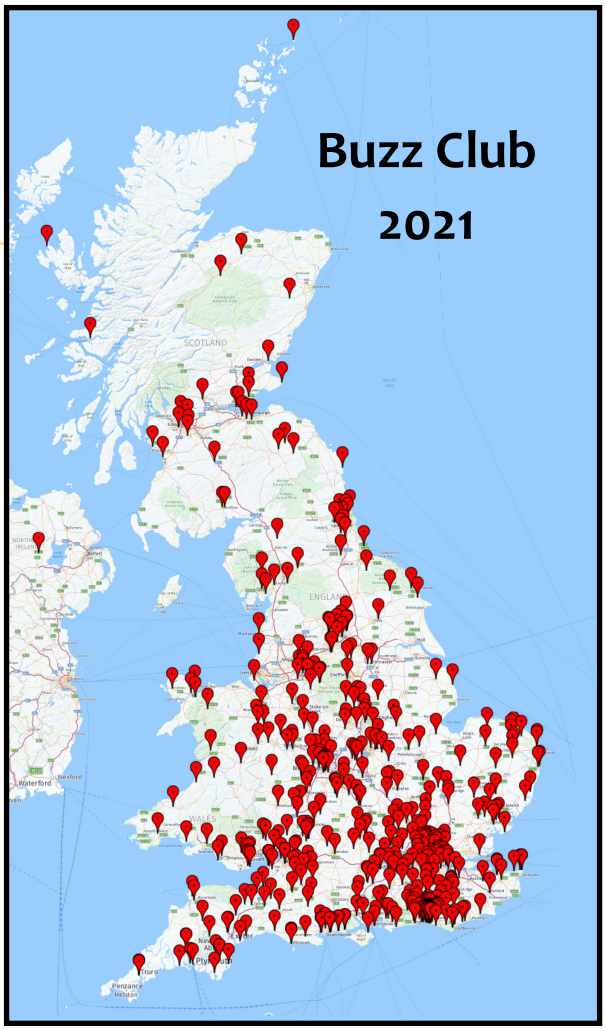
Newsletter

University of Sussex

A later newsletter this year, since one of our new projects kept going until the end of October. So it's a much chillier setting for the 2021 update, but with an equally warm welcome to new and returning members alike.

2021 has been a year where science and biodiversity have really been under the spotlight, in many fields. Our base at the University Of Sussex opened up again (carefully) but we've stayed active on digital channels more than ever. Close to home, Dave Goulson's latest book 'Silent Earth' hit the shelves in August, calling for **real** commitment to action on insect declines.

Inside this issue:



But one definite constant for us has been the ongoing enthusiasm of our fantastic Buzz Club members, taking part in projects, setting aside space and time for insects, and supporting what we do!

Membership

The Buzz Club has continued to grow this year, with members coming from all over the UK & Ireland—and wider afield; with a few folks signing up from Canada, Norway and the USA as well as across Europe.

We focus on data collection from the UK—since that's where the Team and our research is generally based—but there is nothing to stop folks using the methods in other countries. The insects that get involved might differ, but the actual activities will work fine, and we're still very much interested in your real-life experiences and feedback on what happens.

Maybe one day we'll even have full international project options! (Mantid Mansions? Or Hoverfly Hotsprings?)

Can you spot yourself on our map?

Polli-Nightors

A project looking at the nocturnal insect life found in our gardens. Since we are still working on this project's final form, we're testing out different approached and methods - so your feedback is very helpful!

The second year of Polli-Nightors expanded its nocturnal invertebrate-recording to include more sites – such as using windows lit from within, and around security lights – that are less classically 'gardens', making it possible for volunteers without much green space to be able to join in.

Between May and September, Polli-Nightors Count recorded **1433 insects**, with the majority being mosquito-like flies (**652**) and moths (**560**) (Figure 1). These are the same big categories as last year, although this time flies made up the lead. Also commonly spotted were spiders, woodlice, lacewings, beetles, and earwigs (which showed up earlier in *this* project than their own Earwi'GO!); all of these were in lower numbers than moths and flies, but are also less able / likely to fly into your torch beam.

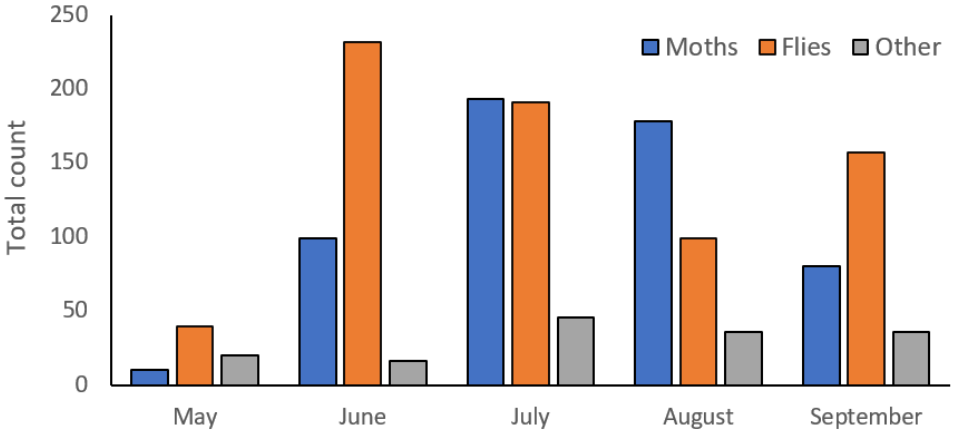
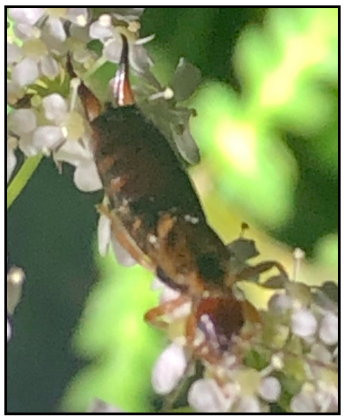


*Figure 1: **Total** counts of **all invertebrates** spotted in Polli-Nightors 2021, by **month**.*



Excuse me ma'am, you are in the 'wrong' project.

In characterising their sites, most participants had 'dim' gardens by our categories, without many other sources of light that they could control. None of these categories showed any patterns with the count data (at this stage).

We also tried a few other possible additions to the project such as looking for night-pollinator plants (none of the options tried got enough visits to take forward), and using a UV torch to do night searches (which made some pretty photos, but did not help to find more insects).

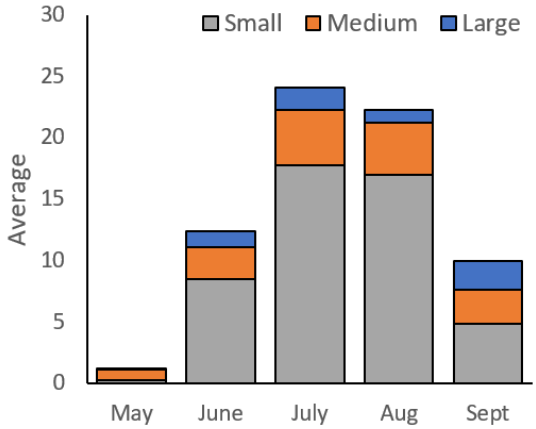


*Figure 2: **Average** counts of **moths** by **month**; in simple size groups*

July and August were the peak moth months, considering both total counts *and* averaged data (Figure 2); June had the most flies. May saw few records for any invertebrates, but was *particularly* bad for moths. It was a notably wet month, and indeed Butterfly Conservation's data for 2021 show a bad year for butterflies and moths in general[1], with that May likely a big contributor to this.

So when considering wildlife gardening actions going forward, it would be good to focus on strategies that provide **shelter and food** for pollinators in this **early part of the year** (whatever the weather does).

1) See: https://butterfly-conservation.org/news-and-blog/big-butterfly-count-2021-sees-lowest-ever-number-of-butterflies-recorded for 2021 Butterfly Conservation data on UK lepidoptera.

Hoverfly Lagoons

Creating homes for overlooked pollinators, using a container of water and decomposing plant material to mimic natural 'rot hole' habitats, and recording the species that visit different lagoon types.

This year we asked our Hoverfly Lagoons volunteers to help us find an effective **alternative Lagoon container** to our single-use plastic milk bottles. We have used milk bottles previously because they are free and available to most people, are safe and easy to use, and are a standard size. However, the plastic will go brittle over time, and there is evidence that degradation of such single-use plastics could leach chemicals into the environment. So this year we focused on finding other options.

Some alternative lagoons, left to right: Ceramic pot; hardwearing outdoor plastic; glass jar; repurposed 'Tupperware'.

The results are promising, with **all trialled container types successful in attracting gravid female hoverflies, and providing enough resources for larvae to develop to the pupal stage!** Figure 3 (below) shows the average number of hoverflies found in each type, with glass jars having the greatest average numbers reported across **all** types (and similar maximum larvae counts to those found in the plastic lagoon controls).

Participants also recorded the **type of filling** used in lagoons, including grass, leaf litter, nettles and saw-dust. The **grass and leaf litter** lagoons had the most larvae on average, followed by **sawdust only** and **grass only** (Figure 4).

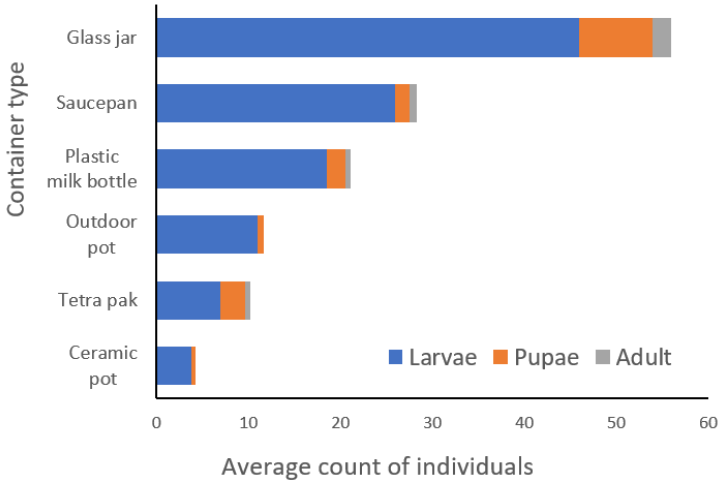


*Figure 3: **Average** counts of hoverflies found associated with different container **types**; by **life stage**.*

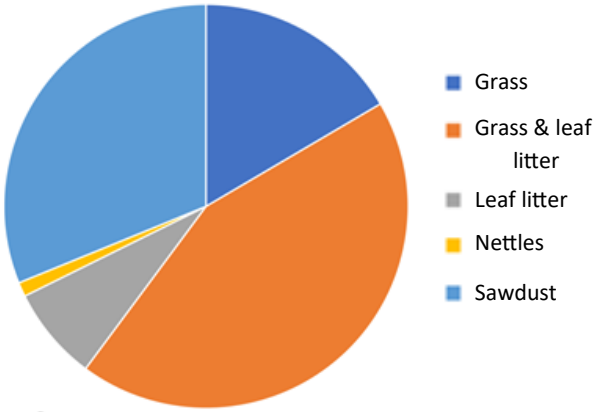
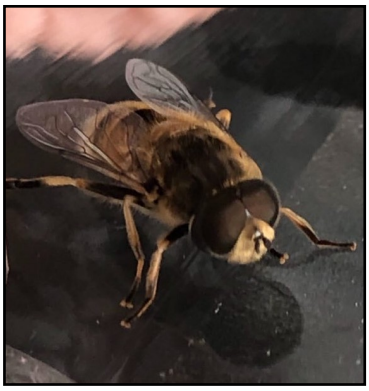


*Figure 4: **Average** counts of hoverfly larvae found in different Lagoon **fillings**. This is across **all** Lagoon sizes and container types.*

Peak **larval abundance** in Lagoons was recorded in June and July, with a peak in **pupae** records in August. Larvae recorded in October will likely overwinter in Lagoons, begin feeding again in spring and pupate in March/April.

Hoverfly Lagoons (cont…)



Eristalis arbustorum male

More **new species found** in the project Lagoons! This August saw the first record of *Eristalis arbustorum* (the European Drone Fly, right) emerging from a Lagoon, bringing our total up to **seven** species of hoverfly making homes in our habitats (and not even including the other invertebrates—and occasional frog—reported having a little visit to these micro-ponds).

Announcing a new publication from Hoverfly Lagoons. Featuring *Rhingia rostrata*, which you might remember as a newly spotted species in Newsletter 13. The larval requirements for this species were previously uncertain, and the pupal stage had never been described. Well, it now has been, using that Lagoon record, and is published in the Dipertist Digest.

Rotheray E, Rotheray GE (2021) The puparium and development site of *Rhingia rostrata* (Linnaeus) and comparison with *R. campestris* Meigen (Diptera, Syrphidae) Dipterist Digest, **28**:127-134, Dipterists Forum. (see: https://dipterists.org.uk/digest)

R. rostra pupae (left), compared to much larger Myathropa florea pupa (right).

Freshly emerged R. rostra male

Hoverflies in the genus Rhingia are known for their long mouthparts, enabling them to feed from flowers with deep corollas such as red campion and ground ivy. Most other hoverflies generally feed on open, shallow flowers such as cherry, buttercups or umbellifers. This means hoverflies utilising Lagoon habitat in gardens may also be contributing to the **pollination** of a **larger range** of wild flowering plants than we thought. Another great reason to create Hoverfly Lagoons!

Garden Shop calculator

Recording domestic harvests, calculating the cost of shop-equivalents & showing what % is from insect pollination.

We absolutely smashed last year's values in the hypothetical Buzz Club farm shop, with over **£3000** of produce recorded by participants (organic values), and ~**£1870** of this **directly due to pollinators** (60%).

We have a fairly hefty contribution from apple growing in this project (spread nicely between the cider makers, the crumble afficionados and those who like a home-grown crunch) which does push the pollination % up somewhat. Apples *really* need to be pollinated by insects, because their pollen is sticky and quite heavy, so the wind can't contribute much. But even if we take out some of the apple focus, well over 50% of the total harvests reported by participants have been helped out, boosted, improved or been dependent on insect pollination.

A harvest stowaway! Aren't you in the wrong project?

Fruit like apples flower early in the year, so it is worth investing in early or hardy flowerers, or a nice bee café, to make sure those pollinators are ready!

Earwi'GO!

New project about garden shelters for earwigs; using upturned plant pots, with different fillings, on trees / sticks.

Participants investigated the best way of making garden 'earwig hotels' by testing what type of filling was the most attractive to earwigs as a place to shelter during the day. The fillings tested were: **paper** (scrunched or folded), **cardboard** (folded up or corrugated), and **straw / dry grass** (or similar).

Between May and October, Earwi'GO participants recorded a huge **8951** visits from different types of invertebrate to their hotels, with **6121** of those visits being made by earwigs. The next most common visitor type was woodlice (**1427**), but this is much less than the >6000 earwig visits.

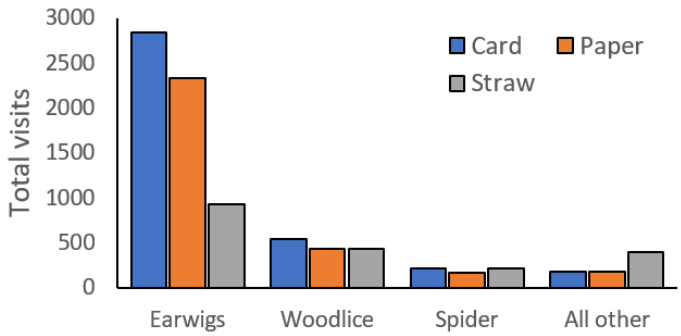


*Figure 5: **Total** counts of **all visits** (split into major groups) to the different filling types.*

Based on the most earwigs counted at once on each site, we can estimate that **1037** individual earwigs 'took part' in the project. Clearly, earwigs like *something* about our hotels!

But which sort do they like most?

Looking at the average number of earwig visits to the different hotel fillings, **straw** seems to definitely be **less popular**. All the hotels got fewer visits towards the end of the project (as we would expect, as earwigs pair off and go to dig a nest hole), but it seems to happen faster for straw hotels. **Card** and **paper** received similar numbers of earwig visits overall.

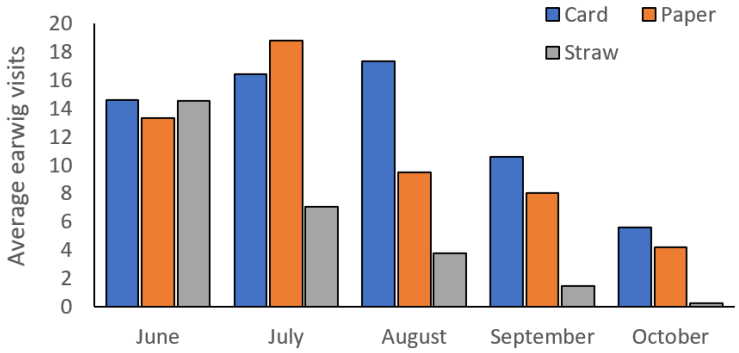


*Figure 6: **Average** number of earwig visits per **month** to different **filling types**.*

Feedback from participants indicated that paper hotels were the hardest to handle and maintain, with paper likely to fall out, get wet or go mouldy.

So **card** seems to be the winner this year, both with earwigs, *and* with project volunteers!

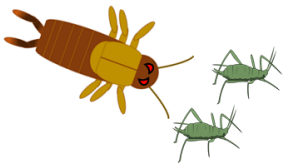
Earwi'GO again!

The **cardboard** filling seem to work the best, but there are other factors we can look into to make the best earwig hotels.

Position in the garden? How shady or warm the site is? Other filling mixes (card AND straw?) or container?

Does putting up earwig hotels **increase** the garden earwig population over time?

Where do we go from here?



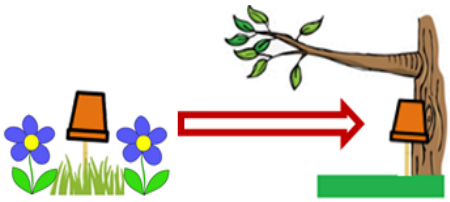
Earwi'GO! to work

Earwigs eat aphids, and can provided valuable **biological control**, especially on fruit trees. Is it possible to detect this effect in garden trees using citizen science?

Earwi'GO! Mobile Homes

Earwigs damage soft plants, especially flowers like dahlias. Can we use Earwi'GO! hotels to **move earwigs** from the flowerbed to the trees?

Will they **stay** there?



Strawberries Rocks!

Can red-painted stones protect strawberries from birds?

One of the unique parts of the Buzz Club is that we are able to really test out new citizen science projects, in real garden environments, and get feedback from participants on what does and does not actually work in the protocol. It's not something that many projects are able to get, since if something does *not* work, it's easy for volunteers to get worried they have 'done it wrong' and be reluctant to tell the organisers what the problems were. Honest feedback is *massively* important to designing the best projects that we can, and Buzz Club members are *great* at it.

Strawberries shelved—for now.

Which is a long-winded way to say that **Strawberries Rock!** is being shelved for now. Over the three years of this project we've had really committed participants crafting their rocks and counting fruits, but this has shown that there are too many things that can affect the project in its current incarnation.

Where do we go from here?

Shelving a project **does not** mean that what we found was not useful—just that it has not provided enough data to make **scientifically robust** conclusions. We *have* found out a lot about the best ways to grow strawberries as experimental plants, and a lot about the garden-specific perils of doing so. Strawberries Rock! wasn't the only Buzz Club project to use strawberries, and likely won't be the last, so we've covered some hurdles for future work already!

- Blackbirds and pigeons in particular were a menace to ground-based strawberry setups. Squirrels will steal fruit from open plants (as will the occasional pet). Enclosing the plants in fruit netting / wide mesh (right) helped greatly with this—but of course, made it so that birds wouldn't be able to access either the fruit *or* the rocks at all.

Netting lets pollinators in, keeps squirrels out.

- This isn't a problem for **insect** access though, with larger mesh holes.

- Raising potted strawberries off the ground greatly reduced losses from blackbirds and slugs / snails (like in 2020's Slowing Slugs project).

- While strawberry flowers are very obvious, the plant changes shape quite a lot as it grows, with a tendency to lose flower stems completely if they are damaged. This made it difficult to keep track of which flowers go on to fruit and how many fruits ripen, since they are not always in the same place when you go to look (whereas, e.g. the third truss on a tomato plant tends to stay in position).

- Otherwise-identical bare root new plants seem capable of behaving very differently in the first year (than e.g. beans from the same seed packet). For future strawberry projects, it may be better to use second-year plants that have had time to get established.

- We're considering converting the current project method into a student project to dedicate the time needed to really unravel this—and work out if Strawberries Rock 2 is a future option.

A **massive thank you** to everyone who took part in Strawberries Rock!

Why we should Ban Urban and Garden Pesticides

Dave Goulson, Professor of Biology, University of Sussex

Tackling biodiversity collapse, along with the interlinked catastrophe that climate change threatens, is the biggest challenge facing humanity in the 21st century. Insects in particular are showing rapid decline. For example, butterfly populations in the UK have fallen by about 50% since 1976, and the geographic ranges of our wild bees and hoverflies have fallen by an average of 25% since 1980.

Many of changes we need to make to protect our environment and prevent further loss of biodiversity are very difficult, expensive, or require sacrifices to our way of life, but some are easy—and one of the simplest of all would be to **end the use of toxic pesticides in our gardens, parks and city streets**.

We live in a health and safety conscious age, yet it is trivially easy to go buy any range of poisons marketed to kill 'pests', and dose our homes and gardens. At the same time, many local authority teams still scour the streets for signs of green plants daring to grow along the edge of pavements, and spray them with pesticides. The tell-tale signs of scorched, dying vegetation are everywhere.

Glyphosate, a "probable carcinogen", is commonly sprayed onto and around children's play equipment [pic by Katie Rushworth]

It would easier to understand if this combated some major threat to wellbeing, but almost all spraying is for cosmetic purposes. Do dandelions growing around a swing actually pose a threat? Are the aphids on your roses really doing great harm? I do nothing to aphid outbreaks on my runner beans—the aphids are soon consumed by beneficial insects and blue tits, and the beans thrive!

Pesticide use is so often unnecessary, and is increasingly unpopular. Polling commissioned by Pesticide Action Network UK (PAN UK) and Sum of Us reveals that 68% of people want local schools, playgrounds and other open spaces to be pesticide-free.

With more eco-friendly management our urban areas could become a refuge for wildlife, and help urban dwellers to reconnect with nature. The UK's 22 million gardens cover about one million acres, more than all nature reserves combined. If all greenspaces—including parks, cemeteries, roundabouts and road verges—were filled with wildflowers, we could form a national network of pesticide-free wildlife habitat.

Some countries and many cities around the world have already banned urban pesticide use to protect insects and human health. France banned all use of synthetic pesticides in public spaces in 2017, and garden use from 2019. In Canada, 170 cities and towns are pesticide-free, some having been so for 30 years. If Paris and Toronto manage perfectly well without them, why can't we?

Hoverfly larvae are fantastic predators of aphids, but are easily killed by insecticides.

It is time to ban the sale of pesticides to untrained members of the public, and to encourage our local authorities to stop spraying streets and playgrounds. The 'cost' would be learning to live with more greenery and wildflowers, and the benefit would be a healthier environment for wildlife and humans together!

Petition link: https://petition.parliament.uk/petitions/590309

The petition is supported by:
PAN UK, RSPB, Friends of the Earth, Greenpeace, Soil Association, Parkinson's UK, Alliance for Cancer Prevention, Garden Organic, Organic Farmers & Growers, Real Farming Trust, Savitri Trust, Bumblebee Conservation Trust, Climate and Ecological Emergency Bill Campaign, Wildlife Gardening Forum & Songbird Survival.

Why mini-meadows are Sow Wild!

*Buzz Team member **Janine Griffiths-Lee** used citizen science to investigate the benefits of planting mini wildflower meadows in gardens and allotments.*

The 'Sow Wild!' project ran in 2016 & 2017, planting wildflower 'mini-meadows' in UK gardens and allotments, to investigate the effectiveness of these small, flower-rich patches in recruiting beneficial insects, such as wild bees and solitary wasps. Project participants were allocated to 'Control' (with no specific wildflower patch) or 'Mini-meadow' gardens (with two different flower mixes sown in 4m^2 patches). All participants sampled the insects in their green spaces during the summer, over two years.

Example of a mini-meadow in bloom; photo from Anne Macarthur.

Even these small flower-rich spaces had a positive effect on local insect life! Planting a mini-meadow increased wild bee diversity, and spaces with meadows supported more bumblebees **(111% more**), solitary bees (**87% more**) and solitary wasps (**85% more)** than the control gardens did. This effect was seen with both wildflower mixes, but the types of insect groups attracted differed based on the flowering species included (e.g. Mix 1 attracted more solitary bees and bumblebees, whereas Mix 2 attracted more solitary wasps).

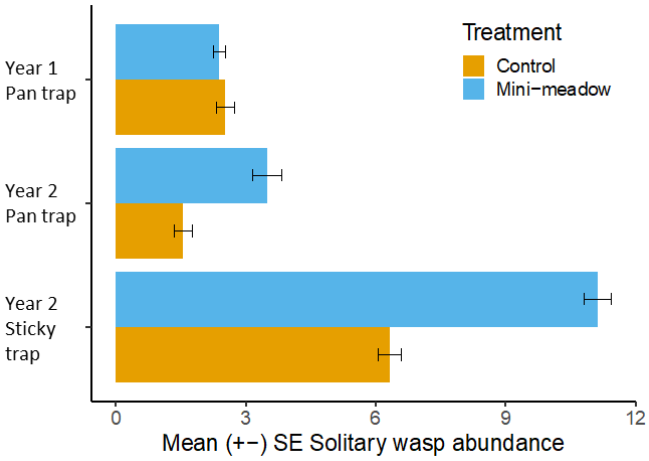


*Figure 7: **Average** abundance of solitary wasps from Sow Wild! Gardens, across the two years.*

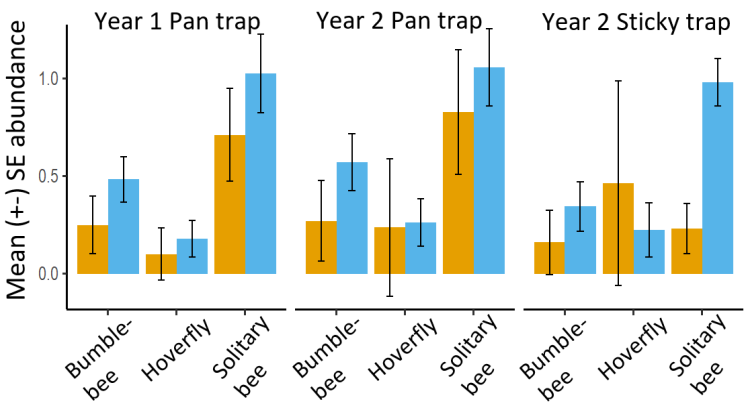


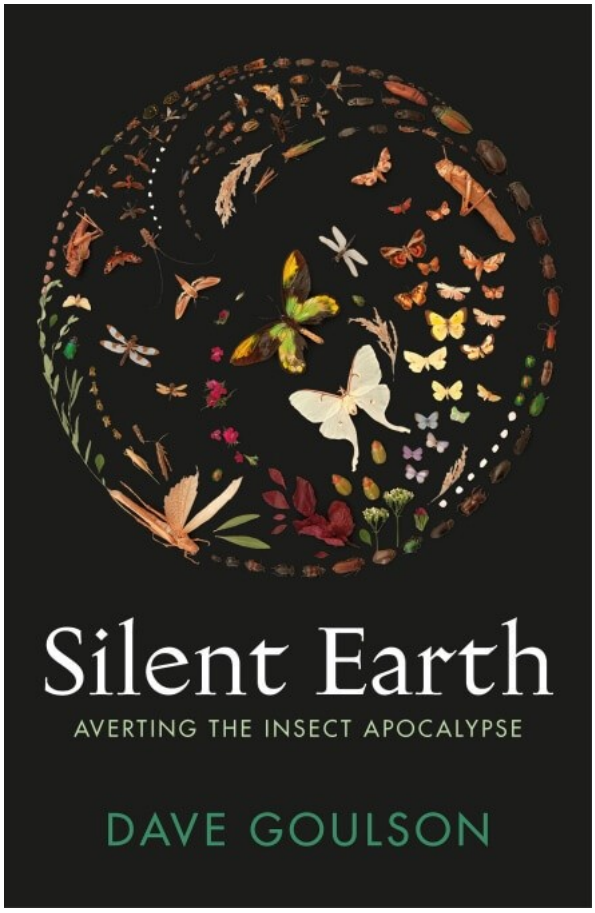
*Figure 8: **Average** abundance of bumblebees, solitary bees and hoverflies from Sow Wild! gardens, comparing meadows and control across the two years.*

Planting mini-meadows in gardens and allotments can attract more beneficial insects by enhancing the floral resources available, while occupying only a small amount of garden space. Different insect species groups can be targeted by using different mixes of flowers. These findings have exciting implications for promoting local **biodiversity**, enhancing natural **biocontrol** and supporting urban **fruit and vegetable** production.

Can you find space for a Mini Meadow?

Silent Earth—averting the insect apocalypse

"There is no doubt that insects are in decline and, given their vital importance to the functioning of healthy ecosystems, and the critical role they play in our own food supply, this should be a cause of deep concern to all of us. Their declines are a sign that the fragile web of life on our planet is starting to tear apart. … To save it, we need to act, and act now."



Released in August, Dave's latest book once again invites us to explore the fascinating world of insects, from the exotically-weird lives of honeypot ants to the everyday essential work of pollinators. However, as much as *Silent Earth* is as full of fascinating insect information as previous titles, it also confronts the chilling reality of current insect declines, and the effects that further losses will have on our planet.

Things are not hopeless but they *are* urgent. Described as "part love letter to the insect world, part elegy, part rousing manifesto for a greener planet", *Silent Earth* calls on us all to really think about what we can do to change the trajectory of insect declines, from pushing for government-scale change, putting aside pesticides, or even considering bug-based breakfasts.

Read the Bookseller's interview with Dave about Silent Earth: https://www.thebookseller.com/profile/

And finally:

We literally could not do these projects without **you**! We're always on the look out for new project ideas, new questions to think about, and new problems to get stuck into— so give us a Buzz any time. Find us on the website, our social media (Twitter and Facebook) and by email, as well as in person (digital or in reality!).

Thanks again,

from the Buzz Club Team!