

New distributional records of psyllid, *Trioza fletcheri* minor Crawford, 1912 and record of its first association with two ant's species in Pothwar

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Received:
29th Nov, 2016
Accepted:
22nd Jan, 2017
Published:
30th Mar, 2017

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Abstract

Psyllid species, *Trioza fletcheri* minor Crawford, 1912 is reported for the first time in association with two ant species, *Camponotus compressus* (Fabricius, 1787) and *Lepisiota frauenfeldi* (Mayr, 1855) in different areas of Pothwar, Punjab (Pakistan). Main identification characters of both ant species supported with micrographs, synonymy, and comments on their associations have been given for future identification. New distributional records of *T. fletcheri* minor in various areas of Pothwar have also been added.

Keywords: Distribution, *Trioza fletcheri* minor, association, ants, Pothwar

Introduction

Psyllids or jumping plant-lice (Hemiptera: Sternorrhyncha) are phloem-feeding tiny insects belonging to eight families: Aphalaridae, Carsidaridae, Calophyidae, Homotomidae, Liviidae, Phacopteronidae, Psyllidae and Triozidae according to new classification (Burckhardt and Ouvrard, 2012). These tiny creatures are phytophagous pests, being sucking insects they cause galls, leaf curling and sooty mould development in host plant. On other side, they are also considered as vectors of many diseases in various crops like citrus, pear, apple, plum, potato and tomato (Aubert, 1987; Hodkinson, 2009). Both adult and immature (Nymph) of psyllids are phytophagous, nymphs secrete honey dew which is fed by various species of bees, ants and wasps (Mathur, 1975).

About more than twelve thousand species of ants are identified around the world (Rabeling et al., 2008). Ants are well known for their mutualistic relationships with some hemipterans (soft scales, aphids, psyllids etc.) for sugary excretions (i.e., honeydew) carbohydrate source (food source). In return, ants protect them against their natural enemies (Way 1963; Way and Khoo, 1992). This relationship can be obligatory as well as facultative (Delabie, 2001). The mutualism between ants and hemipterans is frequent in aphids, mealybugs and membracids and most of the published literature about this phenomenon addresses members of these families (Delabie and Fernandez, 2003). Ant mutualism with psyllids has been less documented up till now except a few examples. According to Novak (1994), presence of two ant species namely, *Lasius niger* (L.) and *Formica pratensis* Retzius increased parasitism of hawthorn psyllids, *Cacopsylla peregrina* Forster, *C.*



melanoneura Forster, and *C. crataegi* (Schrank) by expelling hyperparasitoids. Alene et al. (2011) reported that ants, *Pheidole megacephala* F. and *Crematogaster striatula* Emery protected the immatures of the psyllid against natural enemies and environmental adversities.

As far as Pakistan is concerned, a limited work on ant's taxonomy has been done (Umair et al., 2012 and Bodlah et al., 2016). A little information about ants association with sucking insects, aphids was provided by Bodlah et al. (2011) from Pakistan. Bodlah et al. (2012) reported *Trioza fletcheri* minor Crawford 1912 first time from Pakistan. No work on the exploration of ants association with psyllids was done due to lack of basic research on ants. So there was a need for performing the basic taxonomic work on ants associated with psyllids for further determination of mutualistic associations between ants and psyllids in Pakistan.

Materials and Methods

Present study was performed during 2016. Visits were done for collection of ants associated with Psyllids on trees of *Terminalis arjuna* in different areas of District Rawalpindi, Islamabad and Attock and Chakwal. Psyllids as well as ants were collected from the trees infested with psyllids. The equipments used for the collection of ants were mouth aspirator, camel hair brush and aerial net. The collected specimens were killed in poison bottle having Potassium Cyanide. Specimens were preserved in 75% ethyl alcohol. Killed specimen were pinned and mounted on card boards. Each specimen was labeled with full information about collector name, habitat, area with date, along with technical names were tagged. Collected Specimens were identified under the Labomed microscope with the help of available key of Bingham (1903). Measurements were done by using stage microscope. Pictures of main identification characters of identified specimens were captured by using Nikon SMZ 1500s Sterio-microscope. Psyllid specimens were also preserved in 75% ethyl alcohol in small glass vials and identified up to maximum level.

Results and Discussion

During 2016, various trees of *Terminalis arjuna* were observed for the collection of ants associated with

Trioza fletcheri minor Crawford 1912 in different areas of Pothwar.

Two species, *Lepisiota frauenfeldi* (Var. *sericea*) and *Camponotus compressus* were found to be associated with *T. fletcheri* and inflorescence of *Terminalis arjuna*.

New distributional records of *T. fletcheri* minor:

Rawalpindi (Ayub Park), 22-vii-16, 8♀ and 8♂;
Attock (Hazroo), 15-viii-16, 9♀ and 6♂;
Chakwal (Talagang), 28-vi-16, 9♀ and 12♂;
Islamabad (Pir Sohawa), 6-ix-2016, 4♀ and 6♂;
Rawalpindi (Taxilla), 27-vi-16, 4♀ and 6♂; Attock (Fateh Jang), 5-vii-16, 12♀ and 6♂.

Remarks: Bodlah et al. (2012) reported *Trioza fletcheri* minor Crawford 1912 first time reported from Pakistan. Here we report it from new localities of Pothwar.

Camponotus compressus (Fabricius, 1787) Fig. 1(a-d)

Camponotus quadrilaterus Roger, 1863
Formica callida Smith, F., 1858
Formica indefessa Sykes, 1835

Identification Characters:

Body ranges from 11-16 mm, black, finely and densely reticulat-punctate (Fig. 1a). Mandibles, antennal flagellum and legs castaneous brown or red rarely black. Antennal pedicle and base of abdomen shining. Head triangular, broad posteriorly (Fig. 1d), mandibles with 7 teeth (Fig. 1c). Clypeus medially vertically carinate, the middle portion anteriorly rectangularly forms a lobe (Fig. 1c). Node of pedicle oval, transverse, convex in front. Legs long with tibia prism shaped (Fig. 1a). Abdomen broad and massive.

Material examined: Rawalpindi (Ayub Park), 22-vii-16, 5♀; Attock (Hazroo), 15-viii-16, 4♀; Chakwal (Talagang), 28-vi-16, 4♀; Islamabad (Pir Sohawa), 6-ix-2016, 14♀; Rawalpindi (Taxilla), 27-vi-16, 8♀; Attock (Fateh Jang), 5-vii-16, 2♀.

Remarks: Bingham (1903) discussed this species as tending and keeping ant-cattle. Sharma and Sundararaj (2011) reported it as to be associated with Coccids and Membracids from India. Nettimi and Iyer (2015) studied Patch fidelity in *Camponotus*



compressus ants foraging on honeydew secreted by *Oxyrachis tarandus*, tree-hopper. Krishna Ayyar (1935) mentioned its economic importance and its symbiotic association with a host of mealybugs, scale-insects, aphids, Fulgorids, Psyllids, Membracids and Lycaenid caterpillars on a variety of cultivated crops, ornamental plants, trees and shrubs. Kataria and Kumar (2013) reported it as to be mutually associated with many species of aphids on various plants from India.

***Lepisiota frauenfeldi* (Mayr, 1855) Fig. 2(a-e)**
Acantholepis frauenfeldi azerbeidzhanica Karavaiev, 1932
Acantholepis frauenfeldi caucasica Santschi, 1917

Identification Characters:

Head, thorax, legs and node of pedicel brownish yellow; abdomen very dark brown (Fig. 2a). Head distinctly longer than broad from front side. Antennal scape long, extending more than half its length beyond the top of the head (Fig. 2d). Pilosity pubescence almost entirely absent; head, thorax and abdomen smooth and shining, the last highly polished. In female, head very small in proportion to the very massive thorax and abdomen. Pronotum from above appears almost circular and with a pair of setae (Fig.

2c, e). The mesonotum forms cylindrical neck. Metanotal teeth thick and broad at base. Abdomen oval somewhat massive.

Material examined:

Rawalpindi (Ayub Park), 22-vii-16, 6♂; Attock (Hazroo), 15-viii-16, 12♂; Chakwal (Talagang), 28-vi-16, 8♂; Islamabad (Pir Sohawa), 6-ix-2016, 4♂; Rawalpindi (Taxilla), 27-vi-16, 10♂; Attock (Fateh Jang), 5-vii-16, 12♂.

Remarks: Bingham (1903) discussed a lot of variation in this species and its distribution from India, Southern Europe to Northern Africa. A lot of color variation in various casts of this species has been determined from light brown to dark brown. This species like other species of ants is associated with sap sucking insects as reported by Mortazavi et al. (2015) to be associated with an aphid, *Pterochloroides persicae* Cholodkovsky in Iran. Currently, Shiran et al. (2013) reported another species of this genus, *Lepisiota bipartite* Smith, 1861 as to be associated with different species of aphids on a variety of host plants from central and southwestern parts of Iran. So, different species of this genus are mutually associated with different sap sucking insects. Here in our studies, it was found to be associated with *Trioza fletcheri* minor in various areas of Pothwar tract on *Terminalis arjuna*.



Fig. 1 (a-d) External morphology of *Camponotus compressus* (Fabricius, 1787)
a. Adult showing pilosity at the abdomen and long legs; b. lateral view of thorax;
c. frontal view of head showing clypeus; d. Dorsal view of thorax





Fig. 2 (a-d) External morphology of *Lepisiota frauenfeldi* (Mayr, 1855)
a. Dorsolateral view of a worker cast; b. Dorsal view; c. Pronotum showing a pair of setae;
d. Antennal scape e. Dorsal view of thorax showing rounded pronotum

Acknowledgements

Part of research about ants was supported by PSF funded project No. PSF/NSLP/P-UAAR (313) and Psyllids from PMAS-AAUR funded project (PMAS-AAUR/ORIC/92). We are thankful to both funding agencies for this support.

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