

Sensational Find Species *Trogoderma Variabile* (Dermestidae) in the Fruit of *Astragalus*: *Astragalus Demetrii* in The Republic of the Karachay-Cherkessia (Russia)

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ABSTRACT

This study examines Astragalus in the natural habitats of southern Russia (Republic Karachay-Cherkessia) for the first time. In the fruits of Astragalus, a species of Trogoderma is found - this is the first evidence of the possibility of harming leguminous crops in a natural habitat. There are no reliable literary sources about this, although the carpet beetles have been thoroughly studied.

Keywords: *Astragalus demetrii*, *Trogoderma variabile*, Dermestidae, Karachay-Cherkessia Republics, carpet beetles

HOW TO CITE THIS ARTICLE: Pushkin Sergey Victorovich, Belous Victor Nikolaevich, Sensational Find Species *Trogoderma Variabile* (Dermestidae) in the Fruit of *Astragalus*: *Astragalus Demetrii* in The Republic of the Kara-chay-Cherkessia (Russia), Entomol Appl Sci Lett, 2018, 5 (2): 7-9.

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Received: 10/12/2017

Accepted: 02/04/2018

INTRODUCTION

Trogoderma variabile belongs to the family carpet beetle (Dermestidae). This pest is the closest relative of *Trogoderma granarium* Everts, which is not included in the list of quarantine pests in Russia, and is found on bakery processing plants enterprises in Russia [1-3]. It is a quarantine species facility for Australia, Argentina, Slovakia, the Czech Republic and Cuba [4]. In the southern regions of Russia, this species does not start breeding in the natural environment. We obtained reliable data on propagation in *Astragalus demetrii* Kharadze beans.



Fig. 1. A photograph of the species

The body of the beetle has a length of up to 4 mm: the overall habitus of the imago (Fig. 1). At the end of the belly of the larva, there are characteristic bundles of red hair - a hat. It is a pest of grain, wheat, corn, rye and various products of crushed grain. They multiply in mass only in long-stored grain products; samples of seeds, mixed fodders and mixtures of these products. The damage is particularly significant for entomological collections, silkworm cocoons, natural silk products, and the like. Larvae develops in mass only in long-stored grain products.

The pest spreads with contaminated products, and within the same enterprise with flying beetles. Beetles do not feed. The harm is caused by the larvae of the species.

After winter, larvae of different ages appear. In temperate latitudes one generation is found in the southern regions - two. The average fecundity of the female is 90, the maximum is 150 eggs. Under adverse conditions, the larvae enter the diapause and can do without food for up to 3 years. At the same time, they become extremely resistant to the action of critical temperature and pesticides [3, 5]. The study of biology and ecology of the species in the south in the natural habitat will make it possible to plan measures to combat this quarantine species of *Trogoderma*. We have received the first information, which must pass a critical analysis, whether this species is really capable of mastering the natural environment or it is an accidental find.

Material examined. The material including 1♂, 2♀ which were studied in S.V. Pushkin and deposited in the Zoological Museum of the North Caucasus Federal University. *T. variabile* is similar to the species *T. versicolor* (Creutzer, 1799), but differs in the forms of antennae, elytra maculation and male genital organs [6].

Distribution. This species is known to exist in Armenia, England, Finland, Italy, Latvia, Sweden, Czech Republic, South Africa, Canada, Mexico, USA, Afghanistan, Caucasus, China, Iran, Kazakhstan, Mongolia, Saudi Arabia, Tajikistan, Turkmenistan, Uzbekistan and Australia [3, 4, 7]. This is the first record of the species *T. variabile*. It is polyphagous, with a wide range of nutrients, especially grains, seeds, cereals, legumes. It is known that larvae damage zoological collections and herbariums in Karachay-Cherkessia Republic, and other subjects of the Russian Federation [8]. In recent decades, *T. variabile* has been widely distributed in the countries of the Transcaucasia [5, 7].



Fig.2. Photo of the landscape. The natural habitat of *Astragalus demetrii*, and *Trogoderma variabile*

Origin of the *Astragalus*: Central Caucasus, the Rocky Range. Semiarid intermountain basin in the structure of the North-Jurassic depression (Fig. 2). Valley of the river Daut (middle part), south-southeast macroslope. Mid-high altitude belt. Landscapes of highland steppes. Formative phytocenosis of herbivorous-turf-grass plant communities of the xeromorphic appearance of the Central Caucasus (Fig. 4).



Fig.3. Photo of *Astragalus demetrii* in the natural environment

Astragalus demetrii Charadze from the predominantly Caucasian section of Incani DC, 1825 (=sectio *Proselius* Bunge, 1868) (Fig. 3), Latitude 43.465518 °, longitude 41.980943 °, h = 1794 m above sea level. Collection of herbarium *Astragalus demetrii* summer of the 2016



Fig.4. Photo of a phytocenosis in Karachay-Cherkessia Republics

Under optimal conditions, the life cycle of the *Trogoderma* varies from egg to adult insect within 30-37 days. A female can lay more than 90 eggs. In our case, 15 larvae emerged from infected *Astragalus* beans. The larvae were very active eating holes throughout the infected bean material; they were kept in conditions at a temperature of 24-27 degrees. Males were molted 5 times, females - six before pupation. The pupa stage requires about 5 days, which clearly corresponds to the removal of larvae under artificial conditions. Imagoes live about 30-40 days; they die having time to give offspring. In adverse conditions, *Trogoderma* larvae, as it is known, enter the facultative diapauses, a state of rest during which metabolism slows down and growth stops. In our case, no behavior was observed.

ACKNOWLEDGEMENTS

The paper was carried out by the authors jointly in 2016-2017 due to money resources of Push-

kin, Belous. The authors are grateful to all those who contributed to this study.

Handbooks for the Identification of British Insects, 1991. 5: 1–144.

Author's contribution:

The work was carried out by the authors on the basis of data collected during the identification of *Astragalus*, carpet beetles. The authors made a contribution to the theoretical substantiation of faunistics studies, in which the fact of multiplication of *T. variabile* in natural biotopes of Karachay-Cherkessia republics was established. The work was carried out at the expense of Pushkin, Belous.

Conflict of interest:

In the article, there is no information capable of provoking conflicts of interest, with the exception of information contained in previously published articles by the Pushkin S.V., Belous V.N.

REFERENCES

1. S.V. Pushkin, J. Hava, A. Herrmann. Interesting discoveries of carpet beetles (Coleoptera: Dermestidae) in the Russia // *Eversmannia*, 43-44, 2015, 17-19
2. J. Hava, Herrmann A., Pushkin S.V., Contribution to the knowledge of the Dermestidae (Coleoptera) from the Chechen Republic (Russia) // *Arquivos Entomoloxicos*, 2014, 10, 21-24
3. S. V. Pushkin. Discoveries of Carpet Beetles (Coleoptera: Dermestidae) of the South of Russia // *Entomology and Applied Science Letters*. 2017. 4 (2). 29-31. DOI: 10.24896/easl2017427
4. J. Háva. World Catalogue of the Dermestidae (Coleoptera). Studies and reports of the Regional Museum, Prahavýchodeod in Brandýs nad Labem and Staré Boleslav, Supplementum 2003.186 p
5. S. V. Pushkin. Zhuki-mertvoedy i kozheedy (Coleoptera: Silphidae, Dermestidae) centralno Predkavkazia (fauna, ekologiya, chozjajstvenoe znaczenie). 03. 00. 32 - biologicheskie resursy. Avtoreferat, disertacii na soiskanie uczenoj stepeni kandidata biologicheskich nauk in Russian. 2002. 26.
6. J.R. Gorham. Insect and Mite Pests in food. U.S.D.A., Agriculture Handbook 1991. No.655.
7. J. Hava, World Catalogue of Insects: Dermestidae (Coleoptera), XXVI. 2015, Leiden Boston: Brill, 419 p.
8. E. R Peacock. Adults and larvae of hide, larder and carpet beetles and their relatives (Coleoptera: Dermestidae) and of derodontid beetles (Coleoptera: Derodontidae).