



Chmelařský institut s. r. o.

# SPECIES OF FLEA BEETLES (Chrysomelidae, Alticinae) ATTACKING HOP PLANTS IN CZECH HOP GARDENS



FIGURE 1: Damage of young leaves caused by *Phyllotreta attenuatus* Koch

Josef Vostřel, Ivo Klapal

Hop Research Institute, Co., Ltd., Kadaňská 2525, Žatec, Czech Republic, e-mail: j.vostrel@telecom.cz

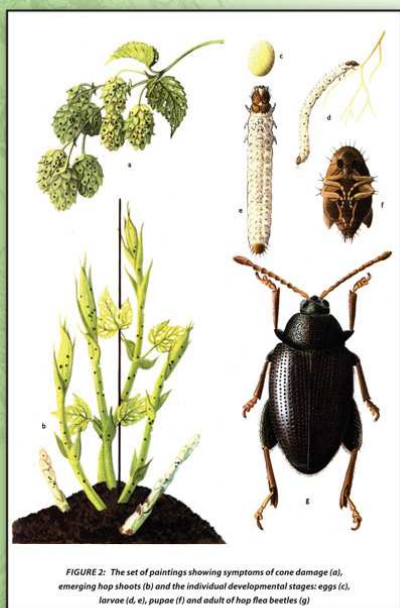


FIGURE 2: The set of paintings showing symptoms of cane damage (a), emerging hop shoots (b) and the individual developmental stages: eggs (c), larvae (d, e), pupae (f) and adult of hop flea beetles (g)

The screening of *Alticinae* beetles was carried out in the village of Oploty belonging to Žatec (Saaz) hop region in 2003-2004. It showed that besides *P. attenuatus* the following other species of this subfamily were found and determined in Czech hop gardens: black flea beetle (*Phyllotreta atra*), cabbage flea beetle (*Phyllotreta striolata*-*vittata*), turnip flea beetle (*Phyllotreta nigripes*), cabbage stem flea beetle (*Phyllotreta chrysocephala*), barley flea beetle (*Phyllotreta vittula*), small striped flea beetle (*Phyllotreta undulata*) and large striped flea beetle (*Phyllotreta nemorum*).

Population dynamics of spring generation of *P. attenuatus* was monitored with the help of yellow dishes filled with water changed every day and placed in the rows near hop plants. In 2003 the first beetles were trapped in the end of March. Population density was the heaviest in the end of April. *P. attenuatus* was the most frequent species (75%), followed by *P. nigripes* (8.5%), *P. atra* (8.5%) and *P. nigra* (6.0%). In 2004 we found first hop flea beetles at the beginning of April. Nevertheless, population density culminated in the third decade of this month. Sex ration (male/female) moved since 1:2 (April 16) to 1:9 (April 27). Hop flea beetle (*P. attenuatus*) was again the dominant species (90.2%), followed by *P. nigripes* (8.7%) and *P. atra* (1.1%). Females full of eggs were found out on April 23. Four days later (April 27) a part of females deposited eggs and on April 29 all the eggs were deposited. Population density of flea beetles on the experimental hop garden was 11x higher in 2004 than in 2003.

*P. nigripes* and *P. atra* were also the only ones to accompany *P. attenuatus* during harvest, when flea beetles were sampled with the help of exhaustor. At that time these species formed 8.5 % of the trapped beetles from the subfamily *Alticinae*. They are known as the pests of rape and other crops from the family *Brassicaceae*. Population density of these species is therefore dependant on the vicinity of a rape field as well as on the occurrence of plants from the family *Brassicaceae* inside a hop garden.

We can conclude that *P. attenuatus* is entirely the most dominant species not only at the beginning of the season but during the whole vegetation period and harvest as well. It is also the only one from this subfamily to cause damage on hop plants on the contrary to the other above-mentioned species. Despite we can see them sometimes on hop plants they are not harmful there as they do not eat and develop on *Humulus lupulus* L. A part of *P. attenuatus* population was parasited by microsporidia (*Protozoa*, genus *Gregarina*).

Hop flea beetles emerging from soil in spring can cause harm on young hop plants. A scale was carried out so as to be able to determine economic damage. Treatment is recommended if beetles damage 5-10% of a leaf. Optimal term of spray depends on actual weather conditions of a year. At the end of April or at the beginning of May emergence of over-wintering beetles from soil usually graduates and it is the right time for treatment. The sum of effective temperatures (SET = 300 °C) was determined for this purpose. According to the scale of growth periods young shoots of hop plants are in BBCH 21-24 (four pairs of leaves are developed).

## REFERENCES:

Vostřel, J.; Klapal, I.; Kudrna T., 2010: Methodology of hop protection against hop flea beetle (*Phyllotreta attenuatus* Koch). Hop Research Institute, Žatec, Czech Republic, ISBN 978-80-87357-05-7: 34 pp.

## ACKNOWLEDGEMENT

The Czech Ministry of Agriculture within the National Agency supported the work for Agricultural Research (NAZV) project no. QD 1179.

TABLE 1: Numbers of flea beetles in yellow dishes placed inside a hop-garden (Oploty, 2004)

DATE	<i>Phyllotreta attenuatus</i>			<i>Phyllotreta atra</i>	<i>Phyllotreta nigripes</i>
	♂	♀	TOTALLY		
01.04.	1	-	1	-	-
02.04.	-	1	1	-	-
05.04.	1	1	2	-	-
06.04.	1	1	2	-	-
07.04.	1	1	2	-	-
08.04.	1	-	1	-	1
13.04.	4	5	9	-	1
14.04.	4	3	7	-	1
SEX RATIO					
15.04.	1:7		272	-	1
16.04.	1:2		8	-	1
19.04.	4:7		33	2	45
20.04.	2:7		98	-	18
21.04.	2:3		124	2	9
23.04.	1:3	*	190	-	7
26.04.	1:4		184	3	8
27.04.	1:9	**	173	2	1
	♂	♀			
28.04.	-	-	109	-	-
29.04.	-	***	41	-	1
30.04.	-	-	16	-	1
03.05.	-	-	54	5	-
04.05.	-	-	49	-	14

\* - females full of eggs  
\*\* - a part of females finished deposition of eggs  
\*\*\* - all females finished the deposition of eggs.

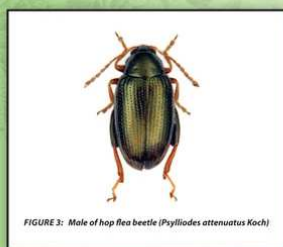


FIGURE 3: Male of hop flea beetle (*Phyllotreta attenuatus* Koch)



FIGURE 4: Black flea beetle (*Phyllotreta atra* F.), male (left), female (right)

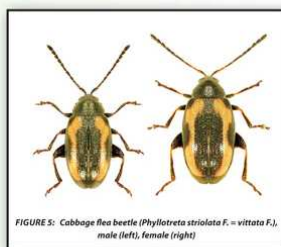


FIGURE 5: Cabbage flea beetle (*Phyllotreta striolata* F. = *vittata* F.), male (left), female (right)



FIGURE 6: Turnip flea beetle (*Phyllotreta nigripes* F.), male (left), female (right)

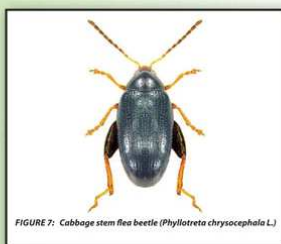


FIGURE 7: Cabbage stem flea beetle (*Phyllotreta chrysocephala* L.)

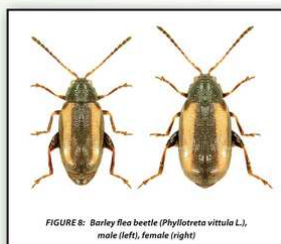


FIGURE 8: Barley flea beetle (*Phyllotreta vittula* L.), male (left), female (right)

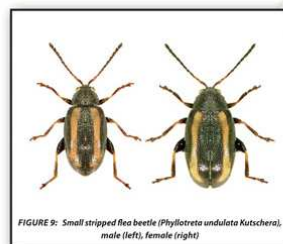


FIGURE 9: Small striped flea beetle (*Phyllotreta undulata* Kutschera), male (left), female (right)

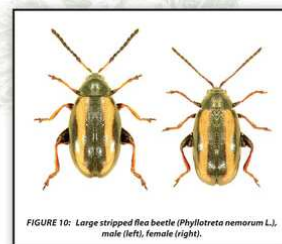


FIGURE 10: Large striped flea beetle (*Phyllotreta nemorum* L.), male (left), female (right)