

“ Spiders are all-round amazing creatures. ”

Wonders of the web

Agricultural spiders

Despite all UK spider species being harmless to humans, these eight-legged creatures continue to be one of the most underestimated groups in nature, particularly when it comes to pest control. *CPM* learns why these heavy-hitting beneficials should be given more credit.

By Janine Adamson

When asked to name beneficial invertebrates in agriculture, it's unlikely spiders will be the first to spring to mind. But despite their bad reputation – 6% of the human population is reported to suffer from acute arachnophobia – to those in the know, spiders are regarded as the true superheroes of the undergrowth.

Beyond simply catching the odd fly, what is it about spiders – which belong to the order Araneae – that makes them so useful to arable farming and why are they classed as beneficial? Molecular entomologist, Dr Jordan Cuff, believes many may underestimate the abundance and skill of spiders within crops.

“In the British Isles, money spiders are the largest spider family – comprising about 290 of the around 700 British

spider species. They're vastly abundant, with estimated populations of up to 2M individuals per acre of grassland.

“But aside from money spiders, different species exhibit diverse hunting strategies and not all spiders spin webs, there's a lot going on,” he says.

In the field, farmers are most likely to observe either money spiders or wolf spiders, the latter of which hunt on the ground during the day. However, it's the ability of money spiders to drift through the air using a technique known as 'ballooning' or 'kiting' which Jordan credits as one of their 'coolest' attributes.

“This involves casting a line of silk to catch the wind and drift at the mercy of air currents and electric fields. Spiders can travel hundreds of kilometres using this skill, regularly flying into different areas and eating pests. Ballooning means they can quickly colonise a new area and predate pests,” he explains.

Investing nutrients

There's also diversity within the webs of money spiders which can vary wildly in size and location as well as between species, adds Jordan. “Webs are effectively an investment of nutrients, so tend to be where prey are highly abundant. Money spiders can adjust the structure of their webs to suit their target by attaching the silk to different surfaces.

“Spiders have also been observed competing against each other to hold the best 'web-site,’” he says.

In terms of prey, agroecological

consultant, Professor John Holland, proposes for aphids carrying BYDV, money spiders are the most effective predator due to their fine webs and ability to operate successfully at low temperatures. “As a group, spiders eat pretty much anything – from aphids and midges to pollen beetle and cabbage stem flea beetle. Of course the webs are non-selective and can catch even large insects, particularly those which fly,” he says.

Spider webs can also be used to help line and strengthen the nests of songbirds such as blue tits. But according to John, one negative is that when in situ, webs will also catch beneficial insects such as parasitic wasps. “That's the balance



Money spiders can travel hundreds of kilometres using a skill known as ballooning, regularly flying into different areas and eating pests, says entomologist Dr Jordan Cuff.



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of nature though,” he suggests.

As for hunting skills, money spiders target prey using different techniques whether that be sitting and waiting for the pest to come to them, or, by actively stalking. Jordan says this is why money spiders have been considered biological control agents for cereal crops for decades, reaching densities of 200-600/m².

Although spiders can utilise ballooning to travel between areas, Meg Skinner from the British Arachnological Society (BAS) says they and their prey still require habitats to be ‘connected’ including to the wider landscape, which is particularly critical for ground-dwelling groups like wolf spiders.

“Furthermore, studies have shown that intercropping, under-sowing or allowing weeds to grow in some areas will increase structural diversity and encourage spiders to utilise crop areas,” she explains.

Habitat niches

“It’s also important to consider microhabitats within semi-natural habitats – so within a field margin there are several niches occupied by different spiders. Although they don’t depend on specific plants, their prey do and rely on certain structures.”

To help boost spider activity further, Meg refers back to connectivity: “Farmers can assist by providing connected areas so spiders can easily move between crops within the rotation such as via field margins and hedgerows. But the great news is, if you build it, they will come.

“Spiders colonise new areas very quickly and when a habitat is first established, you can bet that spiders will



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be the first ones in there,” she says.

Edaphos agronomist, Ben Harrington, says he’s been working with some customers to create large-scale green bridges to help facilitate the movement of beneficials across longer distances. “This is alongside insect-boosting management techniques such as cover cropping, min-till, leaving stubbles/crop residues and planting hedgerows,” he comments.

John points out that spiders are happy to travel. “Once a crop has been harvested, spiders will move to nearby grassland or field margins and then migrate back once a new crop is established. Consequently, providing a diversity of habitats on individual farms and across landscapes is crucial to encourage all beneficial invertebrates, with grassland being particularly important as a source of money spiders,” he adds.

Despite this useful migratory behaviour,

50 years’ of research indicates that spiders in agriculture are seriously on the decline. The Sussex Study, which has monitored changes in invertebrate abundance in the cereal ecosystem of the Sussex Downs, has recorded a 43% decrease in Araneae since 1970.

The work was conducted by the Game & Wildlife Trust (full report available on the GWT website) and also shows that overall invertebrate populations have dropped by 37% across all groups monitored, making the decline in Araneae species even more significant.

However, this research supports other studies by suggesting rotational grass, such as that established through undersowing cereals, is associated with higher abundance of intensification-sensitive taxa—those which have declined over time in the study.

But what else can be done to boost spider populations? As often cited as the reasons behind general insect decline in farming, John says the reduction is likely due to a combination of simplified crop rotations – especially the loss of grassland in arable areas – and agricultural intensification. One critical aspect of this, he believes, is pyrethroid use.

“Spiders are very sensitive to pyrethroid insecticides like cypermethrin, so to increase their populations, such products should be avoided.

“Of course in some instances, it’s difficult to not use insecticides on crops at all, so being more targeted through crop walking and only using pyrethroids when insect pests are at threshold is

advised. Leaving less susceptible areas unsprayed can also provide a refuge for beneficials such as spiders – the key is to avoid blanket spraying,” stresses John.

Ben believes that although some farmers are switching to being insecticide-free, beneficial invertebrates aren't always considered when it comes to spraying. “Or in cases where the awareness is there, it's not always understood how best to encourage populations back to optimum levels. With farms and fields becoming larger, it can be difficult to integrate the management of beneficials into those systems,” he says.

Using biologicals

“What we do know is building crop health and resilience through using biological solutions and therefore reducing the reliance on synthetic chemistry, will help to nurture beneficials including spiders.”

Yet unlike other beneficial invertebrates, the resilience of spiders can work in their favour, points out Meg. “Use of insecticides including pyrethroids is a very difficult conversation but spiders do bounce back really quickly.

“What we desperately require is a similar success story to that of pollinators – the surge in public interest in bees has enabled greater investment and therefore new research to take place. There's no reason why the same couldn't happen with spiders,” she adds.

An example of such spider-specific research is work which has taken place to investigate the effects of glyphosate on arable field margins with relation to spider abundance. The study highlights the impact of spray drift on surrounding margins, which are important habitats for spiders.



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A good basic indicator for spider abundance on farm is early morning dew.

“Increased glyphosate use reduced the number of web-spinning spiders but not ground-dwelling species. Having analysed the data, researchers believe that rather than the herbicide itself, the decrease in spider populations is due to the change in microhabitats and overall vegetation structure,” explains Meg.

“The application of herbicides can affect different spiders in different ways. Although they may be less sensitive in regard to mortality, they can experience secondary effects such as altering their behaviour including web building, courtship and hunting. Many spiders are also active during the winter so can be affected by early herbicide applications,” she suggests.

According to John, a good basic indicator for spider abundance on farm is

early morning dew. “You should be able to see thousands of webs within a crop – that's what we're aiming for. Minimum tillage can help as a more uneven soil surface with crop trash provides features across which webs can be spun.

“Spiders provide much value within the food chain and are hugely underestimated, particularly in terms of their pest control capacity. Not only that, they're food for birds and are all-round amazing creatures,” he comments.

Jordan agrees: “Spiders are incredibly beautiful and are, in my opinion, one of the greatest examples of species diversity and subsequent behaviour. Look more closely at a macro level and it becomes easy to appreciate their wonder – it's time to turn fear into fascination.” ■

British Arachnological Society

The British Arachnological Society (BAS) is a lesser known charity run by volunteers which aims to raise public awareness of all arachnids, says media officer and harvestman recording scheme organiser, Meg Skinner.

The BAS is Britain's only charity dedicated exclusively to spiders and their relatives – focussing on more than 670 species of spiders, 31 harvestmen and 27 false scorpions.

One element of the society's work is running the national recording schemes for spiders and harvestmen, which farmers are encouraged to participate in. “We welcome records from anyone and these are critical in helping to indicate species distribution and will therefore help to steer future conservation requirements,” says Meg.

“It's important that we look at spiders

more closely, learn of their benefits and debunk some myths. The only way to achieve this is through improving awareness.”

There have been two recent conservation success stories, she adds, with varying publicity in the general media. “The headlines don't always help the cause, but it's hoped the fen raft spider and great fox spider might be making a come-back.”

After facing near extinction, the UK's fen raft spider population is steadily increasing following conservation work by the BAS alongside RSPB, Suffolk and Sussex Wildlife Trusts, Natural England and the Broads Authority.

Whereas the great fox spider is red-listed as ‘critically endangered’ and hadn't been seen since 1999 until it was spotted at a Ministry of Defence training area in Surrey in 2020.