

Bulletin of Insectology Supplemental Material

Title: Use of yellow sticky traps to study daily flight activity and behaviour of sap-sucking insects inhabiting European vineyards

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Bulletin of Insectology, Volume 76 June 2023 pages 101-115

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Table S1. Meteorological data recorded over the monitoring days from the weather station located near the study vineyard.

Day	UTC (hour)	Temperature (°C)	Solar radiation (kJ/m ²)	Relative humidity (%)	Wind speed (km/h)
Late-June monitoring day					
29 June	20	19.0	0	92	0.0
29 June	21	18.5	0	93	0.0
29 June	22	18.3	0	93	0.0
29 June	23	18.0	0	93	0.0
29 June	24	17.8	0	95	0.0
30 June	1	18.1	0	95	0.0
30 June	2	20.3	0	88	0.0
30 June	3	23.2	0	73	0.0
30 June	4	25.6	127	60	0.0
30 June	5	27.0	300	51	0.0
30 June	6	28.2	2843	47	0.0
30 June	7	28.7	5048	45	1.0
30 June	8	29.4	6744	44	3.6
30 June	9	29.4	8096	46	5.2
30 June	10	29.8	9125	43	4.6
30 June	11	30.2	9734	43	4.8
30 June	12	30.1	9517	46	5.1
30 June	13	29.6	9148	48	4.9
30 June	14	28.9	8390	47	4.3
30 June	15	27.5	7104	47	3.7
30 June	16	25.8	4934	56	0.6
30 June	17	22.8	3158	77	0.0
30 June	18	21.3	408	87	0.0
30 June	19	20.4	512	91	0.0
30 June	20	20.1	0	89	0.0
Early-August monitoring day					
3 August	20	21.4	0	78	4.0
3 August	21	21.4	0	70	3.2
3 August	22	22.0	0	62	0.4
3 August	23	22.0	0	58	0.0
4 August	24	21.2	0	65	4.0
4 August	1	21.7	0	63	3.2
4 August	2	21.1	0	63	0.7
4 August	3	20.1	0	66	2.5
4 August	4	20.3	0	64	2.2
4 August	5	21.1	199	61	2.9
4 August	6	24.1	722	60	2.2
4 August	7	26.4	820	49	1.1
4 August	8	25.7	964	54	2.9
4 August	9	26.9	2032	33	3.2

Continued

Table S1 continued

Day	UTC (hour)	Temperature (°C)	Solar radiation (kJ/m ²)	Relative humidity (%)	Wind speed (km/h)
4 August	10	27.2	2269	36	7.9
4 August	11	27.6	2374	37	1.8
4 August	12	28.0	2341	41	7.9
4 August	13	29.1	2141	38	2.5
4 August	14	29.0	1817	36	4.3
4 August	15	28.8	1393	39	5.4
4 August	16	28.9	899	37	2.5
4 August	17	27.7	373	52	1.8
4 August	18	24.1	42	68	0.0
4 August	19	22.1	7	66	1.8
4 August	20	21.5	0	61	4.0
4 August	21	19.5	0	69	7.6
4 August	22	19.1	0	73	3.2
4 August	23	18.8	0	68	2.9
5 August	24	18.1	0	75	3.6
5 August	1	17.8	0	77	2.5
5 August	2	17.5	0	78	2.9
5 August	3	17.8	0	73	4.7
5 August	4	17.7	0	73	3.6
Late-September monitoring day					
30 September	17	18.2	0	72	0.7
30 September	18	16.2	0	83	1.1
30 September	19	15.8	0	85	2.5
30 September	20	15.3	0	89	5.0
30 September	21	15.1	0	90	4.0
30 September	22	15.3	0	86	2.9
30 September	23	13.3	0	94	1.4
1 October	24	13.0	0	98	4.7
1 October	1	12.7	0	98	3.2
1 October	2	12.5	0	99	4.0
1 October	3	13.1	0	93	4.0
1 October	4	14.2	0	91	4.0
1 October	5	14.8	0	88	5.0
1 October	6	16.0	238	84	5.0
1 October	7	19.3	746	78	2.9
1 October	8	23.0	1299	58	1.8
1 October	9	24.3	1705	48	8.6
1 October	10	25.1	2012	46	11.2
1 October	11	25.7	2065	45	5.8
1 October	12	26.0	1953	43	9.7
1 October	13	26.5	1659	43	7.2
1 October	14	26.4	1196	43	9.0
1 October	15	25.7	658	45	7.6
1 October	16	24.8	75	51	4.7
1 October	17	22.2	0	66	4.0
Early-October monitoring day					
7 October	4	12.3	0	96	3.2
7 October	5	12.8	0	93	4.0
7 October	6	14.8	18	88	2.9
7 October	7	15.2	96	86	2.5
7 October	8	15.2	102	89	1.8
7 October	9	15.5	120	86	4.0
7 October	10	15.3	203	87	3.6
7 October	11	16.1	831	83	6.1
7 October	12	17.1	878	77	8.3
7 October	13	17.4	679	75	4.3
7 October	14	16.5	240	77	2.2
7 October	15	16.3	114	82	0.4
7 October	16	15.3	6	86	1.4

Table S2. Captures per trap and hour of monitored species (mean \pm standard error). (-): no traps in the field.

<i>Empoasca vitis</i> - late June				
Time interval that traps remained in the field		Trap position with respect to the canopy		
Installation hour	Replacing hour	Shady	Sunny	
20:00	02:30	0.15 \pm 0.09	0.41 \pm 0.14	
02:30	04:00	4.00 \pm 2.34	21.56 \pm 7.71	
04:00	05:00	2.00 \pm 0.00	2.67 \pm 0.33	
05:00	06:00	1.67 \pm 0.33	0.33 \pm 0.33	
06:00	07:00	0.00 \pm 0.00	1.00 \pm 0.00	
07:00	08:00	0.67 \pm 0.33	0.67 \pm 0.67	
08:00	09:00	0.33 \pm 0.33	0.00 \pm 0.00	
09:00	10:00	0.00 \pm 0.00	0.67 \pm 0.33	
10:00	11:00	1.00 \pm 0.58	0.67 \pm 0.33	
11:00	12:00	0.33 \pm 0.33	0.67 \pm 0.33	
12:00	13:00	2.00 \pm 1.15	2.67 \pm 0.67	
13:00	14:00	2.33 \pm 1.20	2.00 \pm 0.58	
14:00	15:00	1.33 \pm 1.33	0.67 \pm 0.33	
15:00	16:00	0.67 \pm 0.33	0.00 \pm 0.00	
16:00	17:00	5.67 \pm 1.20	3.00 \pm 0.58	
17:00	18:00	7.00 \pm 1.53	3.67 \pm 1.45	
18:00	19:00	15.33 \pm 3.93	30.67 \pm 10.27	
19:00	20:00	8.33 \pm 3.53	61.33 \pm 7.22	
<i>Empoasca vitis</i> - early August				
Time interval that traps remained in the field		Trap position with respect to the canopy		
Installation hour	Replacing hour	Shady	Sunny	Inter-row
19:00	03:00	1.67 \pm 0.42	2.54 \pm 0.56	0.33 \pm 0.12
03:00	04:00	19.11 \pm 3.56	70.67 \pm 9.08	9.78 \pm 2.51
04:00	05:00	10.67 \pm 1.67	14.67 \pm 5.78	6.33 \pm 3.75
05:00	06:00	4.33 \pm 0.88	1.67 \pm 0.33	2.00 \pm 1.46
06:00	07:00	1.67 \pm 0.33	1.33 \pm 0.33	0.00 \pm 0.00
07:00	08:00	2.67 \pm 0.88	0.67 \pm 0.33	0.33 \pm 0.47
08:00	09:00	3.67 \pm 0.88	2.00 \pm 1.00	0.00 \pm 0.00
09:00	10:00	2.00 \pm 0.58	0.00 \pm 0.00	0.00 \pm 0.00
10:00	11:00	2.00 \pm 0.58	0.67 \pm 0.67	0.00 \pm 0.00
11:00	12:00	2.67 \pm 0.67	0.00 \pm 0.00	0.00 \pm 0.00
12:00	13:00	7.00 \pm 2.00	2.00 \pm 0.00	0.00 \pm 0.00
13:00	14:00	8.00 \pm 0.58	1.00 \pm 0.58	0.33 \pm 0.47
14:00	15:00	7.00 \pm 3.21	1.33 \pm 0.88	0.33 \pm 0.47
15:00	16:00	5.67 \pm 2.33	3.00 \pm 1.53	0.00 \pm 0.00
16:00	17:00	9.33 \pm 0.88	3.67 \pm 1.86	0.67 \pm 0.60
17:00	18:00	28.33 \pm 6.06	45.33 \pm 12.86	11.00 \pm 1.90
18:00	19:00	9.00 \pm 2.00	118.33 \pm 14.31	18.33 \pm 4.76
19:00	22:00	-	1.11 \pm 0.47	-
22:00	2:30	-	2.44 \pm 0.99	-
2:30	3:00	-	0.33 \pm 0.32	-
3:00	3:30	-	3.00 \pm 0.63	-
<i>Empoasca vitis</i> - late September				
Time interval that traps remained in the field		Trap position with respect to the canopy		
Installation hour	Replacing hour	Shady	Sunny	
16:30	03:30	0.24 \pm 0.16	0.18 \pm 0.10	
03:30	05:30	1.33 \pm 0.67	8.67 \pm 2.60	
05:30	07:40	0.31 \pm 0.31	0.62 \pm 0.62	
07:40	09:50	2.15 \pm 1.11	0.31 \pm 0.31	
09:50	12:00	0.62 \pm 0.62	0.31 \pm 0.31	
12:00	14:10	1.23 \pm 0.81	0.31 \pm 0.67	
14:10	16:30	3.38 \pm 0.81	117.54 \pm 10.14	

Continued

Table S2 continued

Empoasca vitis - early October

Time interval that traps remained in the field		Trap position with respect to the canopy	
Installation hour	Replacing hour	Shady	Sunny
04:00	06:00	0.17 ± 0.17	16.17 ± 4.98
06:00	08:00	0.15 ± 0.15	3.38 ± 0.41
08:00	10:00	0.15 ± 0.15	2.77 ± 0.71
10:00	12:00	1.23 ± 0.55	2.00 ± 0.77
12:00	14:00	1.54 ± 0.41	18.92 ± 1.07
14:00	16:00	0.46 ± 0.27	50.31 ± 3.84

Zygina rhamni - early August

Time interval that traps remained in the field		Trap position with respect to the canopy		
Installation hour	Replacing hour	Shady	Sunny	Inter-row
19:00	03:00	0.38 ± 0.13	0.17 ± 0.11	0.04 ± 0.06
03:00	04:00	2.67 ± 1.54	2.22 ± 0.89	0.00 ± 0.00
04:00	05:00	4.00 ± 1.53	0.33 ± 0.33	0.00 ± 0.00
05:00	06:00	2.00 ± 0.58	0.33 ± 0.33	0.67 ± 0.94
06:00	07:00	0.67 ± 0.33	0.00 ± 0.00	0.00 ± 0.00
07:00	08:00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
08:00	09:00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
09:00	10:00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
10:00	11:00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
11:00	12:00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
12:00	13:00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
13:00	14:00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
14:00	15:00	0.33 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
15:00	16:00	0.33 ± 0.88	0.00 ± 0.00	0.00 ± 0.00
16:00	17:00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
17:00	18:00	0.33 ± 0.33	0.00 ± 0.00	0.00 ± 0.00
18:00	19:00	1.00 ± 1.00	0.67 ± 0.33	0.67 ± 0.60
19:00	22:00	-	0.00 ± 0.00	-
22:00	2:30	-	0.22 ± 0.20	-
2:30	3:00	-	0.00 ± 0.00	-
3:00	3:30	-	0.11 ± 0.16	-

Zygina rhamni - late September

Time interval that traps remained in the field		Trap position with respect to the canopy	
Installation hour	Replacing hour	Shady	Sunny
16:30	03:30	3.52 ± 0.40	0.06 ± 0.106
03:30	05:30	19.33 ± 1.45	0.00 ± 0.00
05:30	07:40	4.62 ± 1.92	0.31 ± 0.31
07:40	09:50	2.15 ± 0.81	0.00 ± 0.00
09:50	12:00	0.31 ± 0.31	0.31 ± 0.31
12:00	14:10	1.23 ± 0.62	0.00 ± 0.00
14:10	16:30	0.62 ± 0.31	0.62 ± 0.62

Zygina rhamni - early October

Time interval that traps remained in the field		Trap position with respect to the canopy	
Installation hour	Replacing hour	Shady	Sunny
04:00	06:00	12.0 ± 2.0	0.17 ± 0.17
06:00	08:00	2.77 ± 1.22	0.62 ± 0.31
08:00	10:00	2.77 ± 0.27	0.46 ± 0.27
10:00	12:00	1.38 ± 0.71	0.00 ± 0.00
12:00	14:00	0.92 ± 0.53	0.00 ± 0.00
14:00	16:00	0.31 ± 0.15	0.00 ± 0.00

Scaphoideus titanus - early August

Time interval that traps remained in the field		Trap position with respect to the canopy		
Installation hour	Replacing hour	Shady	Sunny	Inter-row
19:00	03:00	0.42 ± 0.24	4.29 ± 0.81	0.08 ± 0.07
03:00	04:00	0.33 ± 0.19	1.00 ± 0.97	0.00 ± 0.00
04:00	05:00	0.67 ± 0.38	0.00 ± 0.00	0.00 ± 0.00
05:00	06:00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
06:00	07:00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
07:00	08:00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00

Continued

Time interval that traps remained in the field		Trap position with respect to the canopy		
Installation hour	Replacing hour	Shady	Sunny	Inter-row
08:00	09:00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
09:00	10:00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
10:00	11:00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
11:00	12:00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
12:00	13:00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
13:00	14:00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
14:00	15:00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
15:00	16:00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
16:00	17:00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
17:00	18:00	3.0 ± 1.73	0.33 ± 0.47	0.00 ± 0.00
18:00	19:00	1.67 ± 0.96	13.7 ± 4.22	0.00 ± 0.00
19:00	22:00	-	2.56 ± 0.96	-
22:00	2:30	-	3.44 ± 0.45	-
2:30	3:00	-	0.00 ± 0.00	-
3:00	3:30	-	0.11 ± 0.16	-

Drepanothrips reuteri - late June

Time interval that traps remained in the field		Trap position with respect to the canopy	
Installation hour	Replacing hour	Shady	Sunny
20:00	02:30	0.00 ± 0.00	0.00 ± 0.00
02:30	04:00	0.00 ± 0.00	0.00 ± 0.00
04:00	05:00	0.00 ± 0.00	0.00 ± 0.00
05:00	06:00	0.33 ± 0.47	3.33 ± 2.02
06:00	07:00	2.00 ± 1.93	19.33 ± 2.98
07:00	08:00	5.33 ± 4.24	42.33 ± 13.92
08:00	09:00	4.33 ± 3.53	31.67 ± 6.51
09:00	10:00	4.00 ± 3.65	22.33 ± 10.00
10:00	11:00	3.33 ± 2.80	17.33 ± 3.24
11:00	12:00	2.67 ± 2.27	13.67 ± 3.68
12:00	13:00	1.67 ± 1.53	15.33 ± 4.88
13:00	14:00	0.33 ± 0.47	4.67 ± 2.27
14:00	15:00	3.67 ± 2.47	11.33 ± 4.17
15:00	16:00	0.33 ± 0.47	6.33 ± 2.12
16:00	17:00	1.33 ± 0.94	9.33 ± 2.80
17:00	18:00	0.33 ± 0.47	2.33 ± 1.14
18:00	19:00	2.00 ± 1.03	2.67 ± 1.74
19:00	20:00	0.00 ± 0.00	0.00 ± 0.00

Drepanothrips reuteri – early August

Time interval that traps remained in the field		Trap position with respect to the canopy		
Installation hour	Replacing hour	Shady	Sunny	Inter-row
19:00	03:00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
03:00	04:00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
04:00	05:00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
05:00	06:00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
06:00	07:00	0.67 ± 0.60	3.00 ± 2.28	0.00 ± 0.00
07:00	08:00	2.33 ± 1.35	13.33 ± 7.18	2.33 ± 1.53
08:00	09:00	2.33 ± 1.85	17.00 ± 4.37	3.67 ± 2.47
09:00	10:00	0.00 ± 0.00	17.33 ± 7.47	0.33 ± 0.47
10:00	11:00	2.00 ± 1.03	14.67 ± 8.15	1.00 ± 0.97
11:00	12:00	1.33 ± 1.40	11.33 ± 7.89	1.33 ± 1.19
12:00	13:00	1.67 ± 0.87	20.00 ± 13.78	1.00 ± 0.63
13:00	14:00	1.67 ± 0.87	21.67 ± 11.90	0.33 ± 0.47
14:00	15:00	0.67 ± 0.60	9.67 ± 4.93	0.00 ± 0.00
15:00	16:00	0.67 ± 0.94	5.67 ± 6.38	0.33 ± 0.47
16:00	17:00	0.33 ± 0.47	0.33 ± 0.47	0.33 ± 0.47
17:00	18:00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
18:00	19:00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
19:00	22:00	-	0.00 ± 0.00	-
22:00	2:30	-	0.00 ± 0.00	-
2:30	3:00	-	0.00 ± 0.00	-
3:00	3:30	-	0.00 ± 0.00	-



Figure S1. Transparent Plexiglas roof used in experiment 2 on the influence of shading on capture numbers.



Figure S2. Opaque Plexiglas roof used in experiment 2 on the influence of shading on capture numbers.