

**OBSERVATIONS REGARDING THE ENTRY IN THE HIEMAL DIAPAUSE  
OF *Chrysolina fastuosa* (Scopoli, 1763) (CHOLEOPTERA, CHRYSOMELIDAE)  
IN THE NORTH-WESTERN PART OF ROMANIA (TINCA AREA, BIHOR COUNTY)**

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**Abstract.** The paper presents the results of the observations performed by the authors on the entry in the hiemal diapause of *Chrysolina fastuosa* Scop., in the Tinca area, Bihor county, during September 2017 – January 2018. The overwintering can be achieved usually as an adult, sometimes as a larva.

**Keywords:** *Chrysolina fastuosa*, overwintering, Tinca area.

**Rezumat. Observații privind intrarea în diapauza hiemală (iernare) la *Chrysolina fastuosa* (Scopoli 1763) (Coleoptera, Chrysomelidae) în partea nord-vestică a României (zona Tinca, județul Bihor).** Lucrarea prezintă rezultatele observațiilor realizate de autori asupra intrării în diapauza hiemală (iernare) la *Chrysolina fastuosa* Scop., în zona Tinca, județul Bihor, în perioada septembrie 2017 – ianuarie 2018. Iernarea poate fi realizată, în general, în stadiul de adult, uneori în stadiul de larvă.

**Cuvinte cheie:** *Chrysolina fastuosa*, iernare, zona Tinca.

### INTRODUCTION

Tinca area is located in the south-western part of Bihor County, in the north-western part of Romania. The climate is temperate-continental, the average altitude is 110 m, the vegetation belongs to the oak stage (BERINDEI & POP, 1972).

Data about the biology and the ecology of the species *Chrysolina fastuosa* at the Bihor county level and in Europe were published by different authors (FUSS et al., 2005; BARDIN & TIMRALEEV, 2007; BIENKOWSKI, 2010; BOZSIK, 2014; ILIE, 2017) (Fig.1).



Figure 1. *Chrysolina fastuosa* Scop. - larvae (after ILIE, 2017).

The host plants belong to Urticaceae and Lamiaceae families. The overwintering could be achieved usually in the adult stage, sometimes even in the larval stage, having different ages (ILIE, 2017). The present paper follows the influence of temperature and amount of incoming food on the overwintering of this species.

## MATERIAL AND METHODS

The researches on the entry in hibernation of *Chrysolina fastuosa* were achieved in the Tinca area, on a lot situated in the proximity of the personal farm of the Ilie family, during September 2017 – January 2018.

This lot has a surface of 3m<sup>2</sup> and presents a vegetation formed by *Lamium maculatum* Linnaeus 1758, *Urtica dioica* Linnaeus 1758, along with sporadic specimens of *Stellaria media* Villers 1796, *Veronica didyma* Linnaeus 1758, *Prunella vulgaris* Linnaeus 1758, *Cichorium intybus* Linnaeus 1758 and *Erigeron annuus* Linnaeus 1758. The observations were performed on a daily basis, measuring nocturnal and diurnal temperatures, the velocity of wind (with the help of an anemometer).

## RESULTS AND DISCUSSIONS

Generally, the entry in the hiemal diapause takes place during autumn, depending on temperature, in October, because of the high temperatures registered during October – November in the last years (2014-2016), the entry in overwintering was achieved at a very late date. Example – one specimen of larva of the third age, November 27, 2016, t=7°C (the last appearance in nature from 2016 (ILIE, 2017)).

The high temperatures registered in autumn have determined the beginning of new series of adult in copula:

- Five pairs in copula, September 24, 2017, t=14°C.
- One pair in copula, October 6, 2017, t=11°C.
- One pair in copula, October 11, 2017, t=14°C.

The daily dynamics of the presence of *Chrysolina fastuosa*, during October 2017 – January 2018, is presented in the following table (Table 1).

Table 1. The daily dynamics of the presence of *Chrysolina fastuosa* in the Tinca area, in the analysed period.

Day	Number of specimens				Temperatures		Wind	Time	
	L1	L2	L3	A	Night	Day	Beaufort Degrees	Sunny	Dull
6	-	2	2	6	3	11	-	x	-
7	-	1	2	5	5	15	-	x	-
8	-	1	1	6	5	15	-	x	-
9	1	4	-	5	4	15	-	x	-
10	-	2	-	6	1	14	-	x	-
11	1	2	1	5	4	14	-	x	-
12	-	2	2	4	4	15	-	x	-
13	-	2	2	4	5	16	-	x	-
14	-	2	3	1	7	17	-	x	-
15	-	2	5	2	7	17	-	x	-
16	-	1	7	2	9	23	-	x	-
17	-	3	6	1	10	25	-	x	-
18	1	3	6	1	9	25	-	x	-
19	-	2	19	1	8	23	-	x	-
20	-	2	14	1	4	21	-	x	-
21	-	3	16	1	5	17	-	x	-
22	-	1	12	-	6	16	-	x	-
23	-	-	11	-	10	13	2	-	Rain
24	-	-	10	-	3	12	4	-	Rain
25	-	2	10	-	4	18	2	x	-
26	-	3	9	-	7	14	3	-	X
27	-	3	13	-	5	14	4	-	Rain
28	-	2	12	-	4	12	-	-	X
29	-	2	5	-	4	11	3	-	Rain
30	-	1	5	-	-1	12	2	x	X
31	-	1	3	-	-6	9	-	x	Hoar-frost
<b>November, 2017</b>									
1	-	2	4	-	-6	9	-	-	Hoar-frost
2	1	2	6	-	5	13	-	x	X
3	1	2	14	-	7	13	-	x	Rain
4	1	3	22	-	7	14	-	x	-
5	3	4	23	-	3	17	2	x	-
6	1	3	10	-	-1	16	-	x	-
7	5	8	13	-	-3	15	-	x	-
8	2	8	19	-	5	12	-	-	Rain
9	1	4	11	-	7	12	-	-	Rain
10	5	24	7	-	8	12	-	-	X
11	7	10	21	-	7	13	2	x	-
12	5	19	6	-	7	11	2	x	-

13	3	15	5	-	10	15	2	-	X
14	4	11	3	-	0	6	3	-	Rain
15	4	12	3	-	3	9	-	-	X
16	4	26	3	-	4	12	-	x	-
17	6	41	3	1	5	8	-	-	X
18	4	18	4	1	6	8	-	-	X
19	4	22	4	-	3	7	2	x	X
20	3	32	3	-	-1	6	-	-	Hoar-frost
21	1	13	1	-	-3	4	-	-	Rain and sleet
22	3	11	1	-	3	8	-	-	Rain
23	2	18	3	-	4	12	2	x	-
24	2	16	2	-	5	9	-	-	X
25	6	11	3	-	1	13	-	x	Hoar-frost
26	8	33	7	-	7	12	-	-	Rain
27	4	10	4	-	2	6	2	-	Rain
28	4	17	3	-	-2	6	-	x	Hoar-frost
29	2	5	-	-	-5	7	-	x	Hoar-frost, frozen ground
30	-	5	-	-	2	8	3	-	Rain
<b>December, 2017</b>									
1	1	12	-	-	1	4	-	-	X
2	4	5	1	-	-1	4	3	-	X
3	4	15	4	-	1	3	2	-	Rain sleet, snow
4	4	5	-	-	0	1	3	-	Snow
5	-	2	-	-	-1	3	-	-	X
6	1	5	1	-	1	5	-	-	X
7	5	7	-	-	0	5	2	x	X
8	2	5	-	-	3	8	3	-	X
9	1	9	-	-	3	8,5	-	x	X
10	-	4	-	-	-1	2	-	x	Snow
11	-	2	-	-	0	9	3	-	Rain
12	-	5	-	-	8	17	3	x	X
13	-	6	3	-	5	7	-	-	Rain
14	1	4	1	-	2	7	2	-	Rain
15	-	5	1	-	6	10	2	-	Rain, mana (one minute)
16	1	3	-	-	4	7	2	-	X
17	1	10	1	-	2	4	-	-	X
18	4	5	2	-	-2	7	-	x	X, frozen, ground
19	1	1	-	-	-4	2	-	x	X, frozen, ground
20	1	3	-	-	-5	3,5	-	-	X, frozen, ground
21	-	-	-	-	-5	0	-	-	X
22	-	-	-	-	-3	1	-	-	X
23	-	-	-	-	0	3	-	-	X
24	-	1	-	-	3	6	2	-	X
25	-	4	-	-	2	8	2	x	-
26	1	2	2	-	-2	8	-	X	Hoar-frost (in winter)
27	-	3	1	-	3	13	-	x	-
28	-	4	1	-	5	13	3	-	X
29	-	3	-	-	3	6	-	-	X
30	-	3	-	-	0	5	-	x	X
31	-	-	-	-	1	4	-	-	X
<b>January, 2018</b>									
1	-	-	-	-	3	8	-	x	-
2	-	1	-	-	4	7	2	-	X
3	-	1	-	-	4	6	3	x	-
4	-	-	-	-	-1	3	-	x	-
5	-	1	-	-	7	10	-	X	-
6	-	1	1	-	7	10	-	x	-
7	-	2	-	-	6	13	-	X	-
8	-	2	1	-	5	13	-	x	-
9	-	2	-	-	3	11	-	x	-
10	-	2	1	-	1	10	-	-	X
11	-	2	1	-	1	10	-	x	X
12	-	2	1	-	1	10	-	x	X hoar-frost
13	-	2	1	-	2	5	-	-	X rain

**Legend:** L<sub>1</sub> =larva of first age; L<sub>2</sub>=larva of second age; L<sub>3</sub> = larva of third age; A= adult; xx = partial sunny, partial dull (in the same day).

After January 13, 2018, the larvae were not observed at all, although in the following days the temperatures were relatively high for this period, both at night and day. The reason is, probably, the diminution of food, because the leaves of the hostplants were generally devoured and partial withered. Analysing the data rendered in the aforementioned table, we find that the appearance of a new generation of larvae takes place at the beginning of October (the first week).

The high temperatures during October (up to 25°C) and November (up to 17°C) have determined an increase of the larvae's number (up to 50, in November 17) and even the hostplant (*Lanium maculatum* L.) flowered (November 5 till December 21).

Also, it is surprising that the number of hoarfrosts during autumn was very little (6) permitting to the host plants to remain fresh, as food for larvae.

Other consequences of global heating: the absence of snow (only three sprinkles of snow) and the presence of manna (rain and sun at the same time!) on December 15, a phenomenon specific to summer and autumn. At low temperatures (-5°C) in daytime, the larvae disappeared.

Wind speed was relatively low (2.3, very rarely 4 Beaufort degrees), having no influence on the larvae or adults activity.

The existence of larvae of first and second age proves that temperatures during the analyzed period have not been high enough and the number of days with high temperatures was not enough to transform these larvae into larvae of third age or even in pupa.

The feeding of the larvae was achieved only in the evening and particularly in the night, as in daytime they were only found on the ventral part of leaves or very rarely on the plants stems, remaining immobile. The feeding of adults was achieved only in the day time; after the feeding these were found only on the dorsal part of the leaves. The refuge of the adults on the ventral part of the leaves or at the bottom of the plant was achieved in the case of strong and persistent light, as adults preferred the shade.

## CONCLUSIONS

The hibernation of *Chrysolina fastuosa* in the Tinca area begins, depending on temperature, during October – December. The hibernation can be achieved as adult, sometimes as a larva.

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