

**FOOD SPECTRUM OF *COCCINELLA SEPTEMPUNCTATA* L.
IN THE URBAN HABITATS OF TBILISI (GEORGIA)
[COLEOPTERA, COCCINELLIDAE]**

By

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RÉSUMÉ

Le contenu du tube digestif d'adultes de Coccinella septempunctata collectés au hasard dans trois sites de Tbilisi en mai et juin 2007 a été comparé. Il est conclu que les aphides sont, au mois de mai, la base de la nutrition des coccinelles dans l'habitat urbain. En juin, leur éventail alimentaire change dramatiquement : en conséquence de l'effondrement des populations aphidiennes durant la période chaude, les coccinelles se nourrissent alors de pollens et de spores fongiques (Alternaria spp.)

Key-words: *Coccinella septempunctata*, aphid remains, plant pollens, fungal spores, food spectrum, urban habitats, Georgia.

Coccinella septempunctata is a widespread ladybird beetle in the Palearctic, Nearctic and oriental regions. It is an aphidophagous species and important biological control agent against harmful aphids of crops in the agroecosystems (Hodek & Honěk, 1996, Alexidze & Barjadze, 2006). This is a widely distributed species in Georgia too (Merkviladze & Kvavadze, 2002). Food composition of this species in spring is well studied (Kuznetsov, 1975, Formusoh & Wilde, 1993), but a few data exist about summer diet (Triltsch, 1997, Ricci et al., 2005), when aphids become less abundant.

The aim of our investigation was to clarify food spectrum of *C. septempunctata* in urban habitats of East Georgia.

MATERIAL AND METHODS

The research was conducted in 2007 from May to June. We studied the gut content in adult individuals collected randomly by sweeping net in 3 localities of Tbilisi: Tbilisi Botanical Garden, Tbilisi Sea and Vake Park (5 individuals/ per locality).

The material was treated using standard method widely used in Palynology. Collected adult individuals of seven-spotted ladybird beetle were dissected and their guts were cut out and the content analysed. In the first stage in the palynological laboratory organic zoomaterial was boiled for 3-4 min 10% solution of potassium hydroxide (KOH) and then material was washed with distilled water. The next stage is acetolysis. Cellulose is a polysaccharide and can be removed most effectively by acid hydrolysis. The sample should be dehydrated before being subjected to acetolysis. After the process of acetolysis the pellet was resuspended in distilled water, centrifugated and supernatant decanted. Samples were mounted in glycerine. Pollen identified by using type material deposited at the Institute of Palaeobiology of Georgian National Museum. The material studied is kept at the Institute of Palaeobiology.

We calculate the percentage of food remains in the gut by this way: After centrifugated gut contents we made temporary slides of gut contents in glycerol and studied under the Leitz microscope on 10X20 magnifications. We separately count numbers of aphid and zooremain, fungal spores, various plant pollens and undetermined zoo remains and based on received data we calculated percentage of food remains. Sizes of the aphid and zooremain (parts or semi-digestion fragments of appendages, segments of antenna, rostrum or great part of cuticle with appendages) ranged from 60 - to 250 μm , sizes of the fungal spores - from 35- to 45 μm , while plant pollens sizes were 16-65 μm .

RESULTS AND DISCUSSIONS

The new adults emerged from pupae approximately at the beginning of May and began feeding on the aphids on the studied territory. Aphids represent main proportion of *C. septempunctata* diet, which range from 52 % to 79 % of the total diet in mid-May on the above mentioned three localities (see Table Ia,b,c). We divided food of ladybird in 3 categories: zooremain (aphid remains and undetermined zooremain), plant remains (plant pollens and parenchymal cells), fungal remains (*Alternaria* spp. spores).

Low diversity of food spectrum was registered in Tbilisi Sea (15-V-2007), we recorded the following percentage of ladybirds total diet: aphids - 79%, second come undetermined zooremain by 14%, while pollens of *Asteraceae* and fungal spores are represented by 3.5% species each respectively (see Table Ic).

Based on our investigation it is clear that composition of coccinellids diet corresponds to the biodiversity of researched habitats. If we compare food spectra of adult individuals of *C. septempunctata* collected in the Tbilisi Sea in post-diapause and summer periods we can conclude that percentage of aphids and zooremain were decreased from 79% to 14% and from 14% to 6% respectively and correlate to the decrease in number of aphids in the hot period (see Table Ic, d). In addition, percentage of plant remains and fungal remains were increased from 3.5% to 23.5 % and from 3.5% to 56.5 % respectively, because of pollens and fungal spores are necessary to accumulate energy reserve for overwintering. Among the plants visited, *Asteraceae* and *Poaceae* were preferred by ladybirds.

Table I.
Percentage of food remains in the gut of an individual adults of
Coccinella septempunctata collected in three localities of Tbilisi

	Ia	Ib	Ic	Id
locality	Bot. Garden, 10-V	Vake Park, 11-V	Tbilisi Sea, 15-V	Tbilisi Sea, 12-VI
	percentage of each food remains			

aphid remains	78	52	79	14
<i>Alternaria spp.</i> spores	9	4	3.5	56.5
undetermined zooremain	7	18	14	6
parenchymal cells of <i>Pinus sp.</i>	-	-	-	1
pollens of <i>Acer sp.</i>	2	-	-	-
pollens of <i>Asteraceae</i>	-	-	3.5	-
pollens of <i>Brassicaceae</i>	-	-	-	6
pollens of <i>Carduus sp.</i>	2	-	-	-
pollens of <i>Cichorioideae</i> (<i>Asteraceae</i>)	-	-	-	4
pollens of <i>Corylus sp.</i>	1	-	-	-
pollens of <i>Pinus sp.</i>	-	17	-	-
pollens of <i>Plantago lanceolata</i>	-	-	-	4
pollens of <i>Poaceae</i>	-	-	-	8.5
pollens of <i>Quercus sp.</i>	-	6	-	-
pollens of <i>Urtica sp.</i>	-	3	-	-
pollens of <i>Veronica sp.</i>	1	-	-	-
Total number of remains	102	71	29	142

CONCLUSIONS

We conclude aphids represented the main proportion of *C. septempunctata* diet in the urban habitats during May based on results of our investigation.

Ladybirds' food spectrum changes dramatically in June. *C. septempunctata* feeds on plants pollens and fungal spores (*Alternaria spp.*), because aphids number is significantly decreased during hot period.

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