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Short communication

FIRST RECORD OF OUTDOOR OCCURRENCE OF STORED-PRODUCT COLEOPTERANS IN ARABLE LANDSCAPE IN POLAND

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Abstract: 70 samples of insects caught in a Johnson suction trap were taken during the vegetative period in 2009. The trap was sited in the Experimental Station Institute of Plant Protection – National Research Institute in Winna Góra, Poland. The samples contained 2 869 beetles (Coleoptera) of which 393 (13.7%) are known as stored product pests. 63 specimens of beetle *Rhizopertha dominica* (F.) were caught. It is the first recorded occurrence in Poland of such an economically important stored product pest isolated outside the storage environment.

Key words: Johnson suction traps, Coleoptera, stored products pests, *Rhizopertha dominica*

INTRODUCTION

Stored-product insects spread to new products in a passive way. These insects are carried along with infected material, via transportation, in packaging or on the clothes of people employed in grain stores.

Active distribution of these insects was not considered to have much impact. However, results from recent studies are quite alarming.

Much research has been conducted on the occurrence of these groups of insects in arable landscapes. Many species of insects can develop outdoors: under the bark of trees, in woodworm tunnels or decaying vegetation. Others species infect commodities in the field prior to harvest, and finish their reproduction during storage. Hagstrum and Subramanyam (2009) give a detailed classification of the insects according to their feeding conditions. Both species with wings and without can be found in publications about dispersion outside closed rooms. According to the studies cited above, the distance from grain stores where the insects were found was not too far (Kučerowa *et al*. 2005). Stored-product insects are often caught in traps installed outside grain stores, silos and food processing buildings (Strong 1970; Throne and Cline 1989; Dowdy and Mcgaughey 1994; Campbell *et al*. 2006; Ryne and Bensch 2008).

According to these studies, the insects were isolated from different kinds of traps containing food and pheromones enticements. We decided to check if stored-product pests were present at greater distances. We used insects caught in Johnson suction traps. The traps have been built since 1964 in Great Britain (Harrington and Voivod 2007). Such suction traps have been used in 20 countries throughout Europe. There are 4 Johnson aspirators installed in Poland. They are mostly used to monitor aphid flight activity but there is a presence of individuals from the other insect ranges. These individuals can be useful for biodiversity studies of insects in agrocenosis.

MATERIALS AND METHODS

Insects were caught in Johnson suction traps. It is a device for sucking air from a height of 12.2 meters and taking 0.73 m^3 per second of air along with actively and passively floating aerial plankton (Macaulay *et al*. 1988).

Because it consists of a powerful fan and a tight chamber, air containing insects is sucked in. The insects are then placed in a container with water, preserved in alcohol and analyzed in the laboratory. The device works from 7 a.m. to 10 p.m. and the samples are taken in short intervals every 1 to 3 days. The suction trap was near a farm, located on the Experimental Station in Winna Góra, Poland (60 km south of Poznań).

RESULTS

Three hundred and ninety-three beetles representing 12 families of stored product insects were isolated from the samples (Table 1). The most numerous individuals were from the Lathrididae family (232 specimens). Beetles from this family are of little relevance as stored

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Table 1. Beetles recognized as stored-product insects caught in a Johnson suction trap in Winna Góra in 2009, their number and the category of species (Hagstrum, Subramanyam 2009)

Family	Species	Number of individuals	Category of species
Anobiidae	*Stegobium paniceum* L.	6	S, NR = 5
Anthicidae	*Omonadus floralis* L.	22	S, NR = 3
	Omonadus formicarius Goeze	4	S
Bostrychidae	*Rhyzopertha dominica* F.	63	F, NR = 5
Cryptophagidae	?	8	?
Dermestidae	*Anthrenus museorum* L.	1	S, NR = 2
	Trogoderma glabrum Herbst.	2	S, NR = 5
Histeridae	*Carcinops pumilio* Erich.	21	P, NR = 3
	Dendrophilus punctatus Herbst.	1	S
Latridiidae	?	232	?
Laemophloeidae	*Cryptolestes* sp.	2	?
	Cryptolestes ferrugineus Steph.	1	S, NR = 4
Monotomidae	*Monotoma longicollis* Gyll.	1	S
	Monotoma picipes Herbst.	3	S, NR = 1
	Monotoma spinicollis Aube	1	S
Mycetophagidae	*Typhaea stercorea* L.	2	F, NR = 4
Silvanidae	*Ahasverus advena* Waltl	4	F, NR = 4
	Silvanus unidentatus Ol.	1	S
Tenebrionidae	*Alphitobius diaperinus* Panz.	11	S, NR = 4
	Tribolium castaneum Herbst.	7	F, NR = 5

S, F, P refer to the general categories of the included insect species; S – insects that are primarily found in stored commodities and the facilities or habitats with which these commodities are associated; F – insects that infest commodities in the field prior to harvest and may continue to reproduce during storage; P – parasitoids or predators that are natural enemies of stored-product insects. The new rank (NR) was calculated for each species by adding one point for each of the types of literature information and one point if they had been ranked based upon damage potential

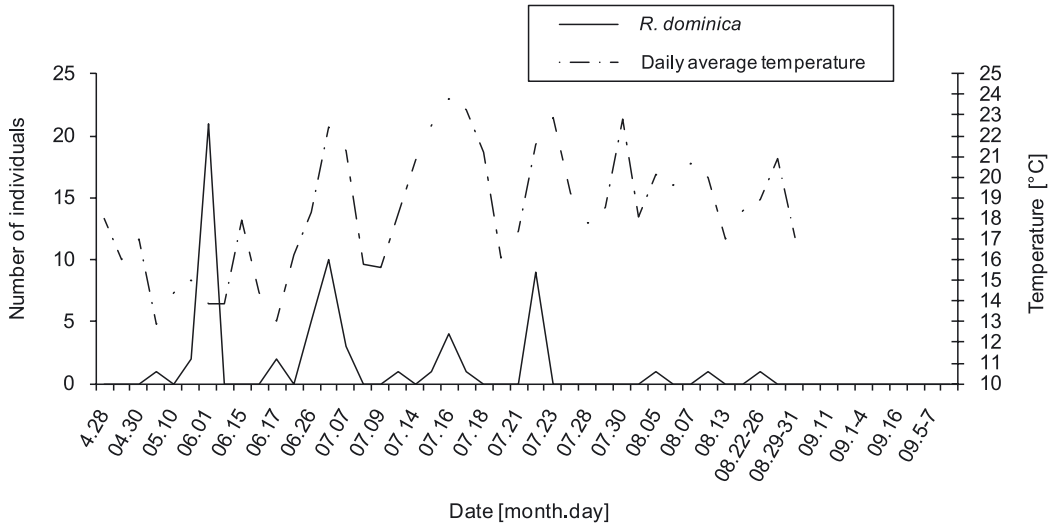

Fig. 1. The flight dynamics of beetles *R. dominica* caught in a Johnson suction trap in Winna Góra in 2009 year, depending on daily average temperature measured 2 meters above the ground

product pests (NR = 1, 2; Hagstrum and Subramanyam 2009). In addition, they are difficult to identify and so were identified to family level only. However, four very serious stored-product pests: *Alphitobius diaperinus* Panz., *Rhizopertha dominica* F., *Tribolium castaneum* Herbst. and *Trogoderma glabrum* Herbst. were found.

This is the first isolation of *R. dominica* outside of the grain storage environment in Poland. Figure 1 shows the number of *R. dominica* beetles caught at different times during the day. Individuals were first found in traps on 27th May 2009 and the last ones on 27th of August 2009. Isolation frequencies fell at the beginning of June and seemed to be temperature-invariant. More numerous appearances of the species were connected with daily temperatures above 20°C.

DISCUSSION

The large number of beetles from the Lathrididae family come as no surprise since many species live in decaying vegetation. An important conclusion is the presence of typical stored-product insects, which occur in closed rooms only. According to Hagstrum and Subramanyam (2009) they are marked as S category. The new rank (NR) formulated by these authors attributes the average 5 to economically important species. This is the first report in Poland of the outdoor occurrence of *R. dominica*.

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POLISH SUMMARY

PIERWSZE STWIERDZENIE CHRZĄSZCZY MAGAZYNOWYCH W WOLNEJ PRZYRODZIE W POLSCE

Szkodniki magazynowe zasiedlają nowe partie produktów w sposób bierny, przenosząc się wraz z zainfekowanymi materiałami, za pośrednictwem środków transportu, w opakowaniach lub na ubraniach osób zatrudnionych w magazynach. Ich aktywnemu rozprzestrzenianiu się, do niedawna, nie nadawano większego znaczenia. Jednak wyniki przeprowadzonych badań wskazują, że szkodniki te mogą pojawiać się w przechowywanych materiałach, nalatując z innych, wcześniej porażonych. Odłowy planktonu powietrznego, przy użyciu aspiratora Johnsona, prowadzono na terenie Polowej Stacji Doświadczalnej Instytutu Ochrony Roślin – Państwowego Instytutu Badawczego, w Winnej Górze. W sezonie wegetacyjnym 2009 roku, w próbach owadów, stwierdzono 393 chrząszcze uznawane za szkodniki magazynowe, należące do 12 rodzin, wśród nich 63 chrząszcze *R. dominica*. Gatunek ten jest groźnym szkodnikiem m.in. przechowywanego ziarna zbóż. Pochodzi on z tropikalnych obszarów Azji. Jest to pierwsza obserwacja tego szkodnika, w warunkach Polski, poza pomieszczeniami zamkniętymi.