

**LEICESTERSHIRE  
ENTOMOLOGICAL SOCIETY**

**First experiences  
with water traps**

**Ray Morris**



**LESOPS 36 (December 2018)**

ISSN 0957 - 1019

16 Hinckley Road, Dadlington, Leicestershire CV13 6HU

([ray@cactusbob.net](mailto:ray@cactusbob.net))

## Introduction

For many years I have been aware of the use of water traps as a monitoring tool for insects (e.g. Disney *et al*, 1982). The main advantage seems to be the sheer simplicity of the method where bowls containing tap water, laced with a few drops of washing-up liquid, are positioned for fixed periods in a variety of habitats. The main requirement does seem to be that the weather is fairly warm and preferably sunny to ensure that insects are actually on the wing! However, there have been reports of water traps also being used in shady positions with some measure of success (Hancock & Ward, 1996). There is also a reported preference for the use of yellow or white traps as they seem to attract most insects (Disney, 2004). In order to (a) check the veracity of using traps of different colours and (b) to have some idea of what is flying in my garden, a series of seven trappings were carried out between July and October 2018.

## Methodology

Traps were positioned on a table at a height of 75cm in an unshaded part of the garden and usually left for 7.5-8 hours each time (Figure 1). After each run the insects were collected from the traps and stored in 70% isopropanol pending sorting. In the main, identification of catches was limited to Order but on occasions it was possible to identify some specimens to family and taxa.



**Figure 1: Coloured water traps**

The experiments used five trap colours each in duplicate. They were arranged in two rows of five with each row being the full colour range. The arrangement of traps within each row was varied with each run to minimise any bias that may have resulted by having pans in the same position each time in each row and, where possible, avoiding the colours in one row being placed adjacent to its duplicate in the other row. On one occasion each colour was run next to its partner in the pair (Figure 1). The conditions for each

run are shown in Table 1 along with the prevailing weather conditions at that time.

**Table 1: Experimental conditions 2018**

Date	Run time	Temperature °C			Weather conditions
		At start	At end	Peak	
05/07/2018	0930-1700	22	30	31	Clear with sunshine throughout
11/07/2018	0900-1700	16	26	27	Mostly clear, slight cloud, slight breeze
15/07/2018	0900-1700	18	23	26	Overcast, breezy
21/08/2018	0930-1700	20	25	26	Cloudy but clearing, slight breeze
24/08/2018	0900-1700	12	20	24	Some cloud, slight breeze
26/09/2018	0900-1700	11	22	23	Some cloud, slight breeze
10/10/2018	0900-1700	11	22	24	Some cloud, slight breeze

## Results and Discussion

Table 2 details the overall counts for each trap colour for each date with Appendix Tables 1-5 providing detail for each colour. During the monitoring period, the total catch of 2,496 was dominated by Coleoptera and Diptera orders accounting for 33.5% and 58.5% respectively (Table 3).

**Table 2: Total catches for each water trap colour**

Date	Red	Blue	Green	Yellow	White	Total
05/07/2018	36	46	116	238	227	663
11/07/2018	13	27	42	70	49	201
15/07/2018	13	19	27	32	27	118
21/08/2018	27	24	88	157	182	478
24/08/2018	62	63	80	249	271	725
26/09/2018	16	28	19	18	96	177
10/10/2018	20	11	30	56	17	134
Total	187	218	402	820	869	2496

**Table 3: Number (%) of each family at each water trap colour**

	Red	Blue	Green	Yellow	White	Total
Total catch	187	217	402	820	869	2495
Coleoptera	62 (33.2%)	72 (33.2%)	147 (36.6%)	276 (33.7%)	279 (32.1%)	836 (33.5%)
Diptera	103 (55.1%)	127 (58.5%)	197 (49.0%)	454 (55.4%)	580 (66.8%)	1461 (58.5%)
Hemiptera	15 (8.0%)	11 (5.1%)	39 (9.7%)	79 (9.6%)	7 (0.8%)	151 (6.1%)
Hymenoptera	3 (1.6%)	3 (2.7%)	13 (3.2%)	6 (0.7%)	2 (0.2%)	30 (1.2%)
Other	4 (2.1%)	1 (0.5%)	6 (1.5%)	1 (0.1%)	1 (0.1%)	17 (0.7%)

However, consideration of the time of occurrence of both these two orders showed that each had its own distinctive period of abundance (Table 4).

**Table 4: Occurrence of Coleoptera and Diptera at water traps**

	Number and % of total catch	
	Coleoptera	Diptera
Total catch	836	1584
05/07/2018	613 (73.3%)	24 (1.5%)
11/07/2018	115 (13.8%)	52 (3.3%)
15/07/2018	70 (8.4%)	36 (2.3%)
21/08/2018	11 (1.3%)	460 (29.0%)
24/08/2018	4 (0.5%)	710 (44.8%)
26/09/2018	16 (1.9%)	133 (8.4%)
10/10/2018	7 (0.8%)	169 (10.7%)

(a) **Coleoptera** - The July traps, in particular, resulted in a large number of pollen beetles (probably mostly *Meligethes aeneus*, Figure 2) with few other taxa. The pollen beetles, when present, were attracted to all colours but with a distinct preference for yellow and white traps which accounted for 69% of the pollen beetle count (Table 5).



**Figure 2: Pollen beetle *Meligethes aeneus* (photo: Graham Calow)**

Throughout the monitoring period, very small staphylinid beetles were encountered (probably of the *Aleocharinae* genus) at the same levels regardless of trap colour (Table 5).

**Table 5: Occurrence of Coleoptera groups**

Date	Type	Red	Blue	Green	Yellow	White
05/07/2018	All	32	41	106	194	218
	Pollen beetles	32	38	106	194	217
	Staphylinids	0	2	0	0	1
11/07/2018	All	10	12	21	41	31
	Pollen beetles	5	10	16	32	26
	Staphylinids	5	2	5	9	5
15/07/2018	All	10	13	14	12	12
	Pollen beetles	0	1	2	2	1
	Staphylinids	10	12	12	10	11
21/08/2018	All	3	2	2	0	2
	Pollen beetles	0	0	0	0	0
	Staphylinids	3	2	2	0	2
24/08/2018	All	0	1	0	1	0
	Pollen beetles	0	0	0	0	0
	Staphylinids	0	1	0	1	0
26/09/2018	All	6	1	1	1	6
	Pollen beetles	0	0	0	0	0
	Staphylinids	4	1	0	1	1
10/10/2018	All	1	1	2	1	1
	Pollen beetles	0	0	0	0	0
	Staphylinids	0	0	2	1	1
Total	All	62	71	146	250	270
	Pollen beetles	37	49	124	228	244
	Staphylinids	22	21	21	22	21

Other beetles (unidentified) turned up from time to time particularly later in the monitoring period.

(b) **Diptera** - In contrast fly levels tended to increase dramatically in August when Phoridae (Scuttle Flies, Figure 3) were dominant with members of the

*Metopina* genus being so numerous as to the exclusion of other members of this family (Table 6). As with the Coleoptera, there seemed to be a distinct colour preference with yellow and white accounting for 71% of the total fly catch.

**Table 6: Occurrence of Diptera groups**

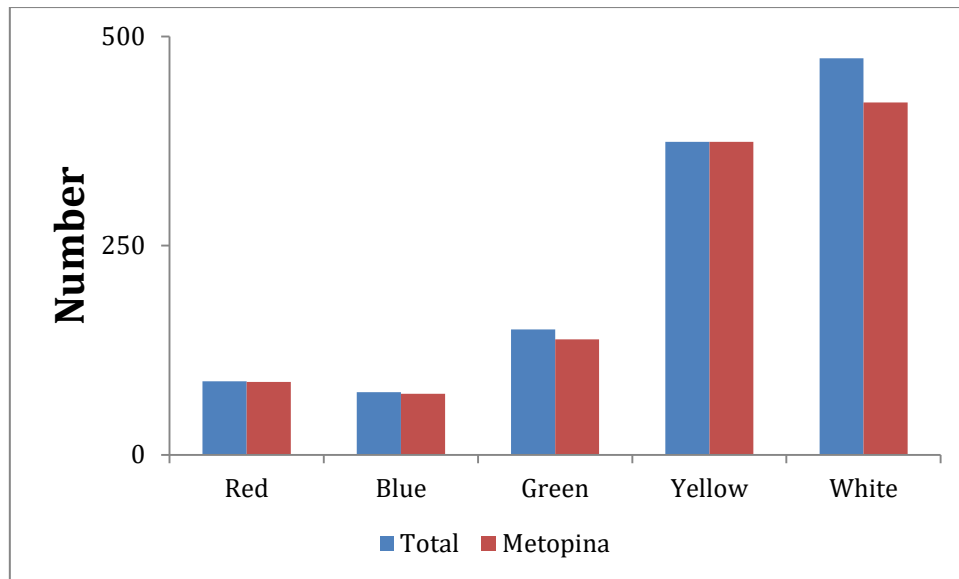
Date	Type	Red	Blue	Green	Yellow	White
05/07/2018	All	2	4	4	6	8
	Phoridae*	0	0	0	0	0
	<i>Metopina</i>	0	0	0	0	0
11/07/2018	All	2	12	10	12	16
	Phoridae*	0	0	0	0	0
	<i>Metopina</i>	0	0	1	0	0
15/07/2018	All	2	1	9	18	6
	Phoridae*	0	0	1	0	3
	<i>Metopina</i>	0	0	1	0	2
21/08/2018	All	24	21	83	152	180
	Phoridae*	0	1	7	13	25
	<i>Metopina</i>	19	9	71	119	110
24/08/2018	All	62	61	72	245	270
	Phoridae*	2	1	4	8	23
	<i>Metopina</i>	60	45	56	223	231
26/09/2018	All	6	24	7	6	88
	Phoridae*	0	0	0	0	2
	<i>Metopina</i>	6	16	5	6	73
10/10/2018	All	2	4	12	15	12
	Phoridae*	0	0	0	0	5
	<i>Metopina</i>	2	3	4	5	5
Total	All	100	127	197	454	580
	Phoridae*	2	2	12	21	58
	<i>Metopina</i>	87	73	138	353	421

\*Phoridae excluding the *Metopina* genus

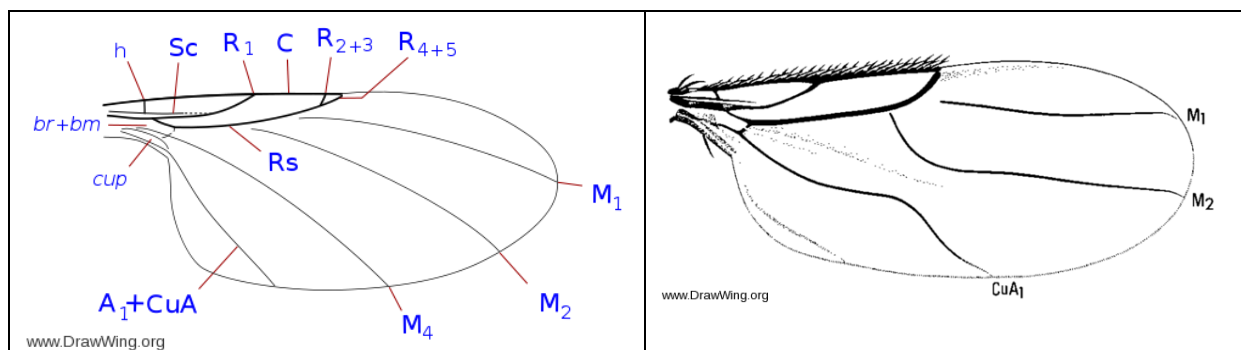
The Phoridae (Figure 3) accounted for 80% of the total catch regardless of trap colour with the genus *Metopina* making up the bulk of this family with 74% of the total fly catch (Figure 4). The latter genus is readily identified within the Phoridae by the distinctive wing venation (Figure 5).



**Figure 3: Typical phorid (Phorid.net)**



**Figure 4: Phoridae at water traps in 2018**



**Figure 5: Typical Phoridae wing venation (left) with differentiation of *Metopina* taxa (right)**

Although many of the trapped flies were very small and of genera that the author has no experience, a few others were identified. Amongst these were the hoverflies *Chalcosyrphus nemorum* (red trap, 11/07/2018), *Episyrphus balteatus* (yellow trap, 18/07/2018), *Eristalis pertinax* (green trap, 21/08/2018) and *Syrphus vitripennis* (white trap, 21/08/2018). The tachinid *Tachina fera* was found at both white and yellow traps on 18/07/2018 while a single unidentified member of the Sepsidae occurred at the green trap on the same date. Two Dolichopodidae were at green and yellow traps on 05/07/2018 although currently unidentified.

### (c) Others especially aphids

Other invertebrates attracted to the water traps were varied but rarely numerous. Among the Hemiptera, the few Heteroptera (bugs) being unidentified while the winged (alate) adult aphids of the Homoptera were the most numerous (91% of the Hemipteran catch). The latter can be particularly difficult to identify with >600 species in Britain. However, they were especially numerous in the autumnal samplings (Table 7). The highest number of aphids was found in the yellow trap (50% of total aphid catch)

with the next most numerous occurring in the green trap (34%). The white trap, unlike with beetles and flies, attracted very few aphids. As part of the UK national monitoring of aphid pests, yellow water traps are widely used (Fera Science Ltd) whilst other work has shown that green traps can also be useful in monitoring these insects (Chu *et al*, 2000). In nearly all cases, yellow-green shades seem to be the most effective for attracting a wide-range of aphid species.

**Table 7: Occurrence of aphids at water traps**

Date	Red	Blue	Green	Yellow	White	Total
05/07/2018	1	0	6	6	1	14
11/07/2018	1	2	11	16	2	32
18/07/2018	0	1	2	2	0	5
21/08/2018	0	0	0	3	0	3
24/08/2018	0	0	0	0	0	0
26/09/2018	0	1	16	5	1	23
10/10/2018	5	4	12	37	3	61
Total	7	8	47	69	7	138

Other catches in the water traps included a few, very small (?parasitic), hymenoptera, a springtail, and even an arachnid! However, no identification was carried out and numbers were usually of singletons.

Overall, it seems that the use of water traps, predominantly white and yellow, would be a simple and effective mean of monitoring some insect groups. They have the advantage that they can be set up at the beginning of a day's visit to a site and then left until collected at the end of the day with no need to do sorting in the field!

## References:

- Chu, C-C. *et al* 2000. Use of CC traps with different trap base colours for Silverleaf Whiteflies (Homoptera: Aleyrodidae), Thrips (Thysanoptera: Thripidae) and Leafhoppers (Homoptera: Cicadellidae). *J Economic Entomology*, **93**, 1329-1337.
- Fera Science Ltd. [www.fera.co.uk](http://www.fera.co.uk).
- Hancock, E.G. & Ward, A. 1996. The effect of shade on the relative abundance of insects in water traps in the tropics. *The Entomologist*, **115**, 91-96.
- Disney, R.H.J., *et al*, 1982. Collecting methods and the adequacy of attempted fauna surveys, with reference to the Diptera. *Field Studies*, **5**, 607-621.
- Disney, R.H.L. 2004. Species preferences for white versus yellow traps for scuttle flies (Dipt., Phoridae). *Entomologist's Monthly Magazine*, **140**, 31-35.

## Appendix: water trap catch details

**Table A1: Water trap catch detail: RED**

Date	Coleoptera	Diptera	Hemiptera	Hymenoptera	Other	Total
05/07/2018	32	2	1	1	0	36
11/07/2018	10	2	1	0	0	13
15/07/2018	10	2	0	1	0	13
21/08/2018	3	24	0	0	0	27
24/08/2018	0	62	0	0	0	62
26/09/2018	6	8	0	0	2	16
10/10/2018	1	3	13	1	2	20
Total	62	103	15	3	4	187

**Table A2: Water trap detail: BLUE**

Date	Coleoptera	Diptera	Hemiptera	Hymenoptera	Other	Total
05/07/2018	41	4	1	0	0	46
11/07/2018	12	12	2	1	0	27
15/07/2018	13	1	1	3	0	18
21/08/2018	2	21	1	0	0	24
24/08/2018	1	61	0	0	1	63
26/09/2018	1	24	1	2	0	28
10/10/2018	2	4	5	0	0	11
Total	72	127	11	6	1	217

**Table A3: Water trap detail: GREEN**

Date	Coleoptera	Diptera	Hemiptera	Hymenoptera	Other	Total
05/07/2018	106	4	6	0	0	116
11/07/2018	21	10	11	0	0	42
15/07/2018	14	9	2	2	0	27
21/08/2018	3	83	1	0	1	88
24/08/2018	0	72	1	6	1	80
26/09/2018	1	7	6	3	2	19
10/10/2018	2	12	12	2	2	30
Total	147	197	39	13	6	402

**Table A4: Water trap detail: YELLOW**

Date	Coleoptera	Diptera	Hemiptera	Hymenoptera	Other	Total
05/07/2018	216	6	16	0	0	238
11/07/2018	41	12	16	0	1	70
15/07/2018	12	18	2	0	0	32
21/08/2018	1	152	3	1	0	157
24/08/2018	3	245	0	0	1	249
26/09/2018	2	6	5	4	1	18
10/10/2018	1	15	37	1	2	56
Total	276	454	79	6	5	820

**Table A5: Water trap detail: WHITE**

Date	Coleoptera	Diptera	Hemiptera	Hymenoptera	Other	Total
05/07/2018	218	8	1	0	0	227
11/07/2018	31	16	2	0	0	49
15/07/2018	21	6	0	0	0	27
21/08/2018	2	180	0	0	0	182
24/08/2018	0	270	0	1	0	271
26/09/2018	6	88	1	0	1	96
10/10/2018	1	12	3	1	0	17
Total	279	580	7	2	1	869

Leicestershire Entomological Society Occasional Publications Series (LESOPS) covering

(a) detailed studies of insects and other invertebrates carried out by Society members and

(b) matters of historical entomological interest to VC55 Leicestershire & Rutland

Editor: Ray Morris (ray@cactusbob.net)