Monitoring ladybirds under an oak tree

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According to plan this year I monitored the habitat under an isolated oak tree (*Quercus robur* L.) in the Colchester Royal Grammar School playground, TL986249, started on 18th May. When I first discovered it in August 2006, it was full of ladybirds and other very interesting invertebrates [Fremlin, 2007a & 2007b].

Observations

This year there were much fewer beetle mites, they turned up only by the second week in June and could be seen on the brick wall only; there were a lot of leaf hoppers right from the start, but very few bark lice. The ladybirds also took time to arrive; by 24th June I saw the first two harlequin ladybird (*Harmonia axyridis* Pallas) imagines. As for the lacewings I only saw their larvae twice. There were no leaf or smut beetles; hardly any spiders and no moths. Altogether this year there was a much lower biodiversity, probably due to the cooler weather.

However after mid August, perhaps peak activity, there was plenty going on and the harlequin ladybirds were by far the commonest Coccinellidae, they had spread all over the school mini bus, which had been parked nearby, and they were even pupating on its tyres.

Then there was plenty of larval cannibalism, plus quite a few imagines with deformed wings (Plate 2), and even one wasp parasitised imago out of 25 (Plate 3).

Results

The monitoring figures of Coccinellidae species present, mostly on the steel railing and low wall, after mid-August in both years are shown in Table 1; coincidentally recorded under similar weather conditions, three days apart.

There was a significant increase in the harlequin ladybirds present. There was a significant drop in the 10-spot ladybirds (*Adalia 10-punctata*). On the other hand in 2007 I observed more 2-spot ladybirds (*Adalia 2-punctata*), plenty of their larvae, matings and even egg laying once; alas by the next day they were gone. I didn't see any *Scymnus auritus*, a tiny black ladybird associated with oak woodland, at all in 2007. Earlier on I saw two 7-spot ladybirds (*Coccinella 7-punctata*) for the first time.

Coccinellid species		18/08/06 12.46 hrs 21.4 °C*	21/08/07 12.47 hrs 20.0 °C
Harlequin	*Harmonia axyridis*	32	70
2-spot	*Adalia 2-punctata*	-	7
10-spot	*Adalia 10-punctata*	12	5
	Scymnus auritus	5	-
Total larvae, imagines and pupae		49	82

*temperatures from our home weather station, 350 meters away.

Table 1. Ladybird species present on the railings and side wall, figures represent the sum of their larvae, pupae, and imagines.

Discussion and conclusion

This year possibly my most significant observation was finding a harlequin ladybird imago parasitised by a braconid wasp, *Dinocampus coccinellae* Schrank, the second record in this part of the country. The first was recorded by Nigel Cuming in September 2004, Aldeburgh, Suffolk, TM461574, shortly after their arrival from the continent (Bowdrey & Mabbott, 2005).

The parasitoid wasp *D. coccinellae* is a bit smaller than a 7-spot ladybird. Females lay a single egg in a ladybird, the larva feeds inside, and before pupating it severs the main nerves of its host's legs; then pupates outside directly underneath it. Thus the ladybird is immobilised but still alive, and it looks as if it is incubating something (Plate 3); this seems to be unique to *D. coccinellae* parasitism (Bruce, 1998). By the time the wasp emerges the ladybird is probably dead. However the wasp, within one hour of emerging, has the potential to start laying fertile eggs by parthenogenesis – no need of a male – about 100 in a generation (Bruce, 1998).

Now, this would have been a welcome performance under that oak, because *D. coccinellae* doesn't seem to go for 2-spot and 10-spot ladybirds (Bruce, 1998), which were the other species after the harlequins, see Table 1. Otherwise it has been recorded in at least 14 of the coccinellid species found in the UK, all large species. It seems to favour 7-spot ladybirds, and I've observed that locally.

On top of being non-specific *D. coccinellae* has a wide geographic range, which includes N. America, Asia, Europe and Africa. There are records in the literature of *D. coccinellae* parasitising harlequins in its original Far Eastern habitats going back at least to 1950 (John

Muggleton, *pers. comm.*). Also it has been reported in places where the harlequin has been introduced, for example, the USA (Koch, 2003) and Canada (Firlej, 2005).

Therefore it was very interesting to find out that *D. coccinellae* has been paying them some attention over here as well. Let's hope that they will carry on with gusto.

It would be worth investigating why so many harlequin imagines had problems with their wings (Plate 2); the same has happened last year towards the end of the season (Fremlin, 2007b).

There is also a question about the missing 2-spot ladybird eggs. Ladybird eggs take 4-10 days to hatch, depending on temperature (Majerus, 2006). Who ate them?

Mainly it would be nice to be able to carry on monitoring the balance between the coccinellid species under that oak.

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Plate 2. Harlequin ladybird *H. axyridis* f. *succinea* with damaged elytra and wings. Photo taken on 27/08/07. *Photo: Maria Fremlin*

Plate 3. Harlequin ladybird *H. axyridis* with its immobilised legs protecting a cocoon of a parasitoid wasp *D. coccinellae* . Photo taken on 18/08/07. *Photo: Maria Fremlin*