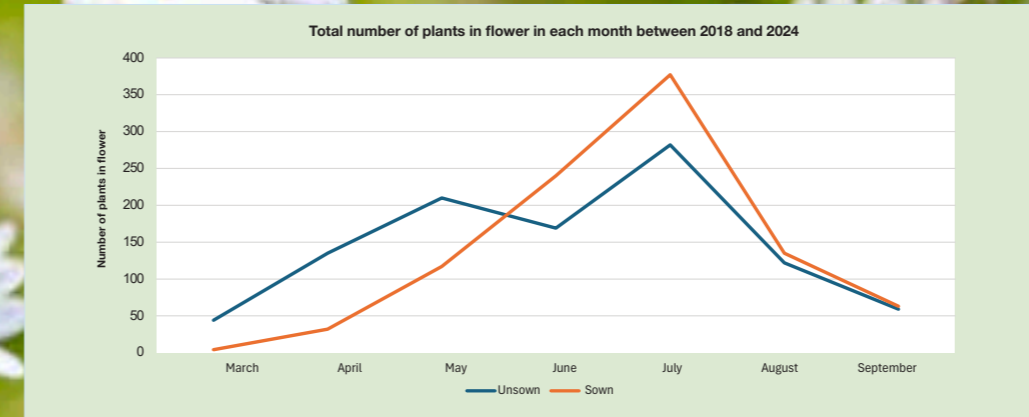
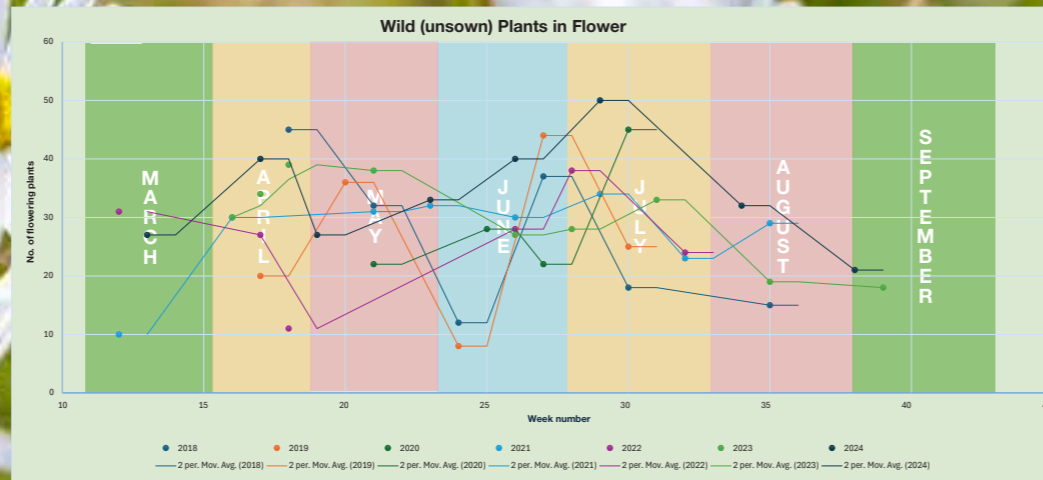
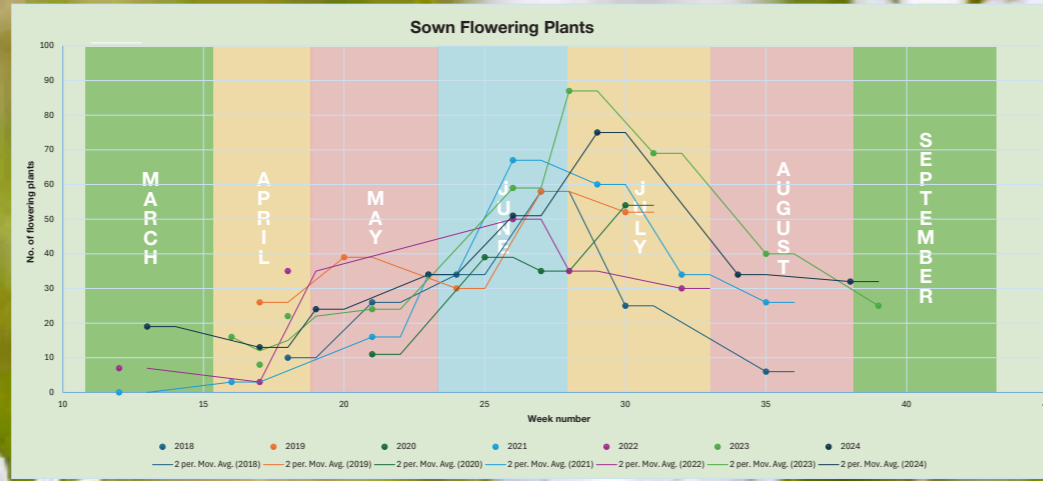
Supporting pollinators throughout the season, especially during the hungry gap, helps maintain biodiversity and food production. Many hedge species only flower on second year growth. Leaving some hedges uncut is a good way to support pollinators during the hungry gap.

**It's about following a regime that echoes the management of wildflower meadows of times gone by.**

William Pitts, The Grange

Wild, unsown plants fill the hungry gap with a flowering peak in spring. Sown species start flowering later and have a distinct peak in June-July.

**TOP TIP:** When planning sown mixes or hedgerows, aim for overlapping flowering windows to provide resources from early spring through to late autumn. Also consider a variety of plant species with different flower structures, as this will broaden the food availability for a wider range of insects.



# FLOWERING WINDOWS

The **'flowering window'** is the period during which a plant produces flowers and gives pollinators potential access to nectar and pollen.

Different flowering species have different windows. By pairing the unsown species that tend to flower in March, April and May with the sown species in June, July and August, a continual supply of pollen and nectar is available.

Historically, unsown wildflowers were far more abundant; less intensive farming left space for them along hedgerows, woodland edges and in ancient meadows. Today, however, only 3% of those ancient wildflower meadows remain.

While sown flowers cannot fully replace these lost habitats, they do provide an abundance of pollen and nectar in the summer months.

**“At The Grange, sown plants start flowering around mid-late May with a significant peak towards the end of June and early July. Unsown plants flower from mid-March through to September, with small peaks in April and June/July.”**

Marek Nowakowski, Independent Wildlife Expert



# FLOWERING STRUCTURES

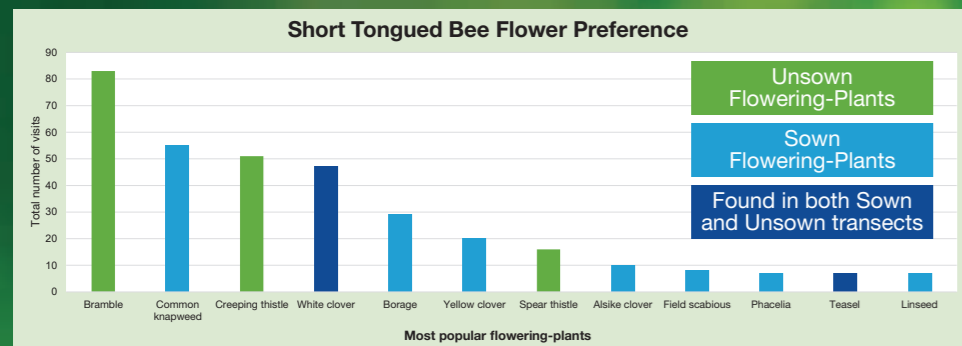
Open, simple flowers such as the daisy family (Asteraceae) and buttercup family (Ranunculaceae) provide easy access to nectar and pollen, making them ideal for short-tongued or smaller insects like hoverflies and some solitary bees.

Tubular flowers, such as clovers and vetches, require longer tongues, found in butterflies and some bumblebees, to reach nectar.

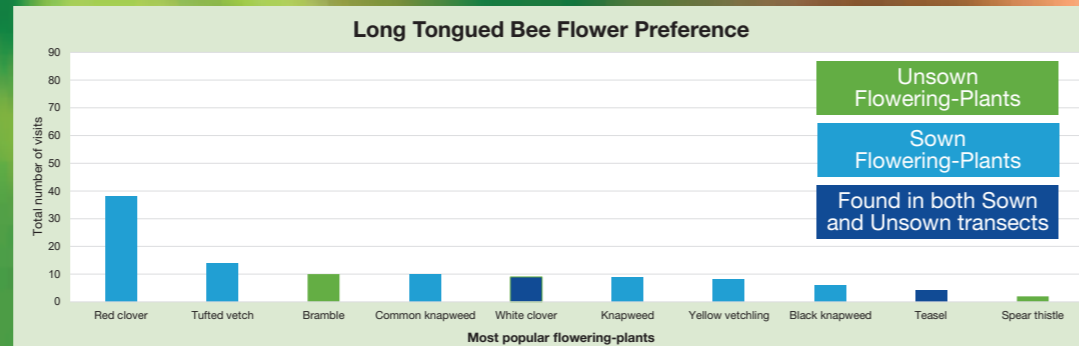
Meanwhile, flowers such as those in the deadnettle family (Lamiaceae) cater to specialist pollinators with enough size and weight to gain access to their pollen and nectar.



Flower preference of Buff-tailed Bumblebee (*Bombus terrestris*) and early bumblebee (*Bombus pratorum*) which are short tongued bees, in June & July.



Flower preference of Common Carder Bee (*Bombus pascuorum*) and garden bumblebee (*Bombus hortorum*) which are long tongued bees, in June & July



“Buff-tailed bumblebees have relatively short tongues in comparison with the common carder and garden bumblebees. This difference in tongue length influences flower choice and highlights the importance of providing a wide range of flowering-plant species with varied structures to support diverse bee populations.”

Marek Nowakowski, Independent Wildlife Expert

# MANAGEMENT OF FLOWERS

Sown wildflower mixes have become a cornerstone of policymakers' efforts to enhance food sources for pollinating insects, frequently featuring in schemes designed to improve the sustainability of farmland.

However, there is great variation in the value that these meadows add, not least because they can, on more fertile soils, degrade over time.

## Golden rules for enhancing the value of your wildflower mix:

- Choose a mix that is well suited to your local environment - look at local wild spaces (hedgerows, nature reserves etc.) and observe what wildflower species grow there. Where possible, choose a wildflower mix which contains these species.
- Broadcast seed at the correct time of year and into good seedbed conditions – wildflower seed may go dormant if drilled.
- Reduce annual weeds / growth by cutting – as part of vegetation succession, some species will naturally take over and dominate the mix unless they are held back. In the first year - either in spring (March to April) or in autumn (August to September) - cutting a wildflower meadow and, where there is grass, removing the clippings, can reduce their impact.



## Wildflowers sown at The Grange

There are many sown wildflowers at The Grange. Alongside the 4.8ha meadow, there are wildflower mixes in the 6m wide margins surrounding seven of the farm's fields.

The meadow featured in this research was sown in 2013. Over the years, the composition of the flowering species has changed over time with a general reduction in species diversity and quantity. This is a natural process – a consequence of vegetation succession acting upon an artificial sown seed mixture on fertile land, all mediated by habitat management.

In 2025, the meadow still had a relatively wide range of flowering species. Its longevity is a result of the initial selection of seed - a high-quality diverse mix of native wildflowers with non-aggressive grasses – and good management.

## MEADOW FLOWER MIX



**Wildflower seed: 80% grass & 20% flowering plants sown at 20kg/ha.**

Yarrow: agrimony: kidney vetch: betony: common knapweed: greater knapweed: crosswort: wild carrot: meadowsweet: hedge bedstraw: lady's bedstraw: meadow cranesbill: field scabious: rough hawkbit: oxeye: bird's-foot trefoil: musk mallow: ribwort plantain: salad burnet: cowslip: selfheal: meadow buttercup: yellow rattle: red campion: common bent: crested dog's-tail: red fescue: small smooth stalked meadowgrass.

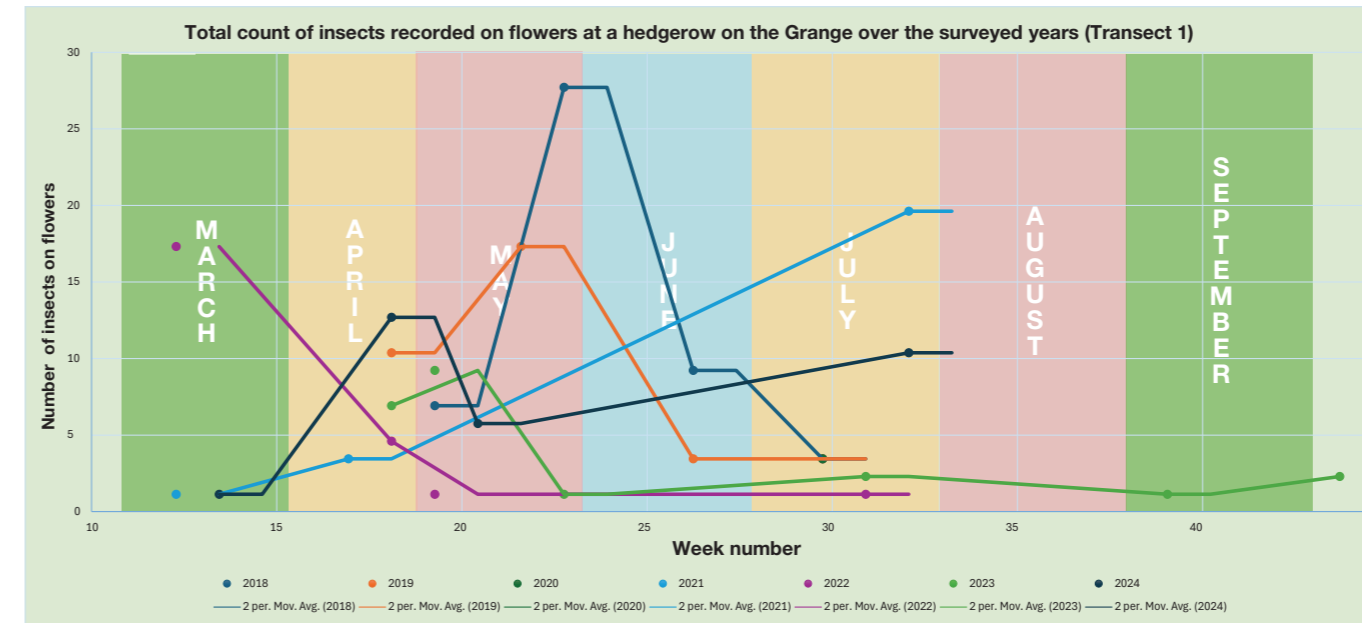


JULY 2018



JUNE 2025

The decline of sown species over time is seen as a natural process which is part of vegetation succession on newly sown fertile farmland. The more fertile soils tend to show this decline more rapidly. The challenge is to reduce the speed of species decline.



EARLY APRIL 2025

This when compared to the meadow shows early flowering (April-May) of some hedgerow trees, shrubs and base vegetation.

# HEDGEROWS

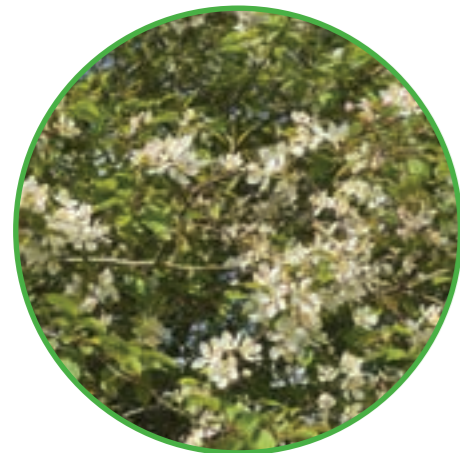
In March, April and May a “spring flush” of blossoms appears on some hedgerow trees and shrubs - especially blackthorn, hawthorn and sallows - along with a variety of flowering hedge bottom plants.

This early bloom gives pollinators their first reliable source of pollen and nectar, long before most commercial seed mixes start producing comparable quantities of flowers. As bees and other insects begin emerging and foraging as early as March, the hedgerows’ early supply of pollen and nectar is essential for their survival.

Most sown flowering species flower later than these hedgerow trees and shrubs. While a few early wildflowers (e.g. ground ivy) exist, they are rarely included in commercial mixes.

A healthy, well managed flowering hedgerow, combined with a diverse base flora and a network of sown flowering habitats across the farmed landscape, provides the optimal mix of early and continuous food sources for insects.

At The Grange, William has mature hedges which contain hawthorn, willow, blackthorn, wild rose and more. They are cut on a rotational basis and supported by bramble, cow parsley, dandelion and red deadnettle. Together with the sown wildflower field margins and meadow, William’s farm provides nectar and pollen from spring through to late autumn.



**The changes of field edges and hedges over time at the Grange**  
Transect 2. Field edge habitat changes over time. 2008 tall grasses and docks dominate. By 2025 bramble and hedge suckers were the dominant vegetation.



JULY 2018



EARLY APRIL 2021



LATE MAY 2025

# VEGETATION SUCCESSION

**V**egetation succession is the natural process by which plant communities change over time. Bare ground progresses through annual, perennial and scrub stages towards more stable climax vegetation such as woodland.

On farmland, this process is usually prevented by cultivating, or otherwise managing, cropped land. Hedgerows are prevented from becoming lines of trees by periodic cutting, coppicing or laying.

Sown wildflower meadows often also require management to prevent vegetation succession.

## The role of soil fertility

Accessible soil fertility can be the enemy of species diversity as it can allow certain fast-growing species to dominate.

Today, wildflower meadows are often established on land which has been taken out of production and where crop yields have been supported by fertiliser. The resulting soil has relatively high fertility, making sown flower rich grassland a challenge to create and maintain.

Regular soil disturbance mineralises nutrients from the organic material in the soil, making them available for plant growth. Ancient hay meadows on alluvial soils are fertile, but because they are no longer cultivated, much of the nutrients remain less available. Similarly, nutrient uptake is also more difficult on chalk and limestone soils owing to their high pH, again allowing more species to coexist.

Farmland soils vary widely in inherent fertility. When planning a grass and flower mix, it is crucial to match the mix, and long-term expectations, to the soil type and fertility levels.

## Practical implications:

### Low fertility soils (index < 2 phosphate):

These offer the best chance of establishing and maintaining a diverse flower mix for longer. Investing in native multi-species mixes is most effective on these “hungry” soils.

### High fertility soils (index > 2 phosphate):

These can still produce shorter term results but require more intensive management to slow the natural process of change, which tends to favour nutrient-hungry species such as grasses.

## Reducing sown species decline on fertile soils

High soil fertility means sown species diversity reduces over time. This process can be slowed by cutting regularly during the first few years and removing cut material to prevent nutrient retention

### Key takeaways:

- Match seed mixes to soil fertility
- Manage competitive dominance by cutting
- Removing the cuttings helps reduce nutrient levels

These steps are essential for increasing the success of quality flower rich habitats within farmed landscapes.

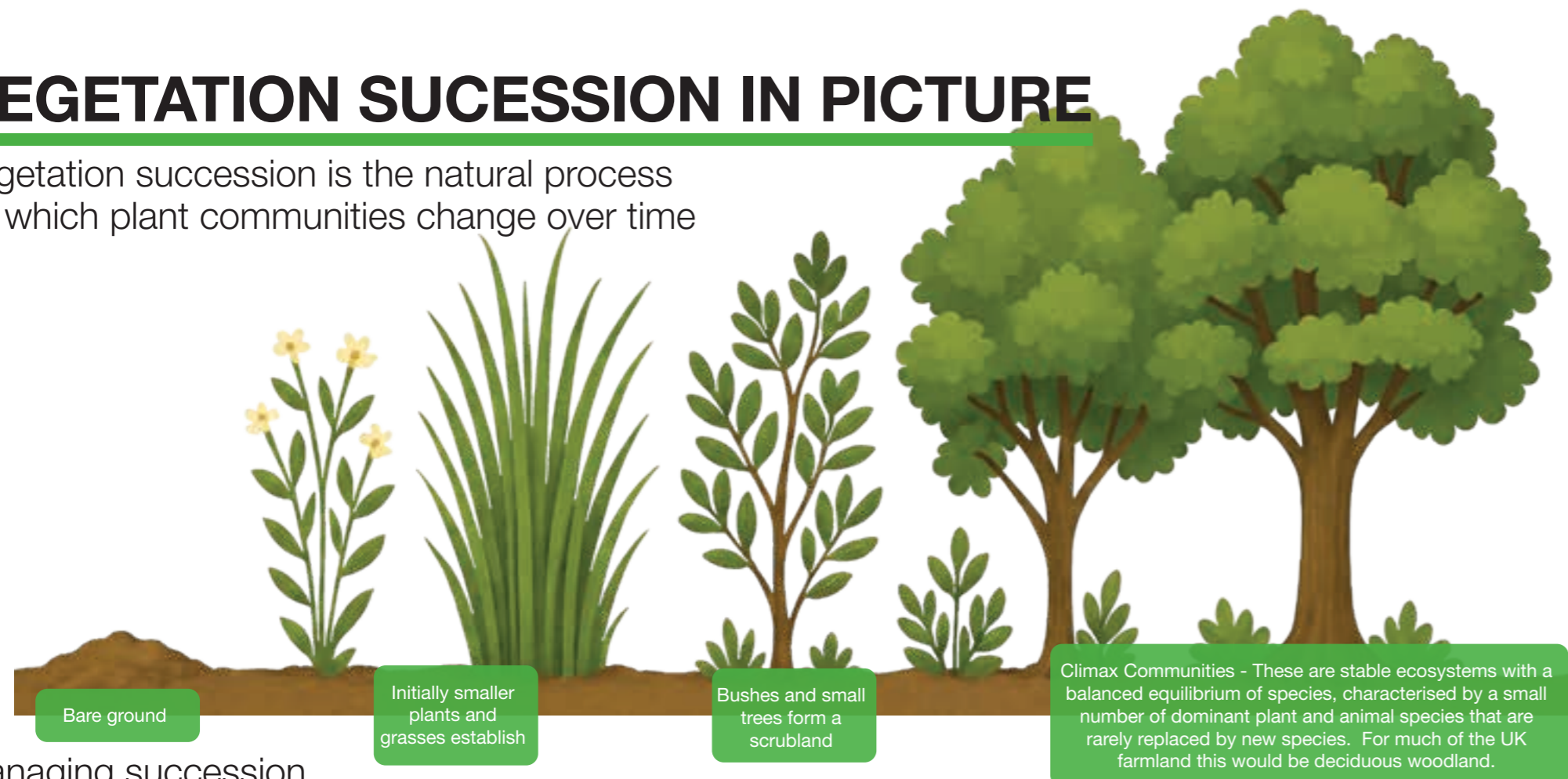


“If you’ve a diverse hedge that flowers, you have a huge part of the insects’ life cycle fueled.”

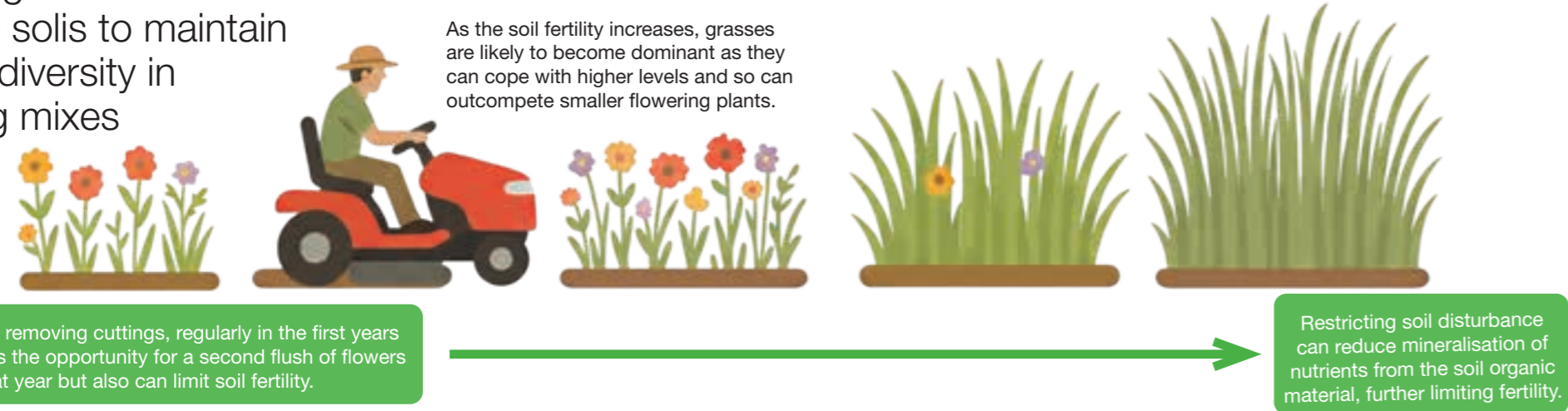
William Pitts, The Grange

# VEGETATION SUCCESSION IN PICTURE

Vegetation succession is the natural process by which plant communities change over time



Managing succession on fertile soils to maintain species diversity in flowering mixes



# ESTABLISHING A FLOWER RICH AREA

## Key considerations

When creating a flower rich area on the farm to ensure success, careful planning and management are essential.

## Where to sow

Choose a warm, sunny, and sheltered location with low soil fertility (ideally a phosphate index below 2). These conditions favour wildflowers over competitive grasses.

## When to sow

- Aim for warming, moist soils for best germination.
- Grass and Flower Mix: **April–May\*** or **July–August\***
- Pollen and Nectar Mix: **April–May\*** or **July–September\***

## Sowing rates

- Floristically enhanced grassland: 80% grass and 20% flowers at 20 kg/ha
- Pollen and Nectar (Legume-Based): 10–12 kg/ha
- Tussocky Grasses: 20 kg/ha

Grass and flower mixes and legume-based options are complementary and worth sowing across the farm to create a matrix of interconnected habitats for maximum benefit.

Tussocky grass is an important habitat for some bumble bees, as well as ground beetles, web building spiders and small mammals.

## How to sow

Good seed-to-soil contact is critical. Prepare a fine, firm, weed-free seedbed and broadcast seed rather than drill. If the seedbed is loose or “puffy”, ring roll before sowing and always ring roll afterwards to consolidate.

## Management for success

Establishment is key. In the first year, regular cutting helps control weeds. Perennials will survive cutting, while annual weeds will not. Cutting annuals means no seed the following year, whereas cutting perennials will allow for flowering the following year.

**Spring cut:** March–April\*  
**Autumn cut:** August–September\*

Where grass is included, remove cuttings to prevent nutrient build-up.

When you are cutting, consider any populations of ground nesting birds you may have in the area and how you might mitigate impact, such as mowing around known nest sites.



\* Due to our changing climate it's difficult to predict sowing dates, but these dates have been reliable in the past.

# THE ROLE OF HEDGES

**H**edge is the Anglo-Saxon word for “hedge”; some existing hedgerows are remnants of ancient woodland, predating the Saxon period. The Enclosure Acts, from the late 1700s through the mid 1800s, prompted widespread hedge planting and dramatically transformed the landscape. After the Second World War, the move to increase food production along with the reduction in labour led to many miles of hedgerow being removed.

Hedges are a vital component of farm biodiversity infrastructure. Hedges represent living archaeology and preserve cultural heritage linked to traditional farming practices. Their presence in the landscape is of both ecological and historical value.

Hedges often support a diverse mix of trees, shrubs, and ground vegetation, providing shelter, habitat and food for invertebrates, birds and mammals. They can also act as wildlife corridors, connecting habitats across the farm and into the wider landscape, helping maintain genetic diversity and resilience against habitat fragmentation.

Hedgerow species such as hawthorn, blackthorn and bramble not only provide fruit for birds but also provide nectar and pollen during early spring and late summer, bridging the “hungry gap” when other floral resources are scarce.

Flowerly margins at the base of hedges can then provide resources in the summer for insects. Numerous insects also overwinter in hedge vegetation; for example, bumblebees hibernate in the base of hedges or in tussocky grasses at their margins and the brown hairstreak butterfly lays its eggs on young blackthorn growth, making this species highly vulnerable to annual cutting.

Woody-hedgerow species grow new wood in year one but flower on two-year-old wood or older, so hard annual cutting destroys any flower delivery. Incremental cutting every 2-3 years allows some flowers each year. In time a hard cut, coppicing or laying on a rotational basis may be necessary to retain a manageable hedge size. Research has shown that cutting in January-February can increase invertebrate diversity by up to 20% when compared to cutting in September - October.

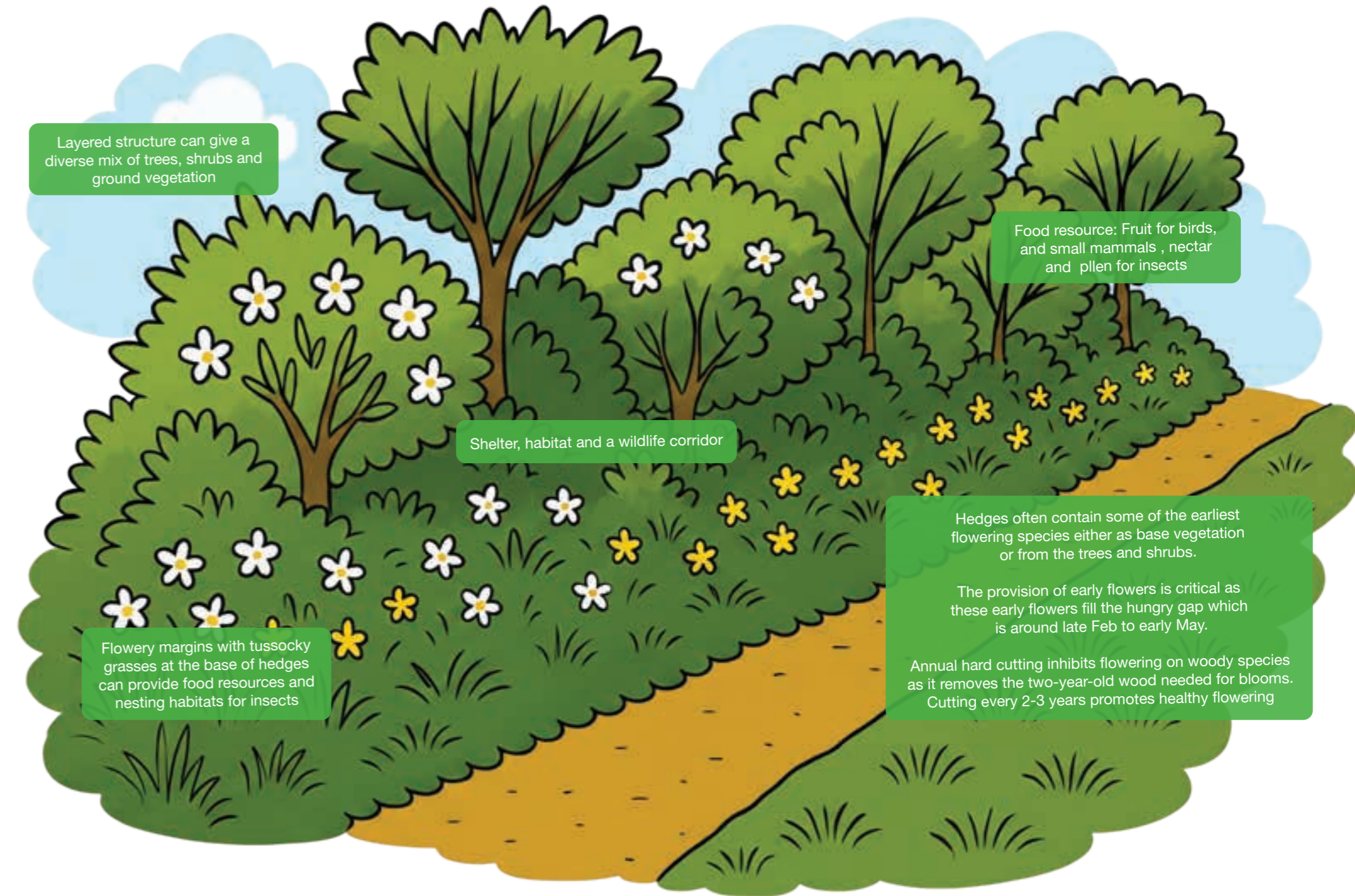
Beyond their role as habitat, hedges deliver multiple ecosystem services. They contribute to carbon sequestration, protect soils from erosion, and buffer crops against wind and extreme weather, enhancing climate resilience. The decomposition of hedgerow leaf litter and deadwood support nutrient cycling.

Over time, well-managed hedges can develop into complex habitats of exceptional ecological value, supporting biodiversity and preserving cultural heritage linked to traditional farming practices.



**“Hedges can develop into complex habitats of exceptional ecological value, supporting biodiversity and preserving cultural heritage”**

William Pitts, The Grange



# THE VALUE OF DIFFERENT HABITATS

Heterogeneity is the cornerstone of effective habitat management across farmland

**H**eterogeneity is a term often used in ecological contexts, referring to habitat differentness.

At The Grange, stone walls, dead wood, bare ground patches, hedgerows, sown and unsown flowering strips with tussocky grass, creates a mosaic of refuge and resource areas that many insect species rely on for foraging and nesting. Without this diversity, populations would struggle to thrive.

Creating diverse habitats, however, is not enough; many must be actively managed otherwise they degrade and a few dominant species outcompete the rest. The most effective way to maintain balance is to stagger management activities - rotating mowing, cutting, or clearing so that no one habitat is disturbed all at once. Although this approach may fragment workload, the long term gains in biodiversity and ecosystem resilience far outweigh the inconvenience.

## Refuges

Provision of refuge areas is essential for the maintenance of robust invertebrate populations.

The size and distribution of these refuges should reflect the behaviour and ecology of the target species. Small solitary bees may travel only around 400 m between nest and forage, so food sources and nesting sites must be closely linked.

In contrast, species such as the buff tailed bumblebee can travel several kilometres, allowing them to exploit more widely distributed resources. This highlights the importance of designing habitat networks that support both short and long range foragers.

**Different farm habitats support different groups of insects. A higher proportion of bumblebees were observed in meadows and flower rich margins, while butterflies and mining bees were more numerous in and around hedgerows. Habitat value reflects not only flowering plants and their foraging potential but also shelter and breeding sites for insects.**

## Overlooked habitats

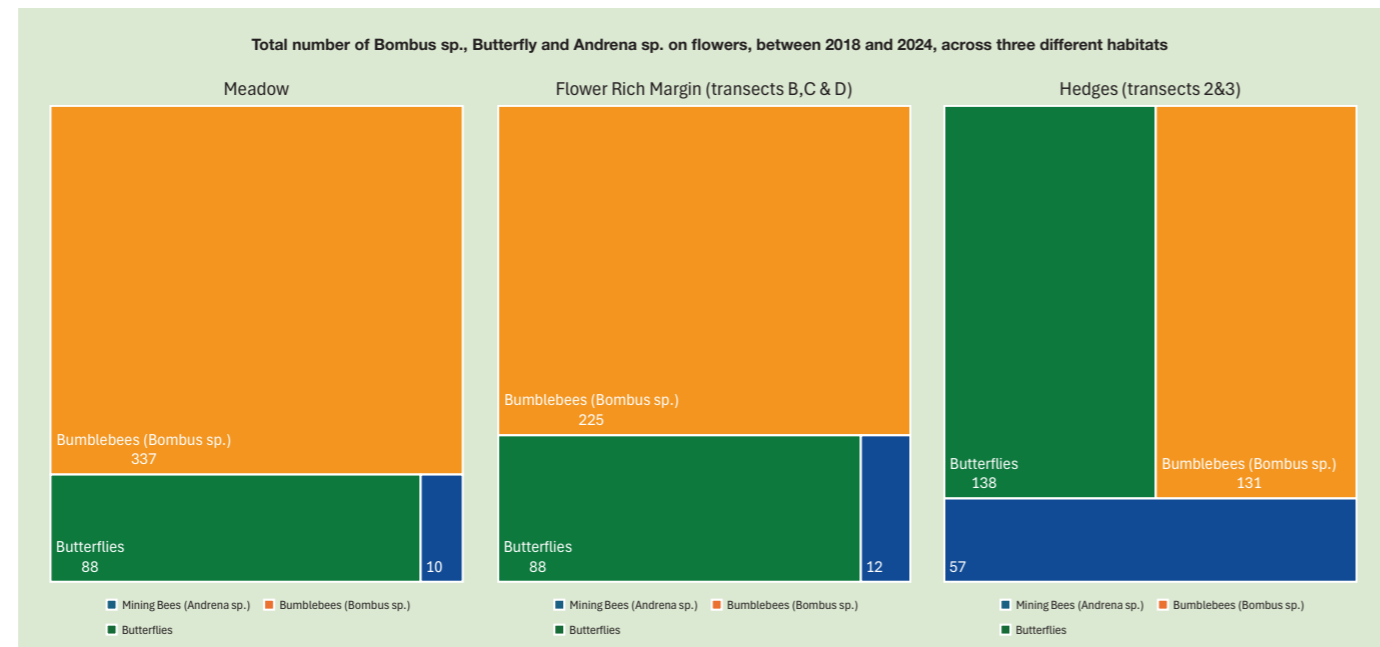
Often-overlooked habitats on farms can play a crucial role in supporting pollinators and enhancing biodiversity. For example:

- Some brambles along field edges provide a useful supply of nectar and shelter
- Stone walls offer warm, protected crevices for solitary bees and other beneficial insects
- Tussocky grass margins create ideal nesting sites for bumblebees, ensuring populations thrive throughout the year

By valuing and maintaining these habitats, farmers can strengthen pollinator diversity and resilience, contributing to healthier ecosystems and more sustainable agricultural landscapes.

## Create habitat diversity by:

- Cutting hedges on rotation to enable flowering on second year growth
- Sowing flowers in blocks, enables different cutting dates which provides greater flowering succession
- Reduced mowing to allow early flowers such as dandelions to flower in areas like grass tracks
- Leaving some small areas of sunny bare ground for mining bee nesting



**“It is so tempting to leave a wildflower meadow when it looks fabulous in late summer and autumn and the barn owls fly overhead. I’m guilty and now some of my meadows are degrading.”**

William Pitts, The Grange



# MEET THE POLLINATORS



Large White Ashy Mining Bee Yellow-legged Mining Bee

Chocolate Mining Bee Dragonfly Garden Bumblebee

Small White Ringlet Orange-tip

Small Tortoiseshell Buff-tailed Bumblebee

Vestal Cuckoo Bee Brimstone Short-fringed Mining Bee

Buff-tailed/White-tailed Bumblebee

Burnetts Peacock Grey-patched Mining Bee Nomad Bees

Common Mini-miner Painted Lady Common Blue

Orange-vented Mason Bee Red-tailed Bumblebee

Comma Meadow Brown Gwynne's Mining Bee

Base-branded Furrow Bee Honey Bee

Small Skipper Hoverfly White-tailed Red Admiral

Mining Bees Flies Hairy-footed Flower Bee



# BUTTERFLIES



Renowned for their colour and beauty, butterflies have a unique place in British culture and are often the subject of citizen science. From an ecological perspective, they are also noteworthy. Sensitive to changes in microhabitat quality, they can be a useful indicator species.

At The Grange, 22 butterfly species were observed. The most frequently seen in flight was the Meadow Brown. It is the most abundant butterfly species in grassland habitats in the UK.

The Large White (or Cabbage White) was the most commonly seen (69 times) butterfly feeding on flowers. The abundance of this species was linked to the many cover crops that contained Brassicaceae, its food plant. Although Large Whites are often considered a pest as the larvae feed on brassicas, like all butterflies, they are an essential element of the food web. Their eggs are eaten by spiders and beetles, and, in the larvae and adult stages, they are a vital food source for birds.

The most well-travelled of the butterflies seen at The Grange was the Painted Lady. Ten were seen in flight and 34 recorded as they fed on flowers. These butterflies migrate from North Africa, the Middle East, and central Asia, to mainland Europe and the UK each year. Successive generations complete a successful 7,000 km round trip.

## Weather effects

Data collected at The Grange mirrored that of national butterfly surveys showing how the weather impacts populations.

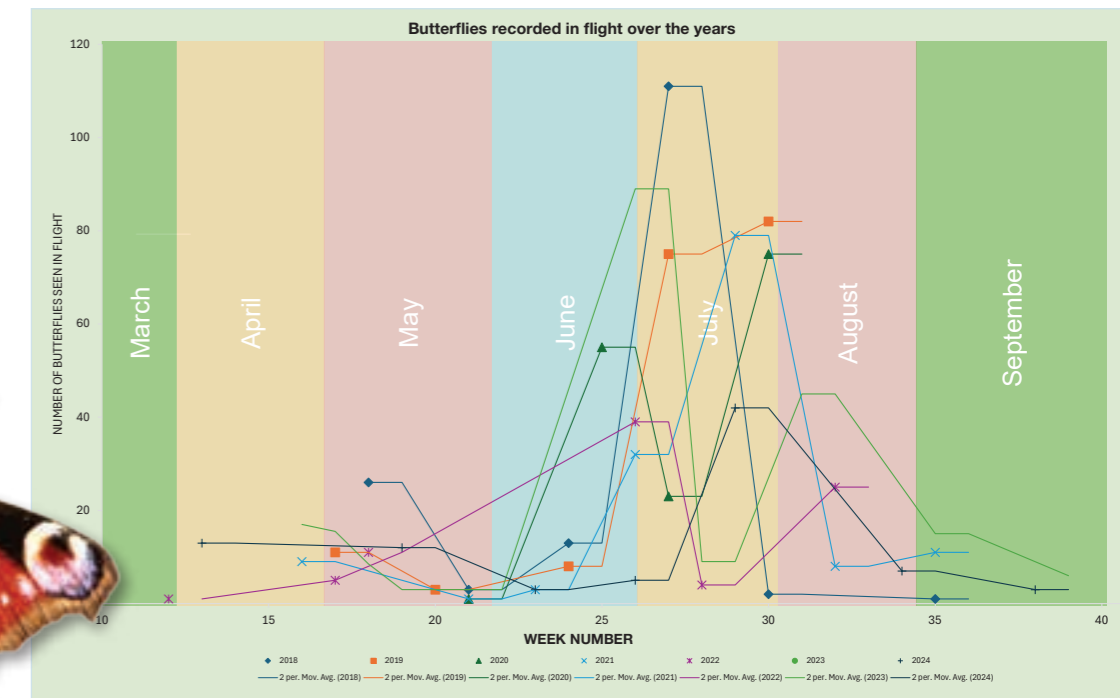
In 2018, 2019 and 2020, favourable weather i.e. warm and dry conditions, enabled flight and foraging behaviour, ensuring butterflies had the reserves needed for reproduction. However, in 2021, 2022 and 2024, the cold and wet springs hampered butterfly development.

At The Grange, butterfly populations peak in July.

Butterflies recorded at the Grange			
Total Sighting Recorded 1558	In Flight	On Flowers	Total
Meadow Brown ( <i>Maniola jurtina</i> )	556	4	560
Large White ( <i>Pieris brassicae</i> )	114	69	183
Ringlet ( <i>Aphantopus hyperantus</i> )	92	1	93
Peacock ( <i>Inachis io</i> )	72	3	75
Small Skipper ( <i>Thymelicus sylvestris</i> )	66	2	68
Small Tortoiseshell ( <i>Aglais urticae</i> )	66	21	87
Small White ( <i>Pieris rapae</i> )	62	42	104
Common Blue ( <i>Polyommatus icarus</i> )	50	5	55
Gatekeeper ( <i>Pyronia tithonus</i> )	40	5	45
Orange-tip ( <i>Anthocharis cardamines</i> )	39	3	42
Brimstone ( <i>Gonepteryx rhamni</i> )	34	6	40
Green-veined White ( <i>Pieris napi</i> )	21	7	28
Painted Lady ( <i>Vanessa cardui</i> )	10	34	44
Comma ( <i>Polygonia c-album</i> )	4	43	47
Red Admiral ( <i>Vanessa atalanta</i> )	4	41	45
Small Blue ( <i>Cupido minimus</i> )	4	0	4
Speckled Wood ( <i>Pararge aegeria</i> )	4	0	4
Small Copper ( <i>Lycena phlaeas</i> )	3	26	29
Brown Argus ( <i>Ancia agestis</i> )	2	0	2
Dark Green Fritillary ( <i>Argynnis aglaja</i> )	1	0	1
Holly Blue ( <i>Celastrina argiolus</i> )	1	0	1
Wall Brown ( <i>Lasiommata megera</i> )	1	0	1

Day-Flying Moths recorded at the Grange			
Total Sighting Recorded 39	In Flight	On Flowers	Total
Burnetts ( <i>Zygaeninae sp</i> )	29	5	34
Silver Y ( <i>Autographa gamma</i> )	3	0	3
Cinnabar ( <i>Tyria jacobaeae</i> )	1	1	2



# BEES

There are at least 270 species of bee in the UK. The majority of species - over 250 - are solitary, 24 are bumblebees and only one is a honeybee.

Mining bees are a subset of solitary bee, and, in the UK, there are around 60 different species. Identifying the different types of bee while they fly and feed is difficult, but 13 species of mining bee were confidently identified at The Grange. Others, whose species couldn't be identified were recorded as 'mining bees'.

13 bumblebee species, five cavity bee species, and four cuckoo bee species were also identified.

The most commonly seen bumblebees were the Buff-tailed and White-tailed bumblebee. Both species are common, widespread, and play vital roles in both natural and agricultural ecosystems. They are both ground nesters and emerge in spring.

Honeybees, hoverflies, dragonflies and longhorn beetles were also observed both flying and feeding within the transects.

Mining Bees recorded at the Grange			
Total Sightings Recorded 779	In Flight	On Flowers	Total
Mining Bees ( <i>Andrena</i> sp)	90	93	183
Base-Banded Furrow Bees ( <i>Lasioglossum</i> sp)	68	149	217
Common Mini-miner ( <i>Andrena minutula</i> )	49	51	100
Short-fringed Mining Bee ( <i>Andrena dorsata</i> )	35	35	70
Grey-patched Mining Bee ( <i>Andrena nitida</i> )	23	25	48
Orange-tailed Mining Bee ( <i>Andrena haemorrhoa</i> )	20	19	39
Yellow-legged Mining Bee ( <i>Andrena flavipes</i> )	19	22	41
Chocolate Mining Bee ( <i>Andrena scotica</i> )	14	14	28
Gwynne's Mining Bee ( <i>Andrena bicolor</i> )	11	10	21
Ashy Mining Bee ( <i>Andrena cineraria</i> )	9	9	18
Tawny Mining Bee ( <i>Andrena fulva</i> )	4	4	8
Davies' Colletes ( <i>Colletes daviesanus</i> )	5	0	5
Hawthorn Mining Bee ( <i>Andrena chrysoseles</i> )	2	2	4
Buffish Mining Bee ( <i>Andrena nigroaenea</i> )	1	1	2

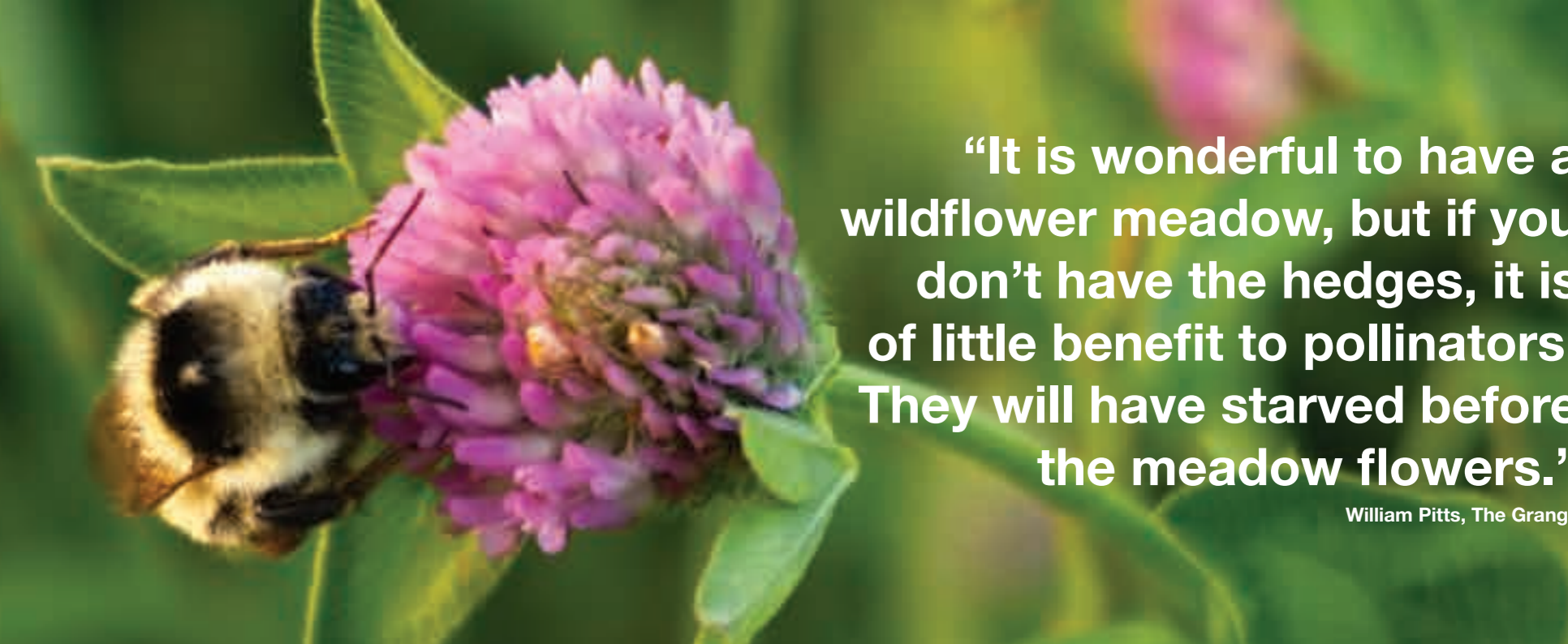
Bumblebees recorded at the Grange			
Total Sightings Recorded 2100	In Flight	On Flowers	Total
Buff-tailed/ White-tailed Bumblebee ( <i>Bombus terrestris/lucorum</i> )	521	352	873
Red-tailed Bumblebee ( <i>Bombus lapidarius</i> )	377	263	640
Common Carder Bee ( <i>Bombus pascuorum</i> )	200	139	339
Buff-tailed Bumblebee ( <i>Bombus terrestris queen</i> )	53	55	108
Early Bumblebee ( <i>Bombus pratorum</i> )	16	19	35
Garden Bumblebee ( <i>Bombus hortorum</i> )	17	15	32
Vestal Cuckoo Bee ( <i>Bombus vestalis</i> )	14	14	28
White-tailed Bumblebee ( <i>Bombus lucorum queen</i> )	9	12	21
Large Garden Bumblebee ( <i>Bombus ruderatus</i> )	5	4	9
Tree Bumblebee ( <i>Bombus hypnorum</i> )	3	4	7
Bumblebees ( <i>Bombus</i> sp)	4	2	6
Red-shanked Carder Bee ( <i>Bombus ruderarius</i> )	1	1	2

Cavity Bees recorded at the Grange			
Total Sightings Recorded 186	In Flight	On Flowers	Total
Hairy-footed Flower Bee ( <i>Anthophora plumipes</i> )	93	34	127
Red Mason Bee ( <i>Osmia bicornis</i> )	35	1	36
Mason Bees ( <i>Osmia</i> sp)	6	3	9
Leafcutter and Mud Bees ( <i>Megachile</i> sp)	6	1	7
Orange-vented Mason Bee ( <i>Osmia leaiana</i> )	1	6	7

Cuckoo Bees recorded at the Grange			
Total Sightings Recorded 81	In Flight	On Flowers	Total
Nomad Bees ( <i>Nomada</i> sp)	45	6	51
Common Mourning Bee ( <i>Melecta albifrons</i> )	13	6	19
Mourning Bees ( <i>Melecta</i> sp)	8	1	9
Blood Bees ( <i>Sphecodes</i> sp)	2	0	2

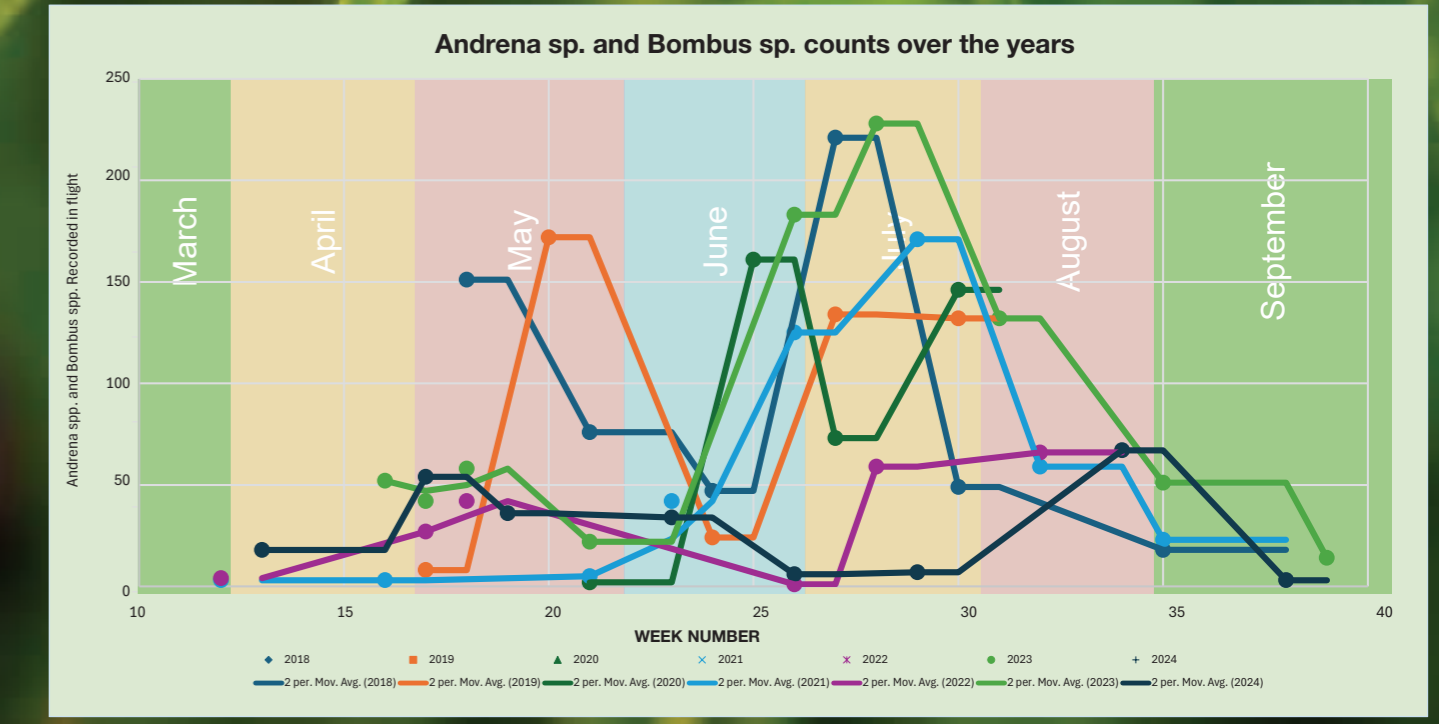
Other Insects recorded at the Grange			
Total Sightings Recorded 1855	In Flight	On Flowers	Total
Honey Bee ( <i>Apis mellifera</i> )	742	970	1712
Greater bee Fly ( <i>Bombylius major</i> )	17	13	30
Hoverfly sp	7	42	49
Dragonfly sp	1	25	26
Flies ( <i>Myopa</i> sp)	1	23	24
Damselfly sp	9	1	10
Greater bee fly ( <i>Bombylius major</i> )	1	1	2
Longhorn Beetle sp	1	0	1
Bumblebee Mimic Hoverfly ( <i>Volucella bombylians</i> )	1	0	1



“It is wonderful to have a wildflower meadow, but if you don't have the hedges, it is of little benefit to pollinators. They will have starved before the meadow flowers.”

William Pitts, The Grange

Mining Bees and Bumblebees (*Bombus* spp.) recorded in flight over the years.



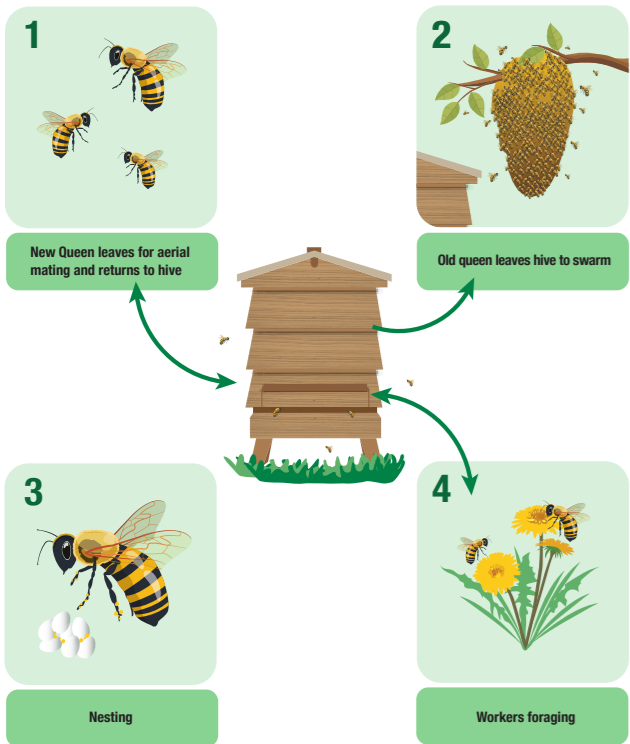
# BEE LIFECYCLES

Bumblebees, solitary bees and honeybees lead very different lives and consequently require different habitats for their survival.



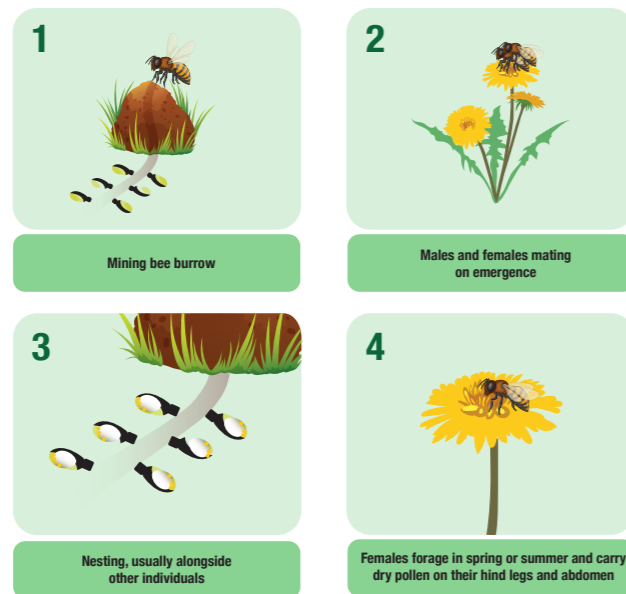
## Honey Bee Lifecycle

Perennial Colony



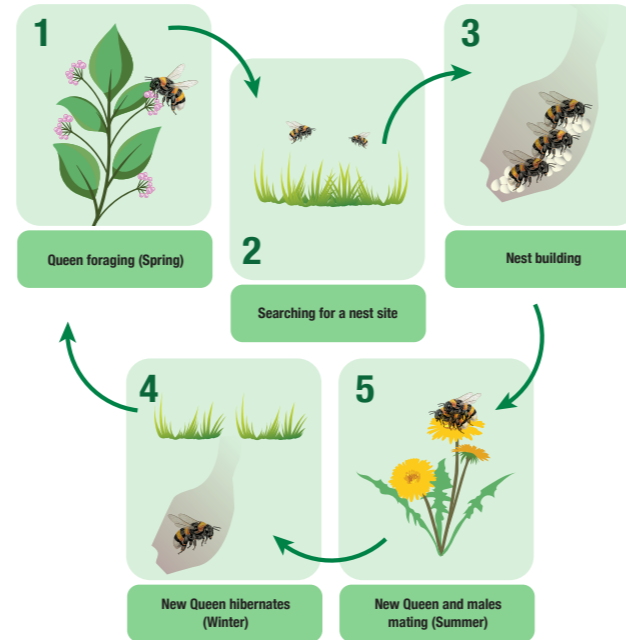
## Solitary Mining Bee Lifecycle

Annual with one or sometimes two generations a year



## Bumblebee Lifecycle

Annual, one lifecycle



“Farmland management practices can have valuable unintended consequences. Direct drilling, which leaves soil undisturbed and benefits ground-nesting bees. Deliberately leaving patches of bare soil and tussocky grass to preserve nesting sites can also help these species.”

Marek Nowakowski, Independent Wildlife Expert



Brown Hairstreak butterfly

# INFLUENCE OF THE WEATHER

## Weather at The Grange

When analysing the effects of temperature and rainfall on pollinator populations at The Grange, two years stand out and provide useful comparisons.

## Rain hinders pollinators

Wet weather can threaten pollinator survival. It hinders their flight and makes foraging difficult, if not impossible. A raindrop can weigh as much as a small pollinator; this, combined with the associated reduction in temperature slows the biochemical reactions in their flight muscles.

With honey in the hive, honeybees can choose not to venture out in bad weather. Bumblebees and solitary bees, unfortunately, do not have the same choice; they only have a short time to carry out their various seasonal activities.

Both will try to hide under leaves and flowers. Bumbles can vibrate their wings to generate heat but in doing so use up the last bit of energy and many die. Solitary bees can't 'shiver' so many, especially the smaller solitaires die of cold.

In spring 2019, high numbers of bees and butterflies were recorded, with an early peak in May. A population crash coincided with the high rainfall in June, but numbers bounced back through the summer.

The initial populations seen in March 2024 dropped significantly in surveys later that spring, as the warmer weather coincided with high rainfall.

	2019	2024
Spring (Mar to May)	0.7°C warmer* 105% of average rainfall**	1.3°C warmer+ 132% of average rainfall +
Summer (Jun to Aug)	0.8°C warmer* 140% of average rainfall**	0.22°C cooler + 95% of average rainfall+

\* than the 1981–2010 average \*\* of the 1981–2010 average  
+ than the 1991–2020 average

## Sunshine more important than temperature

In 2019, when sunshine hours were, generally, above the long-term average in spring and summer, pollinator activity was relatively high. However, in June sunshine hours fell below average, as did the insect activity observed at The Grange.

Sunshine plays an important role in insect activity; it is more effective at warming insects and enabling them to be active than air temperature.

## Weathering climate change

The UK's climate is changing, with trends towards warmer, wetter winters, hotter, drier summers, and more frequent, intense extremes such as heavy rainfall and heatwaves.

These shifts in weather patterns can lead to an ecological mismatch. Species that depend on each other, such as flowering plants and pollinators, can fall out of sync, particularly as plants tend to adjust their seasonal timings more quickly than insects. Some plants have already begun responding to the warmer springs we are experiencing, flowering earlier than historical norms, often before insects emerge.

This mismatch in Spring activity means insects may have fewer food sources when they come out of hibernation, forcing them to forage further and for longer. Specialist insects that have a narrow range of food sources are most vulnerable, as they cannot easily switch to alternative plants. At the same time, plants may lack the insect activity needed for pollination.

### TOP TIP

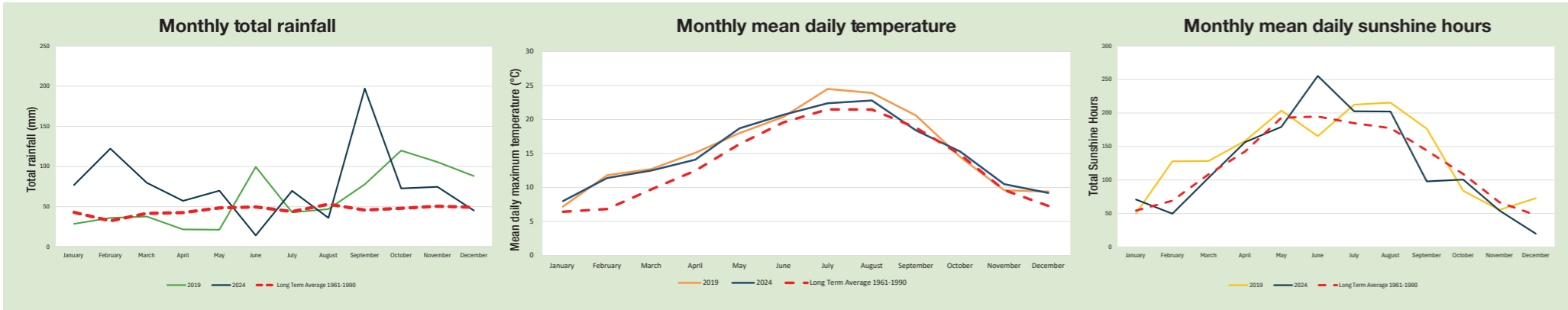
Ensuring a variety of flowering plants are available in early spring can help reduce the likelihood of forage availability when pollinators emerge.



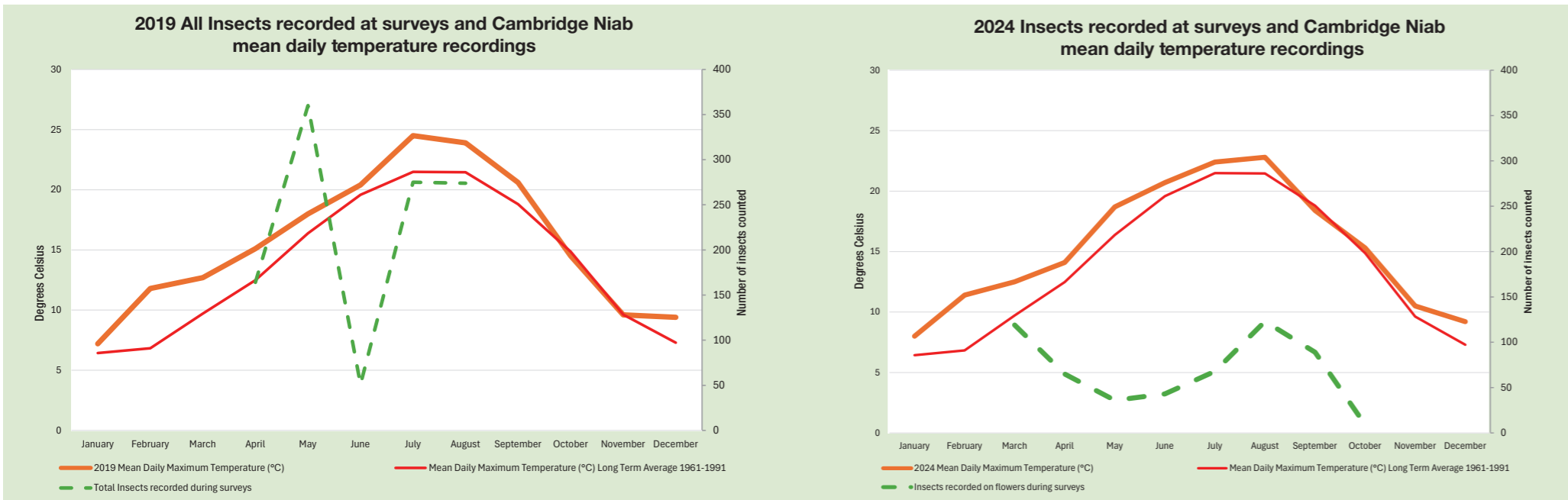
# MET OFFICE GRAPHS

Met Office weather station data  
Cambridge Niab - 37km East of The Grange

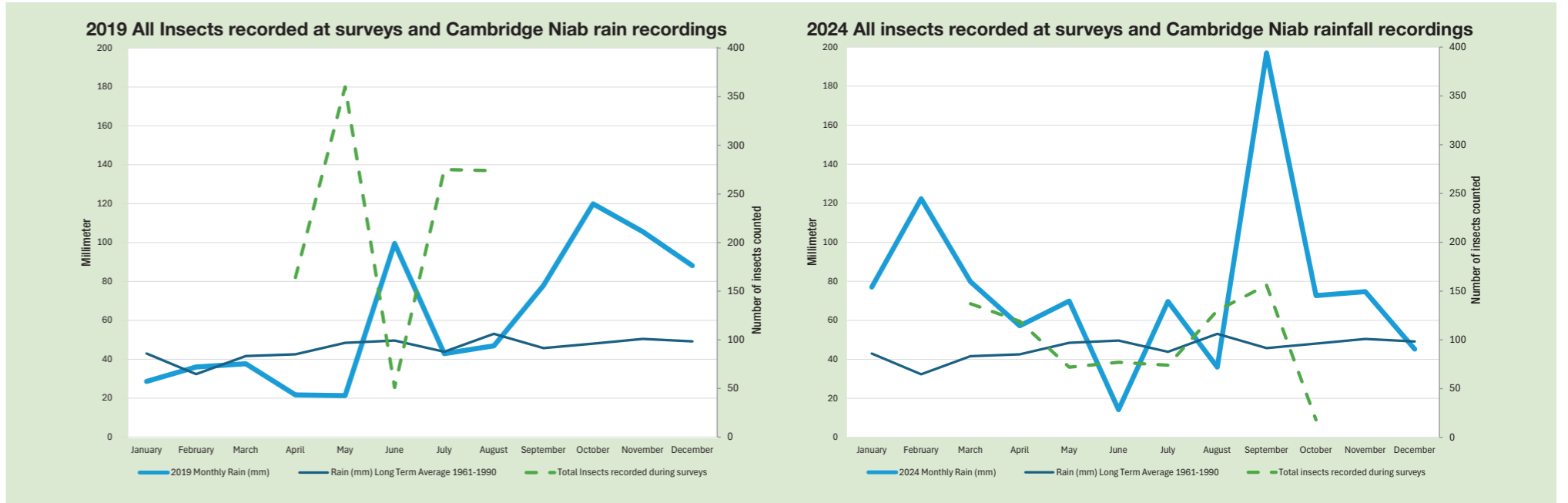
2019 had a relatively warm and wet start to the season, this coincided with an early peak in bee sightings. 2024 saw a colder and wetter spring which coincided with low bee numbers.



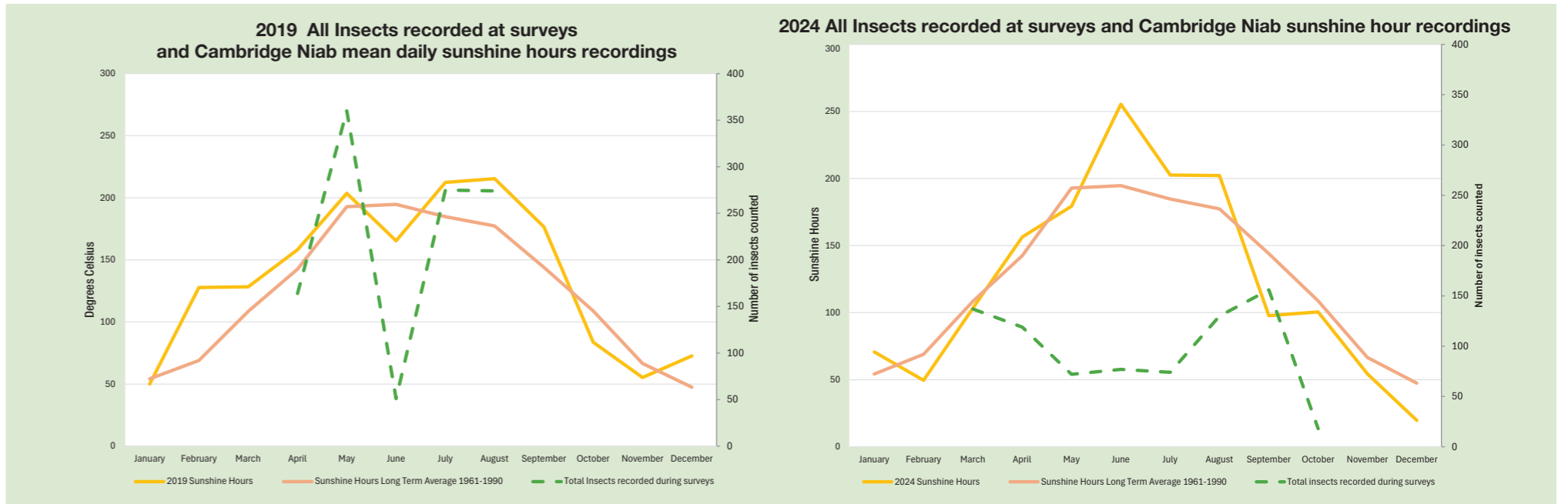
All insects recorded in surveys, in flight and on flowers, in 2019 and 2024 and their correlation to temperature



All insects recorded in surveys, in flight and on flowers, in 2019 and 2024 and their correlation to rainfall



All insects recorded in surveys, in flight and on flowers, in 2019 and 2024 and their correlation to sunshine hours



# REFLECTIONS AND CONCLUSIONS

## Marek's conclusion

It is well established that pollinators require continuity in forage sources and many activities within agri-environment schemes seek to replace lost flower rich habitats which would have historically provided nectar and pollen from spring through to autumn. Yet somehow, flower supply has seldom, if ever, been properly assessed on an 'ordinary' farm. This study addresses that knowledge gap.

After eight years of walking and recording plant and pollinator activity at The Grange, we showed conclusively that the right combination of unsown and sown flower species are indeed capable of providing an unbroken supply of pollen and nectar throughout the season, provided farm regimes and habitats are planned and managed correctly.

That usually means creating additional habitats.

Most of the sown flowers included in seed mixtures tend to bloom too late for many pollinating insects. So, even with sown wildflower habitats, it often falls upon the farm's wild, indigenous wayside blooms and blossoms to fill an important early 'hungry gap' in spring. Sown species, however, may come into their own later on, when pollinator abundance is greatest.

By extending this study over several years we witnessed the variations that come with unpredictable weather, different crop choices and 'early' and 'late' springs. Importantly, we saw how populations were able to bounce back when given access to diverse habitats and forage sources.

We hoped that from our results we could infer similar patterns on farms more generally and seek to inform and improve flower provision across the UK's farmed landscape.



**By opening the gates of The Grange to visitors, the landscape became the teacher. Walking the transects with policy makers and regulators, helped ground truth their work and decision-making.**

## BASF reflections

We began this journey with a clear challenge; to open up the narrative through a science-led approach.

Treating the need for affordable, nutritious food and the decelerating decline of biodiversity as competing demands undermines the efforts of countless farmers, is counterproductive and hinders progress.

Eight years later, the project has achieved its goals. Yet, given the constantly shifting environmental and political landscape, the work is far from over. Sustained adaptation and ongoing commitment will be essential for the long-term success of the agricultural industry.

Our experience at The Grange has given us both the data and the platform to prove that we do not have to choose between farm productivity and pollinators.

## Collaboration is key

Arguably one of the most profound conclusions drawn from the project is that the solutions are fundamentally human and collaborative.

The successes we've seen on this journey hinged on forging robust links. The most obvious being those between farmer, William, and pollinator expert, Marek; and those of the pollinators and their habitats.

Less obvious, but equally important, were the industry stakeholders who saw the project in person.

For many of the farmers that joined us, it was an opportunity to return to their own land armed with a benchmark, a deeper understanding of pollinator needs and some practical actions, as well as the confidence and support to try something new. There is nothing quite like seeing the impact of action, to install belief that change is possible.

## Pursuing perfection for pollinators

Collaboration isn't just a human endeavour. Like many farms in the UK, The Grange has a multitude of habitats. By strategically creating, managing and enhancing them, the farm's ecosystem is more productive and resilient.

Some of the tactics used at The Grange required time and money. Buying wild cultivars, removing weeds from newly sown wildflower areas, are two good examples. However, there were also activities where 'less was more'. For instance, leaving hedges uncut and not clearing the scrub beneath them. It is these points that are the crucial lessons in habitat management.

They demonstrate that true restoration is not solely dependent on costly interventions, but can equally rely on respecting the subtle, resilient processes already at work within the landscape.

## Contribution to the bigger picture

If the collaboration provided the process, the eight-year longitudinal dataset provided the proof.

The continuity of the study, spanning annual cycles and seasonal shifts, has delivered understanding beyond seasonal variation and anecdotal evidence. It established a robust benchmark of pollinator performance and allowed us to differentiate between short-term influences and systemic, long-term trends.

The transect data captured across varied habitats, from the open meadow to the protected microclimates adjacent to the stone buildings, equipped us with an ability to explore the structural components of the agroecosystem and its pollinators. We were not just counting bees; we were mapping the interconnected value of the margins, hedgerows, cultivated and uncultivated wildflower species.

It is the breadth and depth of this data, that makes a significant and valuable contribution to a body of evidence that is crucial to demonstrating that crop production and pollinators can both thrive on the same farm.

## Looking ahead: the path to scale

Ultimately, this study has shown that we have a vital role to play in facilitating the exchange of knowledge: connecting scientists, policymakers, farmers, and industry leaders. Throughout this book we wanted to demonstrate that the lessons learned at The Grange can, and are already in some cases, be shared throughout the industry and importantly, beyond.

To William Pitts, the farm host, whose deep dedication made this study possible; to Marek Nowakowski, whose precision established the scientific integrity; and to all the supporting organisations and visitors who contributed their time and intellectual curiosity—thank you. You have collectively written a crucial chapter...and one that will be a catalyst for the next.

**Alice Johnston**

Head of Technical Management  
BASF Agricultural Solutions UK & Ireland

**Rob Gladwin**

Agricultural Sustainability Manager  
BASF Agricultural Solutions UK & Ireland



# HOW CAN YOU HELP

## Hedgerows

- Adopt incremental hedge cutting - cut hedges every 2–3 years instead of annually
- Aim for diversity of species with staggered flowering windows
- Allow the plants at the base of the hedge to regenerate

## Wildflowers meadows

- Native flowers, though more expensive, are generally better than agricultural shorter-lived cultivars. Don't be drawn to the cheaper flowering mixes as they often deliver brief bursts of colour but limited ecological value — and require more frequent re sowing
- Broadcast seed onto a fine firm seedbed at the optimum time
- Repeated cutting in the first year to reduce competitive growth is essential. Cutting in subsequent years can be done in early spring (March) and or late autumn (September)

## Marginal habitats

- Preserve what you already have. Existing habitats often deliver the greatest long term benefit
- Leave dandelions in grassy areas to maintain one of the earliest and longest flowering windows on the farm
- Don't cultivate or lightly drill field corners, they offer nesting sites for ground nesting bees and reduce disturbance
- Reduce deep soil disturbance to support higher invertebrate numbers

## Strategy development

- Make the most of grant schemes - offset the costs
- Seek qualified, practical advice - ecologists, stewardship advisers or trained agronomists can help you
- Monitor the flowering window across your farm - identify gaps & fill them
- Aim to add diversity – different habitats, flower structures, for example
- Consider what grows naturally locally – it is most likely suited to your conditions and thrive

## Final word

In this book, we've outlined the challenges that pollinators face, and while it is essential that we recognise the overall decline, it is also important to recognise the successes.

Research shows that in nature-friendly farming, butterfly abundance is 53% higher than in the wider countryside, and between 1980 and 2013, the crop-pollinating Ashy Mining Bee population increased over five-fold.

Taking steps to help pollinator species does help.

Like our team, you may find fluctuations year to year with the weather and other external drivers impacting individual species, but the steps above will help build resilience and mitigate against some of the wider pressures at play.



## Further reading

- Habitat Creation and Management for Pollinators by Marek Nowakowski and Richard Pywell (This book can be found on the UKCEH website).
- UKCEH e-Surveyor - a free mobile app for farmers and landowners to assess the quality of habitats they manage (<https://esurveyor.ceh.ac.uk/>)
- UKBMS UK Butterfly Monitoring Scheme. Wider Countryside Butterfly Survey
- Bumblebee Conservation Trust Bee Walk Survey Scheme
- UK PoMS (UK Pollinator Monitoring Scheme) <https://ukpoms.org.uk/>. A national scheme running since 2017.

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3. <https://ukbms.org/latest-results>
4. <https://www.bumblebeeconservation.org/wp-content/uploads/2026/03/BeeWalk-Annual-Report-2026-02.26.pdf>
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6. Solitary bees, for example, fly less in windier conditions in comparison with honeybees and bumblebees.
7. The abundance of each species was not recorded.
8. Sown describes plants found in established stewardship mixes, and unsown describes those that occur naturally without intervention.





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