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THE EFFECTIVENESS OF CATCHING APHIDS (HEMIPTERA: STERNORRHYNCHA: APHIDINEA) IN MOERICKE AND LIGHT TRAPS

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Abstract: The studies were conducted in an urban greenery area of Poznań, Poland to compare the effectiveness of Moericke colour traps and light traps used to catch aphids. The combined methods yielded 61 aphid species from the area. The light trap caught 51 species, while 44 species were caught using the Moericke trap. Over 4,000 specimens were collected with each method separately.

Key words: Aphidofauna, Moricke traps, light trap

INTRODUCTION

In faunistic and biocenological studies of aphids, various methods are applied, such as: reviewing host plants or plant organs, shaking insects from plants, using scooping and sucking devices as well as colour traps (Moericke 1969; Szelegiewicz 1974; Czylok 1983; Basky 1993, 2002; Mook and Wiegers 1999; Ruszkowska and Wilkaniec 2002; Durak & Wojciechowski 2005; Sekulak and Wilkaniec 2006; Wilkaniec *et al*. 2008; Borowiak-Sobkowiak and Wilkaniec 2010; Budzińska and Goszczyński 2010). Light traps are used much less often, although they can yield rich material both in terms of quality and quantity.

The aim of the paper is to compare the effectiveness of aphid catching in urban greenery with the use of Moericke colour traps often applied by aphidologists, and light traps, which have not been used for this insect group yet. The effectiveness of the method was defined as how good the traps were at catching the insects, which is the result of the insects' abundance and activity.

MATERIALS AND METHODS

The experiment was conducted in an urban greenery area abundant in various species of decorative trees and shrubs in the vicinity of the University of Life Sciences on Dąbrowskiego Street, in the city of Poznań. This street borders the Botanical Garden of A. Mickiewicz University.

Aphids were caught in a self-catching light trap with a blended mercury lamp of 250 W, placed (2 m above the ground) near the south border of the Botanical Garden and the greenery area of the Poznań University of Life Sciences. Aphids were also caught in two Moericke traps suspended 1.5 m above the ground, 3 m (trap 1) and about 5 m (trap 2) from the light trap.

Insects were caught in 2010, from mid-April to the end of October. We made 54 catches with the light trap. Insects from the Moericke traps were collected every ten days. Light trap catches were made in favourable weather conditions (on warm, windless and dry evenings and nights). Meteorological data (temperature) came from the Poznań, Marcelin station, which is about 3 kilometers from the place of the experiment.

The aphids were preserved in test tubes with 75% ethyl alcohol and then classified with the keys by Taylor 1984, and Blackman and Eastop 1994.

The statistical analysis, conducted using a Kruskal-Wallis test, covered the data from the total number of aphid species and the total number of aphid specimens collected in the greenery area by the Moericke traps and the light trap. The data was statistically analysed using StatSoft, Inc. (2010), STATISTICA, version 9.0, www.statsoft.com.

The aphid species were named based on the Catalogue des Aphididae du monde (Remaudière and Remaudière 1997).

RESULTS AND DISCUSSION

The combined methods yielded 61 aphid species from the area (Table. 1). There were 51 species from the light trap, while 44 species were from the Moericke traps, out of which 23 were from Moericke trap I and 39 were from Moericke trap II. Over 4,000 specimens were collected with each method separately.

Statistical analysis revealed significant differences in the aphid composition and the total number of aphid specimens which were caught in the light trap and Moericke traps. Significant differences were observed in the species composition between Moericke trap I, and the

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Table 1. Number of aphid species collected in the greenery area of Poznań by Moericke traps and the light trap (significance level * p ≤ 0.05)

Aphid species	Moericke traps			Light trap
	I	II	total	
	1	2	3	4
Acyrthosiphum pisum (Harris)	–	–	–	3
Adelges sp.	–	5	5	1
Anoecia corni (F.)	18	23	41	91
Aphis craccivora Koch	–	1	1	2
Aphis fabae Scop.	2	4	6	4
Aphis pomi de Geer	1	2	3	3
Aphis sambuci L.	1	3	4	–
Aphis sp.	–	1	1	1
Betulaphis quadrituberculatus (Kalt.)	–	–	–	3
Brachycaudus divaricatae Shaposh.	5	6	11	8
Brachycaudus helichrysi (Kalt.)	1	–	1	2
Brevicoryne brassicae (L.)	–	–	–	2
Calaphis betulicola (Kalt.)	–	–	–	1
Capitophorus elaeagni (del Gu.)	2	1	3	41
Cavariella aegopodii (Scop.)	–	1	1	–
Chaitophorus leucomelas Koch	–	1	1	10
Cinara pinea (Mordv.)	–	1	1	1
Clethriobius comes (Walk.)	–	1	1	1
Ceruraphis eriophori (Walk.)	–	–	–	1
Drepanosiphum aceris Koch	1	–	1	4
Drepanosiphum platanoidis (Schrk.)	113	4,190	4,303	2,398
Dysaphis crataegi (Kalt.)	–	1	1	3
Dysaphis plantaginea (Pass.)	1	5	6	–
Eriosoma ulmi (L.)	–	3	3	2
Eucallipterus tiliae (L.)	2	24	26	41
Euceraphis betulae Koch	15	23	38	796
Euceraphis punctipennis (Zett.)	–	–	–	5
Hyalopterus pruni (Geoff.)	–	7	7	63
Hyperomyzus pallidus H.R.L.	–	–	–	1
Hyperomyzus picridis (Börn.)	1	–	1	3
Kaltenbachiella pallid (Hal.)	–	–	–	1
Macrosiphoniella persequens (Walk.)	–	–	–	2
Macrosiphum euphorbiae (Thom.)	–	–	–	1
Macrosiphum rosae (L.)	1	1	2	3
Metopolophium dirhodum (Walk.)	1	3	4	7
Microlophium carnosum (Buckt.)	–	–	–	2
Myzocallis castanicola Baker	–	–	–	1
Myzocallis coryli (Goeze)	–	–	–	1
Myzus cerasi (F.)	1	–	1	4
Myzus lythri (Schrk.)	–	1	1	26
Myzus persicae (Sulz.)	–	2	2	13
Ovatus insitus (Walk.)	–	1	1	
Periphyllus aceris (L.)	3	6	9	–
Periphyllus coracinus (Koch)	–	2	2	–
Periphyllus hirticornis (Walk.)	2	1	3	2
Periphyllus testudinaceus (Fern.)	17	36	53	6
Phorodon humuli (Schrk.)	8	12	20	130
Phyllaphis fagi (L.)	1	–	–	2
Pterocallis alni (de Geer)	–	–	–	5
Pterocomma pilosum Buckt.	–	1	1	–
Rhopalosiphum insertum (Walk.)	–	1	1	2
Rhopalosiphum padi (L.)	3	24	27	373
Sitobion avenae (Börn.)	–	–	–	35
Smynthurodes betae Westw.	–	1	1	–
Tetraneura ulmi (L.)	–	2	2	5
Therioaphis luteola (Börn.)	–	–	–	1
Therioaphis trifolii (Mon.)	–	1	1	–
Tinocallis platani (Kalt.)	2	10	12	7
Trichosiphonaphis corticis (Aizenb.)	–	–	–	1
Tuberculoides annulatus ((Htg.)	–	1	1	1
Tuberculoides borealis (Krzywiec)	–	1	1	–
Total number of specimens	202 (3*,4**)	4,410 (4*)	4,611 (1*)	4,122 (1**,2*)
Number of species	23 (3*,4**)	39	43 (1*)	51 (1**)

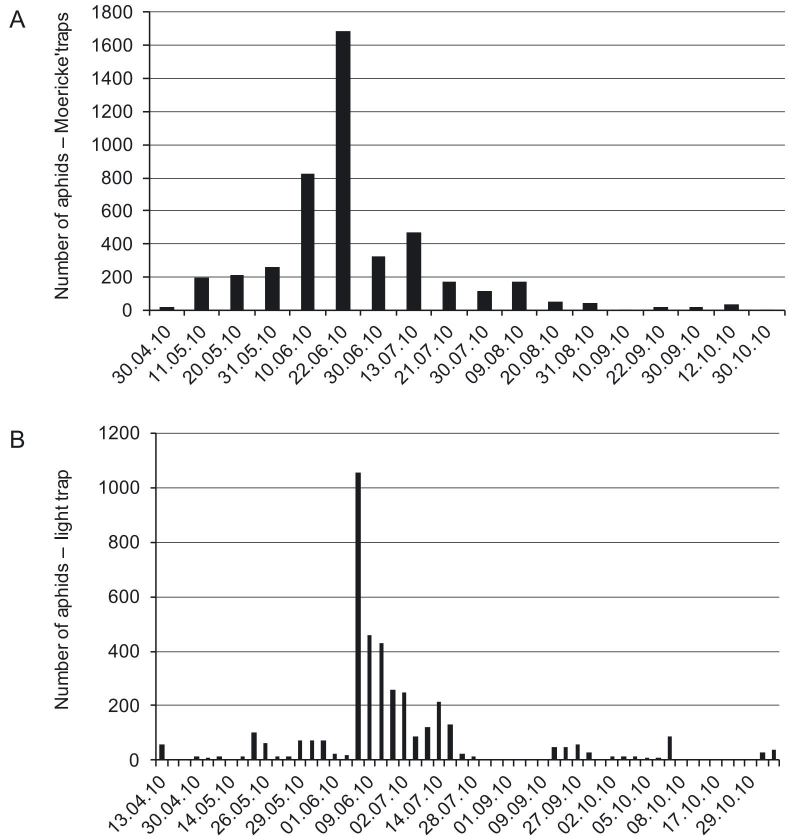

Fig. 1. Numerical changes of aphids in the Moericke traps (A) and light trap (B) in the greenery area of Poznań in 2010

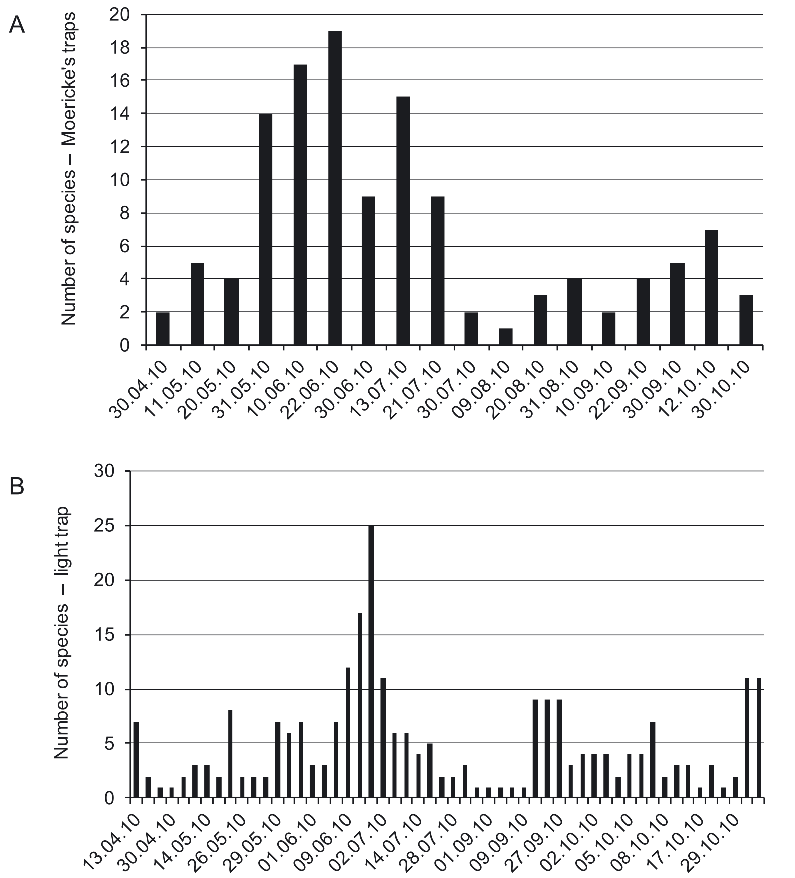

Fig. 2. Number of aphid species caught with the use of the Moericke traps (A) and light trap (B) in the greenery area of Poznań in 2010

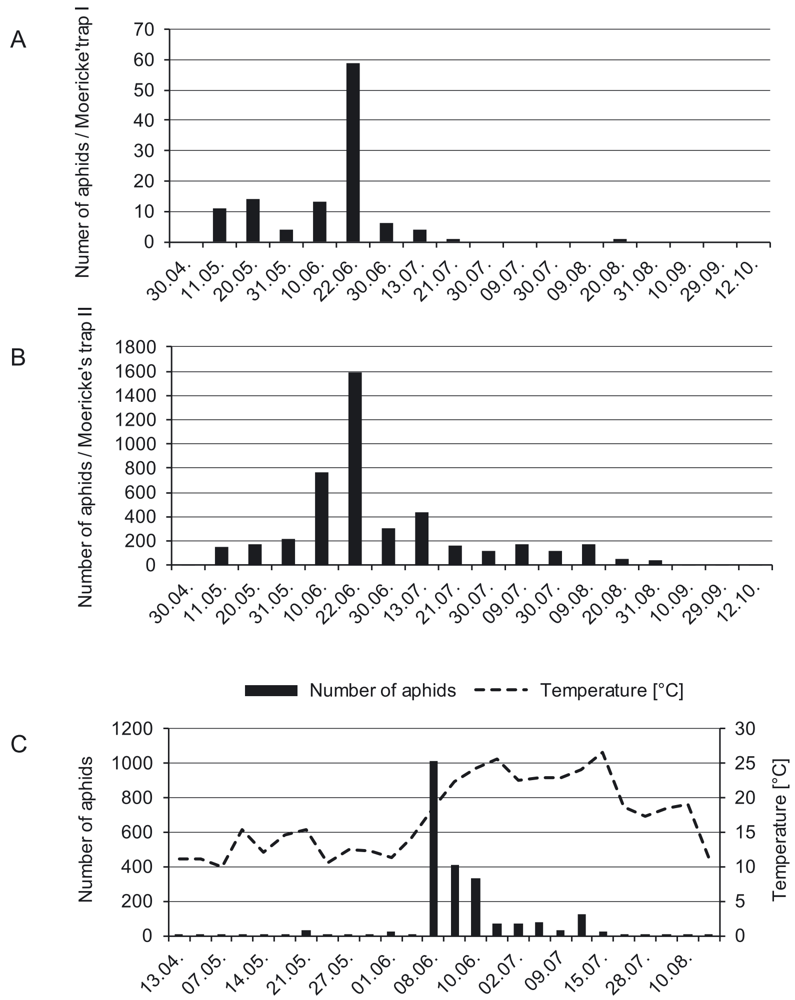

Fig. 3. Numerical changes of *Drepanosiphum platanoidis* caught with the use of I & II Moericke traps (A & B) and the light trap (C) in the greenery area of Poznań in 2010

two Moericke traps and the light trap (H = 29.45; $p \leq 0.05$) (Table. 1). In the total number of caught aphid specimens, further significant statistical differences were observed between Moericke' trap I, the Moericke' trap II and the light trap, as well as between Moericke trap I and the two Moericke traps (H = 30; $p \leq 0.05$) (Table. 1).

From both methods, most specimens were caught within the first ten days of June to the first ten days of July (Fig. 1). The species diversity was the highest in that period, too. The maximum number of species caught in colour traps from 10 to 20 June was 19, while for the light trap there were 25 taxa (Fig. 2) .

The species most frequently caught in both kinds of the traps was the sycamore aphid, *Drepanosiphum platanoidis* (Schrank, 1801). There were 4,303 sycamore aphid specimens caught in the Moericke traps and 2,398 specimens in the light trap.

After the sycamore aphid, the next most abundant species caught in Moericke traps were: *Periphyllus testudinaceus* (Fernie, 1852), *Anoecia corni* (Fabricius, 1775), *Euceraphis* betulae (Koch,1855), *Rhopalosiphum* padi (Linnaeus, 1758), *Eucallipterus tiliae* (Linnaeus, 1758) and *Phorodon humuli* (Schrank, 1801). The light trap caught *E. betulae*, *R. padi* and *P. humuli* (Table 1).

Both methods were quite similar when it came to top seasonal occurrence for particular species. A good example is the occurrence dynamics of *D. platanoidis* in both kinds of traps (Fig. 3).

The efficiency of the traps depended on the weather conditions. This was true particularly for the light trap, in which the number of insects clearly increased as the temperature rose. Aphids seem to react to light like moths do. The studies of the latter group showed that the insects coming to the light were most influenced by the air temperature at sunset. If the temperature was lower than the monthly average insect activity was low. When there was high relative air humidity the insects came only if the temperature was high (Buszko and Nowacki 1990).

An analysis of the reaction of particular insects to light and colour showed that the reaction of *D. platanoidis* was peculiar. This species definitely reacted better to colour than light, which was expressed in almost as many specimens caught in Moericke traps as in the other kind of traps. A similar reaction was noted for: *P. testudinaceus*, *Tinocallis platani* (Kaltenbach, 1843) and *Brachycaudus divaricatae* Shaposhnikov, 1956 (Table 1).

Clearly more species showed the opposite trend, which resulted in significantly more aphids caught in the light trap than in the colour traps. Those aphids caught in the light trap included *E. betulae*, *H. pruni*, *Myzus lythri* (Schrank, 1801), *Myzus persicae* (Sulzer, 1776), *P. humuli*, *R. padi*, *Sitobion avenae* (Fabricius, 1775) and *A. corni* (Table 1).

Several species were caught only in autumn, including: *Capitophorus elaeagni* (del Guercio, 1894), *Hyperomyzus picridis* (Börner & Blunk, 1916), *Tetraneura ulmi* (Linnaeus, 1758) and *A. corni*. The decisive factor could have been the population size of those species at the end of the season.

The results of the study in urban greenery area indicated the usability of light traps for determining the aphid species composition and the dynamics of aphid occurrence in season. Quantity and quality comparisons of the collected material indicated that the reaction of particular species to light was varied. The light trap caught more species than the colour Moericke traps, and many species were also more numerously represented in the light trap. When comparing the collected material for both kinds of traps a certain advantage of the light trap could even be seen in comparison to colour trap I, placed not far from the light trap (3 m).

The disadvantages of the light trap include the fact that a higher labour commitment is required in the operation of the light trap in comparison with colour traps. Collecting comparable material in terms of quantity, required over 50 catches by the self-catch, while for the Moericke traps it took only 19 samples in the same period.

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