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EFFECTIVENESS OF BEER TRAPS AND MOLLUSCICIDES AS MEANS OF GASTROPOD CONTROL

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ABSTRACT: Effectiveness of several kinds of beer and molluscicides in gastropod control was tested in a 15-week experiment in an allotment garden, using plants of *Callistephus chinensis*. Among the total of 462 gastropods trapped during the observation period, 98.1% were slugs; the greatest number of gastropods was trapped in July, in the first week of the experiment. The most effective baits were beer Żubr (25.5% of all trapped gastropods), Mesurol SK 04 GB (14.5%) and beer Żywiec Porter (13.2%). The degree of plant damage dependend negatively on the number of trapped gastropods, suggesting a possibility of slug control in allotments by means of various kinds of baits.

KEY WORDS: pest control, gastropods, beer traps, molluscicides

INTRODUCTION

Owners of allotment gardens often face the slug and snail problem. In favourable conditions some gastropods reproduce fast and feed on virtually every plant. They damage all parts of plants and, when they occur in great numbers, they may destroy cultivations completely. For this reason new means of their control are being sought all the time (KOZŁOWSKI 2003, DANKOWSKA 2006, 2009, DANKOWSKA & KŁOSEK 2008). The experiment described in this paper was to test the possible usefulness of beer traps for gastropod control in allotment gardens.

MATERIAL AND METHODS

The experiment was carried out during 15 weeks in July–October 2009, in an allotment garden 300 m^2 in area, a part of the Family Allotment Gardens in Poznań. The allotment was a recreation garden, planted with ornamental plants: *Hydrangea macrophylla*, *Viola* × *wittrockiana*, *Lilium* sp., *Dianthus deltoides*, *Rosa* sp., *Hosta* sp., *Salvia* sp., *Gladiolus* sp., *Spiraea* sp., *Callistephus chinensis*. The plants were regularly watered by the owners.

Seven brands of beer and four molluscicides were used in the studies (Table 1). Plastic mugs of 0.25 l volume were filled with beer and dug into the soil. Molluscicides, at doses recommended by the manufacturer, were spread on foil sheets 10 cm^2 in area and protected from rain with roofs. Four observation points were selected. Beer and molluscicides were exchanged every week, observations were done every two days. The trapped gastropods were collected, counted and identified. Meteorological data were obtained from the weather station in Marcelin (Poznań).

The damage to the plants [%] was recorded, and the degree of damage was calculated for the whole observation period and for particular weeks, using the Townsend-Heuberger formula (PÜNTENER 1981):

$$\% \text{ damage} = \frac{\sum_o^i (n * v)}{i * N} \times 100$$

where: v – degree of damage, i – the highest degree of damage, n – number of plants or their parts damaged

Table 1. Characteristics of the beer brands and molluscicides used

Beer		
Brand	Alcohol content [%]	Extract content [%]
Fortuna Czarne	6.2	12.7
Kaper	8.7	20.0
Lech Free	0.5	No data
Lech Pils	5.5	11.7
Żywiec Porter	9.5	22.0
Warka Strong	7.8	15.1
Żubr	6.0	12.1
Molluscicide		
Name	Active substance	Content [%]
Mesurol Alimax 02 RB	Methiocarb	2.0
Mesurol SK 04 GB	Methiocarb	4.0
Mesurol Schneckenkorn 04 GB	Methiocarb	4.0
Ślimax 04 GB	Methaldehyde	4.0

to each degree, N – total number of plants or their parts. A six-degree scale of damage was applied (Table 2). The observations involved 200 plants of the Chinese aster (*Callistephus chinensis*).

Table 2. Degree of damage

Degree of damage	Percentage of damage leaf area
0	No damaged leaves
1	1–5
2	6–10
3	11–20
4	20–35
5	36–50
6	50–100

RESULTS AND DISCUSSION

The atmospheric conditions during the observation period are presented in Figs 1 and 2. The mean temperature during the observation period (July–October) was 15.6°C, humidity 75.7%, precipitation sum 146.6 mm.

The numbers of trapped gastropods are presented in Fig. 3. A total of 462 gastropods were collected during the observation period. Their number was the greatest in July – 151, and the smallest in October – 75. The greatest number of gastropods (103) was trapped in the first week of observations which may indicate their initially abundant occurrence in the garden. The number decreased distinctly during consecutive weeks. The species composition of collected gastropods is presented in Table 3. Slugs were

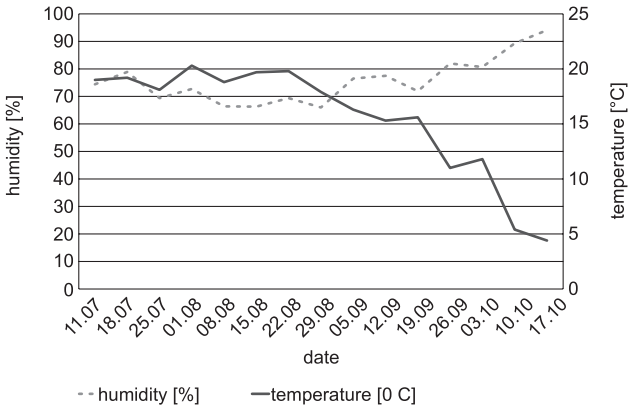

Fig. 1. Atmospheric conditions during the observation period: humidity and temperature

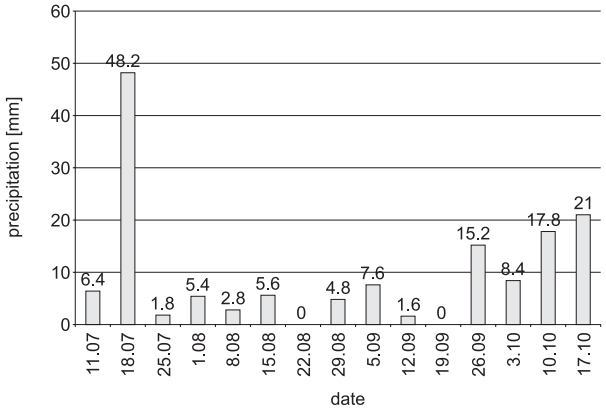

Fig. 2. Atmospheric conditions during the observation period: precipitation

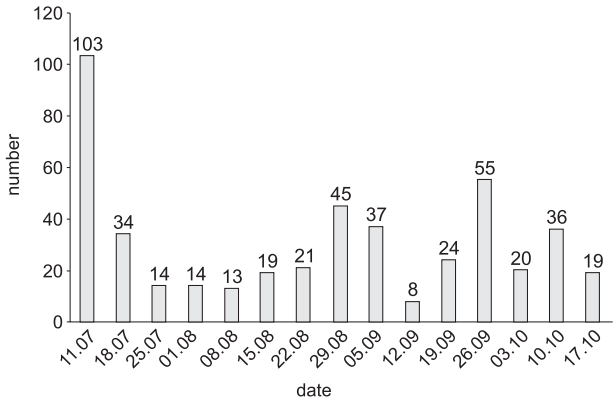

Fig. 3. Number of gastropods trapped during the observation period

Table 3. Species composition of collected gastropods

Species	Number
Deroceras reticulatum	154
Deroceras laeve	299
Limax maximus	5
Cepaea hortensis	4
Total	462

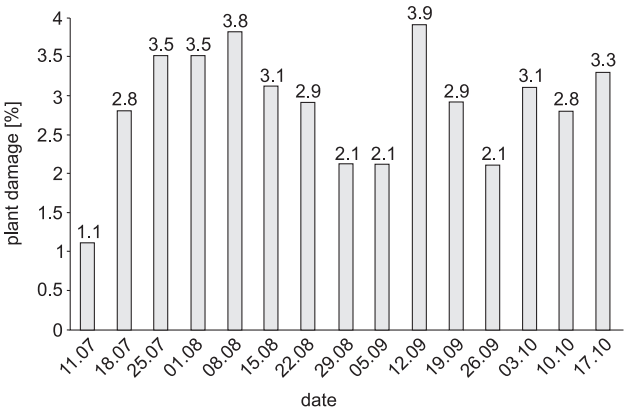

Fig. 4. Degree of plant damage during the observation period

Table 4. Attractiveness of beer traps and molluscicides

Trap	Species					
	D. reticulatum	*D. laeve*	*L. maximus*	*C. hortensis*	Sum	Per cent (±S.D.)
Fortuna Czarne	7	20	1	1	29	6.3±1.9
Kaper	8	13	0	0	21	4.5±1.4
Lech Free	4	14	0	0	18	3.9±1.4
Lech Pils	13	14	0	1	28	6.1±1.7
Żywiec Porter	20	41	0	0	61	13.2±4.3
Warka Strong	1	32	0	1	34	7.4±3.4
Żubr	37	81	0	0	118	25.5±8.3
Mesurol Alimax 02 RB	13	18	2	1	34	7.4±1.8
Mesurol SK 04 GB	33	34	0	0	67	14.5±4.2
Mesurol Schneckenkorn 04 GB	8	21	1	0	30	6.5±2.1
Ślimax 04 GB	10	11	1	0	22	4.8±1.3
Total	154	299	5	4	462	100.0

the most numerous, constituting 98.1% of all gastropods.

The attractiveness of beer traps and molluscicides is presented in Table 4. Among the baits used, the following were the most attractive to gastropods: beer Żubr – 25.5% of all gastropods, Mesurol SK 04 GB (14.5%) and beer Żywiec Porter (13.2%). Slugs *Deroceras laeve* were the most numerous, constituting 64.7% of all gastropods.

The percentage of plant damage in consecutive weeks is presented in Fig. 4. The damage during the whole observation period was 43.1%. There was a dependence between the number of trapped gastropods and the percentage of plant damage (cf. Figs 3 and 4); the more numerous the trapped gastropods, the less damaged the plants. The results suggest a possibility to control gastropods in allotment gardens, using various kinds of baits.

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