

SHORT COMMUNICATION

## Description of a new species of *Rhizococcus* (Hemiptera: Coccoomorpha: Acanthococcidae) from Iran

Masumeh MOGHADDAM

Insect Taxonomy Research Department, Iranian Research Institute of Plant Protection, Agricultural Research Education and Extension Organization, Tehran, P.O. Box 19395-1454, Iran; e-mail: moghadam@iripp.ir, moghaddamm2002@yahoo.com

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**Abstract.** A new felt scale species, *Rhizococcus avicennae* sp. nov. (Hemiptera: Sternorrhyncha: Coccoomorpha: Acanthococcidae), is described and illustrated based on adult females collected in Hamadan province, Iran. The new species resembles *Rhizococcus desertus* (Matesova, 1957) originally described from Kazakhstan and differs from the latter in having cruciform pores on the venter of the head, thorax, and abdominal segments I and II; in lacking frontal lobes and the frontal tubercle on the head; in the presence of flagellate setae on the ventral submargin and macroducts in three sizes on the venter and dorsum. The females of *R. avicennae* sp. nov. were found at the bases of leaves of an unidentified species of grass (Poaceae). An identification key to the species of *Rhizococcus* Signoret, 1875 currently known from Iran is presented.

**Key words.** Hemiptera, Sternorrhyncha, Coccoidea, scale insects, felt scales, identification key, morphology, taxonomy, Poaceae, Palaearctic Region

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### Introduction

The felt scale genus *Rhizococcus* Signoret, 1875 (Hemiptera: Sternorrhyncha: Coccoomorpha: Acanthococcidae) currently comprises 65 described species, mostly distributed in the Palaearctic Region and mainly feeding on herbaceous plants (KOZÁR et al. 2013, GARCÍA MORALES et al. 2016). The taxonomy of Iranian felt scale insects (Acanthococcidae family group or Eriococcidae *sensu lato*) have not been adequately studied, although faunistic studies over the last decades added substantial new data (BODENHEIMER 1944; FARAHBAKHSI 1961; DANZIG 1990; MOGHADAM 2001, 2009, 2013; ROOZDAR et al. 2013; MOGHADAM & MOHAMMADI-KHORAMABADI 2015). According to MOGHADAM (2013), 15 species of the group have been recorded from Iran, belonging to two families in the recent classification by KOZÁR et al. (2013), namely Cryptococcidae: *Cryptococcus fagisuga* (Douglas, 1886) and *Pseudochermes fraxini* (Kaltenbach, 1860), and Acanthococcidae *sensu stricto*: *Acanthococcus aceris* (Signoret, 1875), *A. costatus* Danzig, 1975, *A. isacanthus* Danzig, 1975, *Anophococcus abaii* (Danzig, 1990), *A. cingulatus* (Kiritchenko, 1940), *A. kondarensis* (Borchsenius,

1949), *A. sanguinairiensis* (Goux, 1993), *Gossyparia spuria* (Modeer, 1778), *Neoacanthococcus pamiricus* (Bazarov, 1968), *N. tamaricicola* Borchsenius, 1978, *Rhizococcus borchsenii* (Danzig, 1975), *R. reynei* (Schmutterer, 1952), *R. saxidesertus* (Borchsenius, 1949), and *Uhleria araucariae* (Maskell, 1879). Acanthococcidae *sensu stricto* can be distinguished from other related families by the presence of two pairs of setae on the basal segment of the labium (KOZÁR et al. 2013).

This paper describes a new species of *Rhizococcus* infesting Poaceae from Iran, based on the morphology of the adult female. A key for the identification of *Rhizococcus* species in Iran is also presented.

### Material and methods

The new species was found during a faunistic survey of scale insects in the Lashkardar Protected Area, Malayer County, Hamadan Province, Iran, in 2017. Samples were preserved in 96% alcohol until preparation on microscopic slides in Canada Balsam, using the slide-mounting protocol described by WILLIAMS & GRANARA DE WILLINK (1992). The type material was deposited at the Hayk Mirzayans Insect



Museum, Tehran, Iran (HMIM) and the Natural History Museum and Genetic Resources Bureau, Tehran, Iran (NMGR). Data written on the type slide labels are cited verbatim with slashes (/) indicating line breaks.

Morphological terminology in the description follows KOZÁR et al. (2013). Measurements were taken from slide-mounted specimens. The nomenclature follows ScaleNet (GARCÍA MORALES et al. 2016); furthermore, the synonymies proposed by KOZÁR et al. (2013) for species in Acanthococcidae *sensu stricto* have been accepted.

### Taxonomy

#### *Rhizococcus avicennae* sp. nov.

(Figs 1, 2)

**Type locality.** Iran, Hamadan Province, Malayer County, Lashkardar Protected Area, Golparabad village, 36°26'19.5" N, 50°16'06.1" E, 1386 m a. s. l.

**Type material.** HOLOTYPE: adult ♀, IRAN, left label: 'No. 2886 / 6.vii.2017 / Hamadan province / Malayer, Lashkardar Protected area / Golparabad / Alt. 1386 m / N36°26'19.5" / E50°16'06.1" '; right label: 'Holotype / *Rhizococcus avicennae* sp. n. / Pl. Poaceae / M. Moghaddam coll.' (HMIM, slide-mounted). PARATYPES: 4 adult ♀♀, same data as holotype except for right label: 'Paratype / *Rhizococcus avicennae* sp. n.' (slide-mounted on 4 slides of which 3 in HMIM and 1 in NHGR).

**Description. Adult female. Live (unmounted) specimens.** Body pyriform, dark green; ovisac white, rounded, completely covering body (Fig. 1).

**Structure (mounted specimens)** (Fig. 2). Body elongate-oval, 2.27–2.50 mm long, 1.18–1.35 mm wide. Antennae 7-segmented, 233–256 µm long; length of segments: I: 38–40, II: 30–32, III: 38–40, IV: 44–48, V: 22–30, VI: 22–24 and VII: 30–34 µm; all segments except for III with a few strong, hair-like setae; apical segment with apical seta 32–38 µm long, and one or two sensory falcate setae, about 22 µm long; segments V and VI each with one sensory falcate seta. Frontal lobes and frontal tubercle absent. Eyes situated on ventral margin. Anal lobes strongly developed, each with three enlarged setae, each 44–46 µm long, plus one or two microtubular ducts on dorsal surface; apical seta 152–200 µm; ventral subapical seta 80–100 µm long.

**Venter.** Labium 130–160 µm long, 80–85 µm wide. Legs well developed; length of segments and digitules of prothoracic legs: coxa 100–104 µm, trochanter 48–60 µm, femur 120–128 µm, tibia 100–104 µm, tarsus 112–114 µm, claw 34–36 µm and with a denticle, trochanter + femur: 146–170 µm, tibia + tarsus: 208–216 µm, tarsal digitules 42 µm, claw digitules 32 µm; mesothoracic legs: coxa 100–108 µm, trochanter 56–60 µm, femur 124–128 µm, tibia 100–112 µm, tarsus 114–120 µm, claw 30–36 µm, trochanter + femur: 160–184 µm, tibia + tarsus: 216–232 µm, tarsal digitules: 40 µm, claw digitules: 30 µm; metathoracic legs: coxa 108–110 µm, trochanter 54–60 µm, femur 104–120 µm, tibia 124–126 µm, tarsus 130–140 µm, claw 34–36 µm; tarsal digitules knobbed, claw digitules slightly knobbed and longer than claw; claw with denticle. Hind coxae with translucent pores on dorsal surface. Derm with normal flagellate setae, in varying sizes, usually 24–50 µm long, present near margins and scattered across segments. Macrotubular ducts of three sizes: large ducts (MTD I) 16–24 µm long and 10–12 µm wide, present as transverse



Fig. 1. Live adult female of *Rhizococcus avicennae* sp. nov.

bands on marginal parts; intermediate ducts (MTD II) 24–28 µm long and 4–8 µm wide, scattered, except for margin; small ducts (MTD III) 6–10 µm long and 3.5–4 µm wide, present as transverse bands on marginal parts of venter. Multilocular pores each 5–6 µm in diameter and with 7 loculi, forming transverse bands on abdominal segments III–VIII+X, and a few present near anterior spiracles. Quinquelocular pores each about 4 µm in diameter, present on abdominal segments I–VI and near anterior and posterior spiracles. Cruciform pores few, each 3–4 µm in diameter, on submargin of prothorax and head.

**Dorsum.** Dorsal enlarged conical setae of two types: longer ones with pointed tip, 46–54 µm, present on margin; smaller ones with pointed tip, 14–40 µm long, in transverse rows on each body segment, rows irregular on head. Macrotubular ducts of three sizes, similar to ventral ones: large ducts (MTD I) present on head, thorax and abdominal segments; intermediate ducts (MTD II) on all segments but much sparser than large ducts; small ducts (MTD III) scattered on abdominal segments. Anal ring well-developed, with partially double rows of pores, about 80 µm in diameter, with 6 strong setae, each about 100 µm long.

**Differential diagnosis.** *Rhizococcus avicennae* sp. nov. is similar to *R. desertus* (Matesova, 1957), redescribed by KOZÁR et al. (2013) from Kazakhstan, in the following characters: (i) enlarged setae present on dorsum of abdominal segment VIII; (ii) dorsal enlarged setae usually sharply pointed; (iii) dorsal enlarged setae on abdominal segment VIII numbering 6–8; and (iv) three enlarged setae present on anal lobes with two microtubular ducts on dorsal surface. *Rhizococcus avicennae* differs from *R. desertus* as follows (the character states of *R. desertus* in parentheses): (i) cruciform pores present on venter of head, thorax, and abdominal segments I and II (only on head and prothorax); (ii) frontal lobes and frontal tubercle absent (present); (iii) flagellate setae present on ventral submargin (enlarged setae present on submargin in two or three rows); (iv) macroducts present in three sizes on venter and dorsum (one size on dorsum and one size on venter).

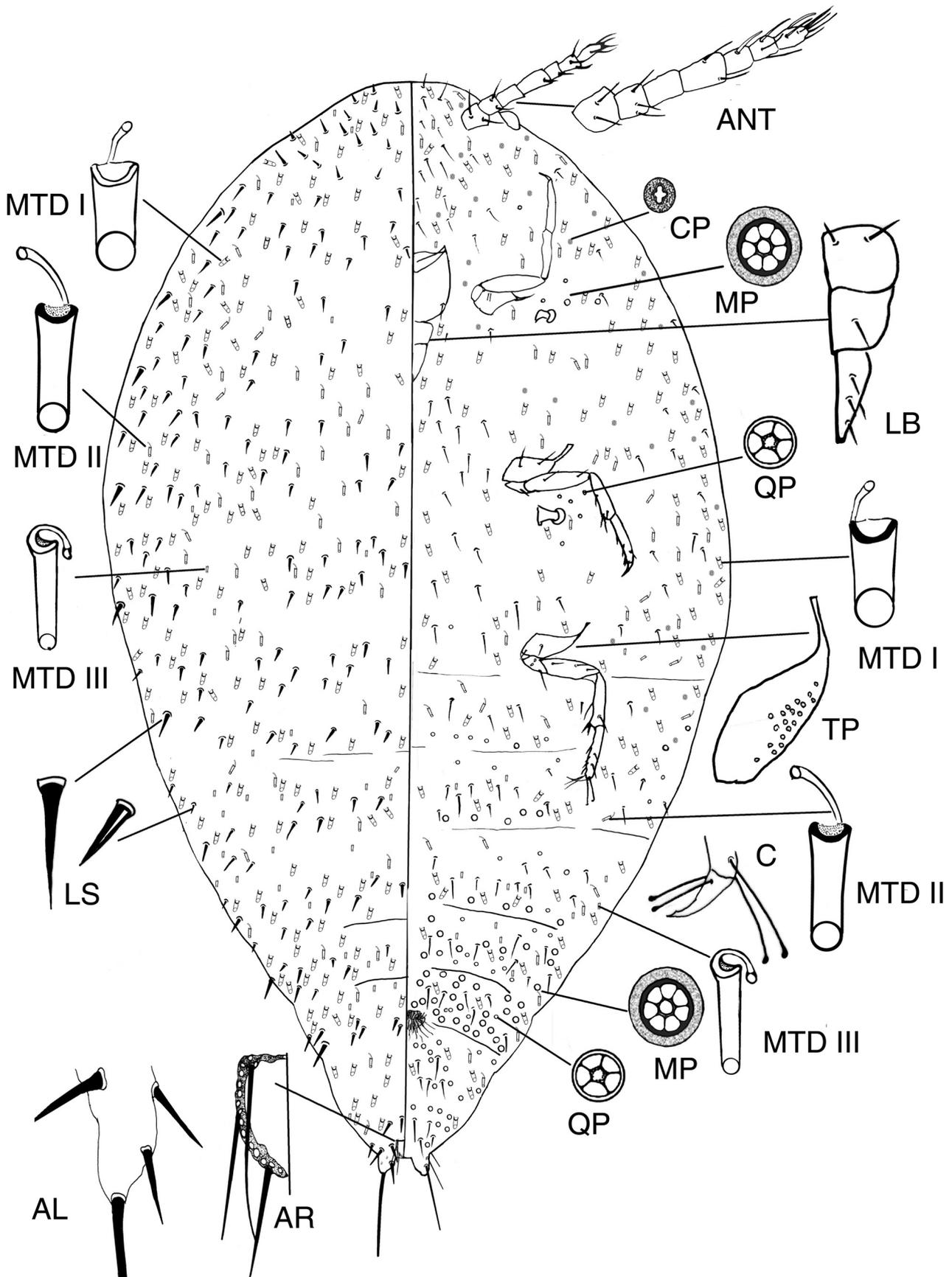


Fig. 2. Adult female of *Rhizococcus avicennae* sp. nov., left side dorsal view, right side ventral view. Abbreviations: AL – anal lobe; ANT – antenna; AR – anal ring; C – claw; CP – cruciform pore; LS – large seta; LB – labium; MP – multilocular pore; MTD I – large type of macrotubular duct; MTD II – intermediate type of macrotubular duct; MTD III – small type of macrotubular duct; QP – quinelocular pore; TP – translucent pore.

**Host plant and ecology.** The females of the new species were collected at the bases of leaves of an unidentified species of grass (Poaceae). Males, life cycle and development unknown.

**Etymology.** The new species is named after Avicenna (Abu Ali Sina), Persian philosopher and scientist (ca. 980–1037) who lived in Hamadan, Iran.

### Key to species of *Rhizococcus* in Iran

(based on adult female morphology)

- 1 Anal lobe setae hair-like. ....  
..... *R. borchsenii* (Danzig, 1975)
- Anal lobe setae enlarged, spine-like. ....2
- 2 Macroducts present in three sizes on venter and dorsum. .... *R. avicennae* sp. nov.
- Macroducts present in single size on venter and dorsum. ....3
- 3 Dorsal enlarged setae of various sizes but most of them 2/3 smaller than marginal enlarged setae, small setae scattered all over surface. ....  
..... *R. saxidesertus* (Borchsenius, 1949)
- Most dorsal enlarged setae almost equal in size or slightly shorter than marginal enlarged setae, if such small setae present, then restricted to posterior abdominal segments only. ....  
..... *R. reynei* (Schmutterer, 1952)

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