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Mediterranean spiny stink bug *Mustha spinosula* Lefebvre, 1831 – a new record for Southern Romania

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Abstract: This report presents new information on presence of the Mediterranean spiny stink bug *Mustha spinosula* (Heteroptera: Pentatomidae) in the south of Romania, and new host plants for this species.

Keywords: Southern Romania, spiny stink bug *Mustha spinosula*, host plants

INTRODUCTION

Mustha spinosula Lefebvre 1831 is a species of true stink bugs belonging to the genus *Mustha*, the family Pentatomidae, the suborder Heteroptera and the order Hemiptera. It is a European species from the Ponto-East-Mediterranean region, known as the Mediterranean spiny stink bug. With more than 4700 species, the family Pentatomidae is ranked as the fourth largest and most diverse heteropteran group (Grazia et al., 2015). This family includes true stink bugs evaluated as important agricultural pests that damage fruit, vegetable and field crops by sucking plant organs and yield losses (Panizzi et al., 2000; Muhammed, 2020).

M. spinosula is reported as the most widespread species of the genus *Mustha* in Europe, in the countries such as Albania, Bosnia and Hercegovina, Bulgaria, Greece, Macedonia, Montenegro, Romania, Russia (Caucasus), Turkey (European part) and Ukraine, as well as North Africa (Egypt) and Asia (Armenia, Azerbaijan, Cyprus, Georgia, Iran, Iraq, Israel, Syria, Asian part of Turkey and Turkmenistan) (Önder et al., 2006; Rider, 2006; Markina et al. 2018; Hassan et al., 2020; Rădac & Teodorescu, 2021; Halimi & Paparisto, 2021).

In Romania, the first detections of *M. spinosula* were in 2020 and 2021 in the south of the country and were performed by Rădac and Teodorescu (2021); the species is reported as having a well-established population in this zone.

M. spinosula is polyphagous species feeding on a wide variety of woody plant species, such as: carob (*Ceratonia ciliqua* L.), hawthorn *(Crataegus sp., C. monogyna* Jacq.), myrtle (*Myrtus communis* L.), pine (*Pinus sp.*), wild pear *(Pyrus elaeagnifolia* Pall.), Oriental plane (*Platanus orientalis* L.), poplar (*Populus sp.*), oak (*Quercus sp., Q. lusitanica* Lam., *Q. pubescens* Willd.), Italian cypress (*Cupressus sempervirens* var *pyramidalis* L.), juniper (*Juniperus sp.*), acacia (*Acacia sp.*), cotoneaster (*Cotoneaster nummularia* Fisch & Meyer), green olive (*Phillyrea latifolia* L.), Japanese holly (*Ilex crenata* Thunb.), terebinth (*Pistacia terebinthus* L.) (Dursun & Kartal, 2008; Fent et al., 2010; Fent & Dursun, 2022).

Many researches in Turkey reported *M. spinosula* as one of the harmful insects associated with fruit trees, feeding on species of economic importance such as apple (*Malus domestica* Borkh.), cherry (*Prunus avium* L.), plum (*P. x domestica* L.), mulberry (*Morus sp.*), pistachio (*Pistacia vera* L.), almond (*Prunus amygdalus* Batch.) and hazelnut (*Corylus avellana* L.), common quince (*Cydonia oblonga* Mill.) (Lodos et al., 1998; Özgen et al., 2005;

Orçan & Kivan, 2017; Kaplan, 2020; Tek & Okyar, 2021; Kaçar & Dursun, 2022; Tezcan & Gülperçin, 2022). Kaya and Kovancı (2004) reported the bug in raspberry (*Rubus* sp.) fields in north-western Turkey.

Rădac and Teodorescu (2021) in Romania sampled the spiny bug from common ash (*Fraxinus excelsior* L.), pedunculate oak (*Quercus robur* L.), field maple (*Acer campestre* L.) and elm (*Ulmus sp.*); the collected specimens were observed to feed on *Crataegus monogyna* in laboratory conditions.

Data in this paper reports a new detection of the spiny stink bug *M. spinosula* in the south of Romania and new host plant species including fruit trees and grapevine.

MATERIAL AND METHODS

Insects of the spiny stink bug *Mustha spinosula* were observed and collected by hand directly from different plant species in the Southern Romania, in the period from April to May 2024, in three localities: (i) Baneasa area in Bucharest, in the former experimental field of the Research and Development Institute for Plant Protection (RDIPP) (44°30'07"N/26°04'11"E), (ii) Moara Domneasca in Ilfov County, at the Research and Development Station for Agronomy (RDSA) belonging to the University of Agronomic Sciences and Veterinary Medicine (44°29′33″N/26°15′20″E) and (iii) Naipu village in Giurgiu County, in two gardens with a mixture of fruit trees (44°09′13″N/25°45′42″E).

The collected specimens were examined in laboratory under a stereomicroscope Stemi 508 (Karl Zeiss) and species identification was performed following the external morphological characters of insects, described and illustrated in the literature, mainly in Memon et al (2014) and Hamid and Sabr (2023).

The overwintered nymphs gathered alive from the field were reared in laboratory conditions at room temperature to adult stage. Fresh leaves of *Acer platanoides* (firstly) and branches of *Prunus cerasifera* and *P. domestica* (after) were offered as food source for nymphs. The specimens brought to laboratory conditions were monitored, and the molting process until they reached adults was observed.

Living specimens were photographed on site with a Panasonic LUMIX DMC-FZ82 digital bridge camera and in the laboratory with a Zeiss *Axiocam 105 color* attached at the stereomicroscope.

RESULTS AND DISCUSSIONS

In this report, new data on the presence of the spiny stink bug *Mustha spinosula* in the south of Romania are given. Nymphs and adults of this species were recorded from the localities Bucharest (Baneasa area), Moara Domneasca (Ilfov County) and Naipu (Giurgiu County), during a period of two months, April and May 2024. This represents the second record of the species for the south zone and also for the country, the first being of Rădac and Teodorescu in 2021. In the study of these authors, *M. spinosula* was reported from the localities Pruni and Magurele (Ilfov County) and Comana (Giurgiu County).

A total of 50 specimens of *M. spinosula*, nymphs and adults, were collected and/or visually observed in this survey. First exemplars of the spiny bug were five overwintered nymphs collected on the common walnut bark in Moara Domneasca on 4th April (Figure 1a). After this date, we carried out visual inspections in other localities in the south of the country where we travelled for other purposes. Therefore, on 6th April, sixteen nymphs were picked up from two private gardens in Naipu which included a mixture of tree species and vine. Insects were collected from plum (10 specimens), common walnut (3 specimens), grapevine

(2 specimens) and lilac (1 specimen) (Figure 1 b, c, d). Following the weekly visual checks in the two backyards in the period from April to May, many other specimens of the spiny stink bug were observed without collecting them. The insects were collected/observed on fruit trees such us species of *Prunus* genus, plum (*P. domestica* L.), cherry plum (*P. cerasifera*), sweet cherry (*P. avium* L.), sour cherry (*P. cerasus* L.), common walnut (*Juglans regia* L.) as well as on common grapevine (*Vitis vinifera* L.), common lilac (*Syringa vulgaris* L.) and white mulberry (*Morus alba* L.*).* In Bucharest area, the bug was found on plum, sweet cherry and mulberry.

Figure 1. *Mustha spinosula* - Overwintering nymphs on trunk of trees (a) common walnut, (b) apricot (c) sour cherry (d) mulberry

The insects were most often found on the trunk and thick rough branches of the trees, on their sunny side, one by one, rarely two together. At a light touch, the insects of *M. spinosula* move slowly to the shady side of the tree trunk or branch.

The overwintered nymphs collected from the field and individually reared in laboratory conditions were able to complete their development to reach adult stage (Figures 2, 3 and 4).

Figure 2. *Mustha spinosula* - overwintering nymph molting in laboratory conditions

Figure 3. *Mustha spinosula* - Newly emerged male adult and evolution of its coloration in laboratory conditions

Figure 4. *M. spinosula* - Dorsal and ventral view of adults emerged in laboratory

The first two adults of *M. spinosula* in the field were observed on 18 May on the trunk of a plum tree in the garden in Naipu (Figure 5). After this time other adults on fruit trees were found but not collected. On 29 May, two adults, on mulberry and sweet cherry, were collected from Bucharest area.

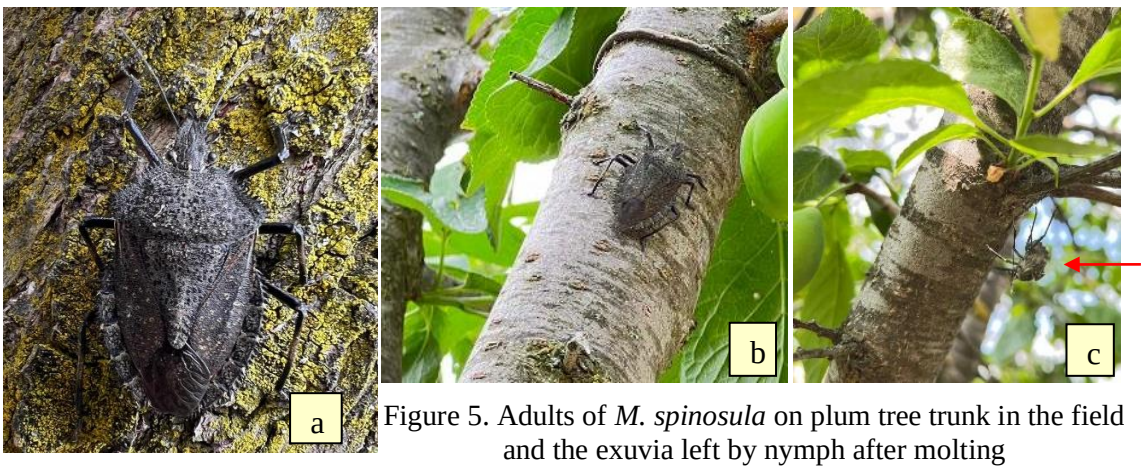

Figure 5. Adults of *M. spinosula* on plum tree trunk in the field and the exuvia left by nymph after molting

Detection of the spiny bug specimens on plants was often hampered because of their blackish colour, similar to that of the bark of host plants. Exuvia on the trees (Figure 7), left by the nymphs after molting to pass to a new instar, was an obvious sign indicating the presence of insects. The specimens found in our survey have been easily recognized from other true bugs by appreciable size, round or ovoid shape and dark colour of their body. In addition, the presence of spines on the lateral margins of whole body is a distinctive characteristic of this species.

A key of the species of the genus *Mustha* as well as a description of morphological characters of *Mustha spinosula* are widely and thoroughly presented and illustrated in the works of Memon et al (2014) and Hamid & Sabr (2023).

Adults of *M. spinosula* (Figures 5 and 6) have a large body, blackish-brown, flat shield-shaped when viewed dorsally and convex when viewed ventral; female is of 25.2-23.3 mm length and 11.5-12.5 mm width and male is of 20.2-22.5 mm length and 10.6-10.2 mm width. They present spines on the lateral margins of entire body (head, pronotum and abdomen). The head is medium-sized, reddish-brown and presents 9-11 triangular spines (long and short) on each lateral margin. The antennae are filiform, five segments, covered with hairs. The first two segments are black; the third segment is yellow at the lower end and pink at the upper end; the fourth segment is the longest and hairiest and is brown in colour. Pronotum has 15-16 broadly triangular spines of unequal size. Scutellum is large, triangular and elongated, blackish-brown, with thick black spots and thick yellow fluff; it has a reddish-brown pointed apex with a yellowish edge. Hemelytra are reddish-brown with many ochre-coloured spots. Femur is cylindrical in shape, black in colour and covering with short and dense spines; the tibia is rectangular and compressed on one side, with less dense spines on the entire surface.

Nymphs have five instars, oval-shaped body, convex dorso-ventrally. The nymphs of second instar are lighter, abdomen cream in color with dark spots, whitish spines with yellow base (Rădac & Teodorescu, 2021). In the mature nymphs collected in this survey, we observed a variable coloration of them, from grey to blackish, depending on the host plant from which these were collected (Figure 1). Nymphs have numerous pale to intense orange spines on the margin. A difference in the color of the fourth and fifth instar nymphs was also observed by Muhammed and Ali (2021) in the species of stink bug *Mustha spinulosa* (Lefebrve, 1831) collected from several types of trees in North Iraq. The color variation of the nymphs was associated to the color of the host plant stem. The authors attribute this to the feeding behaviour of species on the host plants, using their color as a camouflage method that allows organisms to remain indistinguishable from the environment and hide from natural enemies.

The species *M. spinosula* overwinters as nymphs under the bark of host plants, in leaf litter, under fallen trees and other types of shelters (Rădac & Teodorescu, 2021).

This species can make important damage to the fruit trees. Adults and nymphs possess specialized mouthparts for piercing and sucking plant sap, especially on trunks and branches (Tezcan & Önder, 1999). According to density and widespread of *M. spinosula* currently mentioned in the literature in Turkey, this species is considered a pest of fruit trees of economic importance. So far, no damage of this species has been shown in the European countries where its presence has been reported. The continuous change of environmental and climatic factors can create over time favorable conditions for multiplication and advanced spread of the species with negative consequences on the host plants. Fruit trees are among the preferred host plants of *M. spinosula*, and that is why further investigations are required to know bioecological aspects of the species and establish its potential damage in agroecosystems.

CONCLUSIONS

The spiny stink bug *Mustha spinosula* was identified in three localities in the south of Romania; overwintered nymphs and adults were collected from fruit trees, common walnut as well as grapevine and lilac. The study highlights that the spiny bug is a widespread species in the south of the country and presents low populations. With this report we provide new information, important to better understand the current state of *M. spinosula* distribution in the country.

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