

Description Of Pine Ladybirds Beetle, *Exochomus Quadripustulatus* (Linnaeus, 1758) (Coleoptera: Coccinelidae) From Kurdistan Region-Iraq

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ABSTRACT

Pine ladybirds beetle, *Exochomus quadripustulatus* (Linnaeus, 1758) is described in details from Kurdistan Region-Iraq. The species is distinct by asymmetrical mandibles, a unidentate, apical part of right mandible with single tooth, the molar area consist of single teeth, while the left mandible consists of two teeth. Terminal maxillary palpomere axe shaped, 1.3 times as long as the 3rd palpomere. Antenna clavate shaped, consists of 10 antennomeres, 3rd–8th gradually broadening, 10th antennomere small, triangular and partially embedded in the 9th antennomere. Forecoxae elongated, beak shaped. Elytra with two pairs of orange spots and the bigger spots near humeral angle C-shaped. Aedeagus distinctly symmetrical in ventral view; parameres are parallel longer than the penis. The diagnostic characters of the species were photographed. Localities, hosts and date of collecting were recorded.

Keywords: Pine ladybirds beetle, *Exochomus quadripustulatus*, Coleoptera: Coccinelidae

INTRODUCTION

Coccinellidae is a widespread family of beetles (Order: Coleoptera) ranging in size from 0.8 to 18 mm (Seago et al., 2011). The family is commonly known as ladybirds beetles or lady beetles (White, 1983). The family is found worldwide, with over 6,000 species described (Canepari, 2009). The majority of coccinellid species are generally considered beneficial insects, because many species prey on herbivorous hemipterans such as aphids or scale insects, hoppers, psyllids, whiteflies and immature stages of phytophagous beetles, moths and plant mites, which are agricultural pests (Gordon, 1985; Majerus, 1991; Ahmadi and Yazdani, 1993; Hodek et al., 2012). Ladybirds beetles are of great importance in biological control of pests (Gordon, 1990). *Exochomus* Redtenbacher, 1843 is important genus of the family which characterized by, Postcoxal line on first abdominal sternum not merging with posterior margin of sternum, recurved apically, and complete. Tarsal claw with basal tooth (Kovar, 1995). *Exochomus quadripustulatus*, is one of the important species of the family, the common name is, pine ladybird or pine lady beetle (Daly et al., 1998). The distribution range of the species includes Europe, Northern Asia (excluding China), and North America, in the eastern Palearctic realm, and in the Near East. Pine ladybirds beetles can be found in a number of habitats including deciduous, coniferous and mixed woodland, grassland, coastal habitats (cliffs and

dunes), heathland and marshy areas. This species is common in urban habitats. Pine ladybirds were first recorded in Ireland (County Armagh) in 2014 (Foster et al., 2018). *E. quadripustulatus* can reach a length of about 4-6 mm. It is almost circular, convex and shining, with a flange around the base. The color is quite variable and may change with ageing. Usually elytra are black with two larger red comma-shaped spots and two smaller red round or oval spots. The color of these spots can also be orange or yellow, but completely reddish brown specimens may occur (Arnett, 2000). The pine ladybird in both adult and larval stages preys aphids and scale insects, especially *Diaspidiotus perniciosus* adelgids which feed only on conifers, including douglas fir, hemlock, larch, pine and spruce (Sengonca and Arnold, 2003). Radwan and La-Vei (1983) looked at the acceptability of different aphid species as prey for the coccinellid, *Exochomus quadripustulatus*. Females pine ladybirds oviposited when fed on *Dysaphis plantaginea* and *Acyrtosiphon pisum*. *E. quadripustulatus* L., a polyphagous predatory beetle of both aphids and diaspidids, is capable of developing on mussel scale *Lepidosaphes ulmi* L. alone (Farooq-Ahmad, 2012). *E. quadripustulatus* L. is considered as an important polyphagous predator of both aphids and scale insects. Despite the fact that many researchers have studied various *Exochomus* species as predators of different prey on horticultural crops (Umeh, 1990; Kanika-Kiamfu et al., 1993).

In Iraq, Derwesh (1965) indicated 17 species of the family Coccinellidae in 11 genera. Abdul Rassoul (1976) recorded 17 species of the family belonging 12 genera. Al-Ali (1977) recorded 20 species belongs to 10 genera including the species under of the study. Swail (1986) recorded 14 species belonging the tribe Coccinellini and Al-Ali et al., (1990) listed 61 species.

The objective of this study is a detail description of pine ladybirds beetle, *Exochomus quadripustulatus* (Linnaeus) as predators of *Aphis* spp. on different plants in some localities of Erbil Governorate, Kurdistan Region - Iraq.

MATERIALS AND METHODS

The specimens were collected from the leaf of pomegranate and peach which infested by *Aphis* spp. from the period of April till July/ 2021 in some localities of Erbil governorate (Qoshtapa; and Shaqlawa) and Sulimani (Kalar and Kefri) in Kurdistan Region - Iraq. The specimens were placed in boiling water for 10-15 minutes to soften their parts. Then the parts were separated to three parts; head, thorax and abdomen under dissecting microscope, the head and abdomen soaked in a beaker contained 10% KOH, placed on fire with shaking for about (4-5) minutes for dissolving of lipids materials of the body and destroying the muscles. After that placed in distilled water for 2-3 minutes in order to neutralize the alkali. The parts were placed in ethyl alcohol 25% and dissected under microscope, then transferred to ethyl alcohol 50%, 75% and 100%, respectively for two minutes of each concentration for dehydration of water, then placed in xylol for two minutes, for translucency. Finally the parts places on slides with a drop of DPX solution and covered by cover slides to prepare slides for examination (Lane and Grosskey, 1993; Mawlood et al., 2016; Abdulla et al., 2020). The species were identified with the help of available key of (Li et al., 2015). The specimens were deposited in the Insects Museum at the Department of Plant protection in College of Agricultural and Engineering Sciences, Salahaddin University, Erbil Iraq.

RESULTS AND DISCUSSION

Synonyms

Exochomus quadripustulatus (Linnaeus, 1758)

Synonyms

Coccinella quadripustulata Linnaeus, 1758

Coccinella 4-pustulata Linnaeus, 1758:367.

Exochomus Quadripustulatus: Redtenbacher 1843:15.

Exochomus quadri-pustulatus: Mulsant 1846:172; Crotch 1874:192.

Exochomus quadripustulatus: Seidlitz 1872:193, 1888 :274; Kraatz 1873:191, 194.

Exochomus (Exochomus) quadri pustulatus: Barovsky 1922:293; Mader 1955:784S; Savoiskaya 1971:108, 1983:16 1.

Brumus quadripustulatus: Kovař 1997:101.

Description

Body: Semi- circular, moderately convex and black shining; each elytra with two orange marks. Length 3.1-3.8 mm.

Head: Black, nearly cup shaped, slightly longer than pronotal width. Frons slightly convex, fine punctate, as large as eye facets, each with long setae. Eyes are black, oval, dorsally separated by more than 2 times the width of an eye; inner ocular margin slightly divergent. Labrum (Fig.1a) yellow transverse, moderately sclerotized, anterior margin straight; posterior margins slightly concave, surface sparsely yellow setose and punctate. Mandibles asymmetrical, unidentate, high sclerotized, apical part of right mandible (Fig.1b) with single tooth, dorsal surface bare, molar area consist of single basal tooth, prostheca distinct, with height density of yellow short setae, lateral margin of mandible strongly curved. Left mandible (Fig.1c) resemble to the right except, the molar area consists of two basal teeth. Maxilla (Fig.1d) dark brown, cardo semi- rounded bare, galea dark brown, basigalea oval, distigalea cup shaped, apical part with height density of pale brown setae; lacinia brown, hook like, apical part sparsely pale brown setose; maxillary palps brown to dark brown, with four palpomeres, 1st palpomere is the smallest, nearly triangular; 2nd clavate shaped, 3rd palpomere nearly quadrat; terminal maxillary palpomere axe shaped, 1.3 times as long as the 3rd palpomere. Labium (Fig.1e) brown, mentum taprozoid, labial palps consist of three palpomeres, 1st one is small and rectangular, 2nd and 3rd palpomeres cylindrical shaped, 2nd palpomere 4 times as long as 1st, terminal labial palpomere tubular shaped, 1. 2 times as long as penultimate segment. Antenna (Fig. 1f) black, clavate shaped, 0.4 -0.5 mm long, consists of 10 antennomeres, sparsely covered with short, grayish pubescence. Scape stout nearly rectangular, 1.3 times as long as the pedicel, 3rd –8th gradually broadening, 3rd antennomere rectangular, 1.1 times as long as the 4th; 4th and 5th antennomeres trapezoidal, same length; 6th and 7th antennomeres cup shaped, 7th antennomere 1.3 times as long as the 6th ; 8th and 9th antennomeres somewhat quadrate; 10th antennomere small, triangular and partially embedded in the 9th antennomere.

Thorax: Pronotum black, strongly convex, slightly wider than the pronotum, outer margins are yellow, width two times as the long, posterior margin strongly concave, surface sculptured as on head, the sculptures much weaker; punctation smaller than eye facets, shallower and sparser than on head. Scutellum black and triangular shaped. Prosternum black, T-shaped, in front of coxae distinctly longer than basal width of prosternal process; prosternal process triangular narrow with

parallel sides, without carinae and truncate at apex. Elytral (Fig.1g) nearly triangular shaped, black, distinctly wider than pronotum at base, with two orange spots, the bigger spot situated at humeral angle, C-shaped, the smaller one nearly oval and situated at apical part, surface of elytra covered by sculpture as on pronotum; punctures large stronger than on pronotum, moderately densely distributed, slightly deeper and more concentrated, about as large as eye facets.

Hind wings yellow, the post-radial sclerite strongly sclerotized, median spur extending to anal wing margin. Fore legs (Fig. 1h) brown to dark brown. Forecoxae elongated, beak shaped; trochanter rectangular; femur cylindrical, slightly longer than the tibia; protibia nearly tubular, apically with two short spurs, surface densely yellow setose; fore tarsus four segmented, densely setose, 1st-2nd segments cup shaped, 1st segment 1.2 times as long as the 2nd, 3rd segment is the smallest, hidden in cavity of 2nd segment, 4th segment tubular, 1.3 times as long as the 2nd. Claw small, strongly curved with basoventral tooth. Middle legs resemble to fore legs except coxa is conical shaped, trochanter trapezoid. Hind legs resemble to fore legs except, metacoxae bot shaped, the femur more expanded at the middle.

Abdomen: Yellow to dark brown consists of dorsal view of six visible sternites. 1st- 5th abdominal sternites rectangular shaped, 2nd sternite 2.3 times as long as the 1st and 1.7 times as long as the 3rd. 3rd and 4th abdominal sternites same length. 6th sternite nearly cup shaped, posterior margin weakly emarginate; the sternites covered with densely yellow setae. In ventral view consist of eight visible tergites, 1st- 6th abdominal tergites rectangular shaped. 7th abdominal tergite bot shaped, posterior margin weakly emarginate with height density of short yellow setae. Spiculum gastrale (sternite nine) (Fig.1j) yellow- pale yellow, basal part boat shaped, apex clavate, shaped, length 0.6-0.8 mm. 10th abdominal sternite (Fig.1k) yellow, moon shaped posterior margin with moderate dense of yellow setae. Abdominal postcoxal line on first abdominal sternum complete and semicircular.

Male genital: Aedeagus (Fig.1k and l) brown. Length 1.0-1.2 mm. parameres elongated oval, tapering at the base and gradually expanded forward the apical, which covered with high density of yellow and long setae. Peins knife shaped 0.8 times as long as the parameres. P Apex of penis dark brown, long and tubular shaped, 1.3 times as long as the peins. Phallobase cup shaped, apical margin strongly emarginated. Siphon very long, tubular shaped, Siphonal sac funnel like.

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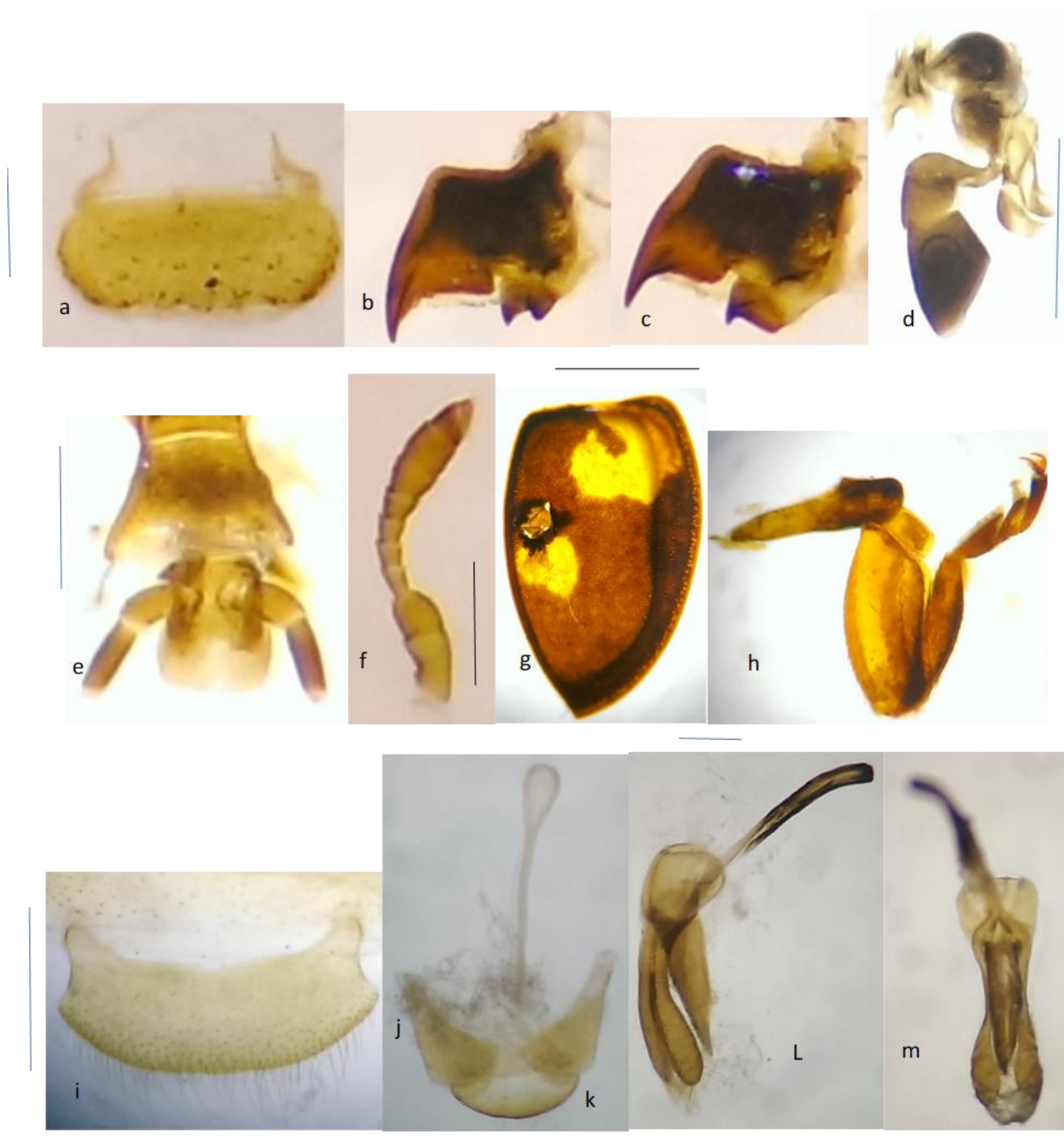


Fig.1 *Exochomus quadripustulatus* (Linnaeus, 1758)

a. Labrum b. Right mandible c. Left mandible d. Maxilla e. Labium f. Antenna g. Elytra h. Fore i. 7th abdominal tergite j. Spiculum gastrale k. 10th abdominal sternite l. Aedeagus (Lateral view) m. Aedeagus (Ventral view). Scale bare: a, b, c, d and f= 0.2mm; g and h = 1mm; i, j, k, l and m = 0.5mm

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