A potential pest of rhubarb (*Rheum ribes* L.) (Polygonaceae) in Turkey: *Capnodis marquardti* Reitter, 1913 (Coleoptera: Buprestidae)

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Abstract

The rhubarb (*Rheum ribes* L.) (Polygonaceae) is element of Iran-Turanian phytogeographic region. It is distributed Turkey, Azerbaijan, Armenia, Syria, Israel, Jordan, Lebanon, Northern Iraq, Iran, Afghanistan and Pakistan. In Turkey, it is quite abundant in the Eastern and the Southern Anatolia. This plant occures on the altitude between 1800 and 2800 m on rocky and gravel slopes, and can grow up to 40 cm of height. The rhubarb is a perennial herbaceous plant blooming with yellowish-white flowers during May and June. In addition to medical use its shoots and petioles are consumed fresh and cooked for different recipes in Turkey. Buprestid beetle *Capnodis marquardti* Reitter, 1913 (Coleoptera: Buprestidae: Dicercini) known from northeastern Turkey exclusively, was found to be associated with this plant. There is very limited information about the interrelations between this species and rhubarb. Large population of *C. marquardti* was found in Cirisli Pass between Erzurum and Bingol, 13th km N of Karliova. The adults were observed on the soil close to the stems of rhubarb plants; while a single larva was found in the roots of this plant. The adult feeding and oviposition were observed on caged plants in the field. Further observations of the biology of *C. marquardti* and its impact on the plant are necessary to study. In any case, known this exclusively rare and presumably endemic species for northeastern Turkey by people working with this plant has great importance.

Keywords: *Capnodis marquardti, Rheum ribes*, biological observations, Turkey

Introduction

Rhubarb (*Rheum ribes* L.) is a perennial, herbaceous, and wild plant from Polygonaceae family and it is the only species that grow from *Rheum* species in our country. This species which is known as işgın or işgın weed in Turkish and it is called different names such as ışkın, ıçgın, ıçkın, uçkun, uçgun, uşgun, uşkun, aşgın, aşkın, eşkin, eşgin in public language (Baytop, 1997). Rhubarb is a element of phytogeographical region in Iran-Turan (Anonymous, 2019a). *R. ribes* distributed in Turkey, Syria, Israel, Palestine, Jordan, Lebanon (Anonymous, 2019b; 2019c), Armenia, Northern Iraq, Iran, Afghanistan, Pakistan (Anonymous 2019d) and Azerbaijan (Seyidahmedov et al., 2008). The most densely grow region of the rhubarb are reported as Kars, Erzincan, Bingöl, Van, Ağrı, Hakkari, Elazığ, Erzurum (Aziziye), between Erzurum and Bayburt (Kop Mountain Pass), between Erzurum and Bingöl (Karlıova, Cirisli Pass), Muş, Malatya (Anonymous, 2019e), Bitlis, Tunceli, Iğdır (Anonymous, 2019f), Adıyaman, Kahramanmaraş, Hatay (Amanos Mountains), and Sivas (Anonymous, 2006a) (Fig. 1).



Fig. 1. Distribution of *Rheum ribes* in Turkey

It was observed that *R. ribes* prefer medium or heavy textured soil and also, it can be grown in clay, acidic or alkaline soil. It has resistance against extremely cold weather and can survive up to minus 20 °C (Öztürk et al., 2007). The plant which can be seen in heights of 1800-2800 m grows in rocky and pebble slopes and can grow up to 40-150 cm (Andıç et al., 2009).

It is a perennial, hard, taproot, and herbaceous plant which blooms yellowish-white in May and June. The stem is foliated. The large leaves that are not completely lobed resemble a kidney or elephant ear with reddish, ramentaceous, grooved features. The surface of the leaves and petiole is rough and hard (Tanker, 2004).

It is stated that the sucker of the plant is foliated on the base and aphyllous on the top and these suckers and petioles are consumed freshly and different meals are prepared by cooking (Munzuroğlu et al., 2000). The fresh suckers of the plant are rich in Vitamin C and poor in Vitamin A and E, furthermore, it was reported that the level of selenium is sufficient in terms of nutrition (Munzuroğlu et al., 2000). In the study of Andiç et al. (2009) in which the content of chemical compounds was examined for *R. ribes* plant that was collected from Ağrı, Bitlis, Erzurum, Hakkari, Muş, and Van provinces, it was determined that the average total solids were 5.589%, ash was 0.636%, nitrogen was 0.206%, crude protein was 1.292%, crude fiber was 1.798%, soluble solid content was 3.897%, total sugar was 1.760%, inverted sugar was 1.643%, saccharose was 0.112%, acidity was 0.967%, pH was 3.566, vitamin C was 5.196 mg/100g, Fe was 3.752 µg/g, Zn was 1.132 µg/g, P was 411.2, Pb was 0.016 µg/g, Cu was 0.501 µg/g, and Mn was 0.423 µg/g.

It is reported that *R. ribes* are a raw material source for the most important drugs in the Middle-East (Kashiwada et al., 1988). It is also reported that the leaves and stem of the plant are sour, strengthen the stomach, and prevent vomiting (Munzuroğlu et al., 2000). It is stated that the roots of *Rheum* are used as a laxative and antipsoriatic drug (Shokravi and Agha Nasiri, 1997). It is also recorded that beige (Öztürk and Özçelik, 1991), blue, mustard colour (Özgökçe and Yılmaz, 2003), brick red, dark green, maroon and canary yellow colors (Gönen, 2008) were obtained from the roots of rhubarb. Furthermore, *R. ribes* plant which has commercial value is

picked by the locals where the plant is grown in Turkey, sold freshly and a significant income is obtained (Fig. 2). In addition to all of this information, warnings are given by various researchers about not using the plant randomly, not destroying its population insensibly (rooting out in particular) and the fact that the plant might be harmful to human health (Anonymous, 2014; 2017).



Fig. 2. Trade of fresh *Rheum ribes* (in Erzurum, Original)

There are several insect species that harm the plant by feeding on it which has commercial and nutritious value for human health. The aim of this study is to reveal the existence of *Capnodis marquardti* Reitter (Coleoptera: Buprestidae) damages to *R. ribes* and endemic for Turkey, its eggs and its larvae for the first time in Turkey.

Material and Method

The material of the study consists *Capnodis marquardti* adults that were caught around the roots and leaves of *Rheum ribes* plant in the rocky and pebble slopes between the heights of 1940 and 2200 m and between Erzurum-Bingöl provinces (13 km North of Karliova) (Fig. 3), its larvae obtained from the root of the plant, and its eggs laid by the female insects as a result of the mating of adults that were taken to culture.



Fig. 3. A view from the area (Cirisli Pass between Erzurum and Bingol) where the study was conducted

Results and Discussion

The length of the *Capnodis* species is between 10 to 40 mm. Their body is solid and hard. The color is black with bronze shining or cupreous. The insect has big eyes and slightly approximate in the vertex. The sense pores at the tip of the antenna spread through the slight holes of which the borders are uncertain. The pronotum expands and has smooth black areas which are aligned straight and characteristic (Fig. 4 b). There is a space shaped like reverse (V) letter in the middle of the pronotum posterior. The pits on the elytra create deep lines in certain species (Tozlu, 1997). It is reported that 22 species and sub-species of this insect in the world (Löbl and Smetana, 2006) and 10 of this species exist in Turkey (Lodos and Tezcan, 1995).

The larvae of this genus are called as "fidan dipkurtları" in Turkish. Most of the species damage fruit (such as almond, peach, apricot, plum, cherry, sour cherry, pistachio, and hackberry) and forest trees (such as poplar and willow) and the roots of bushy plants.

Capnodis marquardti Reitter, 1913 türünün sistematikteki yeri:

Order: Coleoptera

Superfamily: Buprestoidea Leach, 1815

Family: Buprestidae Leach, 1815

Subfamily: Chrysochroinae, Laporte de Castelnau, 1835

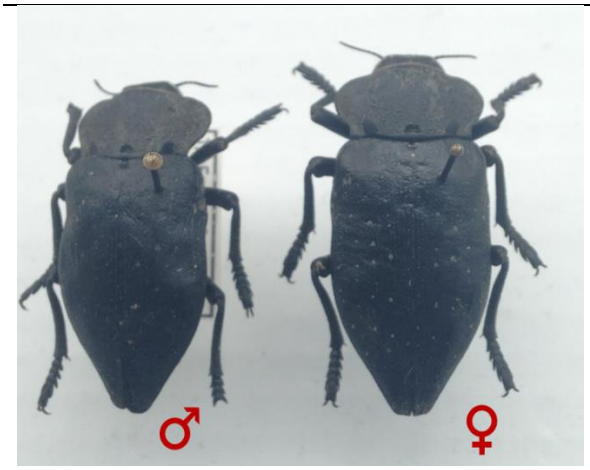
Tribe: Dicercini, Gistel, 1848

Genus: *Capnodis* Eschscholtz, 1829

C. marquardti samples (16 units) were found for the first time on June 16, 2001, in Cirisli Pass (between Erzurum and Bingöl, 13 km north of Karliova) in 1940 meters (Fig. 4a,c). On the same date, adult insects were found between the heights of 2000 to 2200 meters. On July 8, 2005, adult insects (22 units) were determined in 2100 meters. The larvae was obtained from

inside the plant roots uprooted (in 10 October 2005) (Fig. 4i,j,k,l,m,n,o). These adults and a plant that was rooted out were brought to the Department of Plant Protection, Faculty of Agriculture at Atatürk University for cultivation. This plant was transferred to a plastic box with soil within the landscaping of the Department of Plant Protection and the adult insects were released on the plant (Fig. 4d,f). Although the plant was not preserved for a long time, it was provided for adult females to lay eggs (Fig. 4g,h,ı). Another remarkable condition in the area is that the adult insects were found on the soil near the root parts of plants (Fig. 4e) and on the leaves of *R. ribes* plant between 12:00-14:00 which is the hottest hours of the day and brightest hours of the sun. Moreover, *C. marquardti* was not determined prior to this time of the day although the area was studied. This situation verifies that the Buprestidae species are active in the hottest hours of the day and the period when the sun is brightest. The determinations about the egg and larvae of the species and the images shown here are presented for the first time in this study in the world and Turkey.

C. marquardti was first identified in Van province in the world and it is endemic to Turkey. Koçak and Kemal (2009) recorded about this species that "Van Prov., Erekdağı 2150 m,.19.05.2009; inhabits at stony slopes, where *Rheum ribes* grows" and they also stated that this species was found in Van and Bingöl (Koçak and Kemal, 2010). Koratyaev et al. (2016) was stated that "*Rheum ribes* forms dense population in the location (Bingöl–Erzurum provinces border, 13 km N of Karlıova, Cirisli Pass, 2000-2300 m) on the deforested and eroded mountain. A jewel beetle *C. marquardti* is specialized coleopterous herbivores associated with *R. ribes* in this location, all of them common on the plants" in their study entitled "Bioindicator beetles and plants in desertified and eroded lands in Turkey". They also reported that they encountered this species on 07.03.2005 and the plant was a new record as a host. Although it was determined by us in 2001 and were made certain biological observations in 2005, the study can be published this year. Due to the terrorist threat in the region, detailed data cannot be obtained. Even though it is late, this study was put forward since it was considered to present this information.



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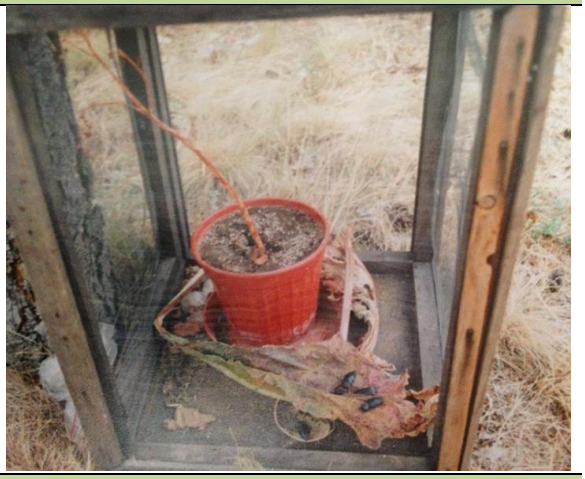

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Fig. 4. The views of this study (field and laboratory) on *Capnodis marquardti*

As is seen, there are only a few studies about the determination of this insect. This study is significant in terms of providing information about the species for those who are studying or will study the insect. We need to know the existence of *C. maquardti* which is endemic and damaging to *R. ribes* an important plant for many different areas such as medical and human nutritient. It is necessary to consider this for the plans that will be made about this plant in future studies.

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