A NEW SPECIES OF AEOLOTHRIPS (THYSANOPTERA: AEOLOTHRIPIDAE) FROM MANGO CROPS IN OAXACA, MEXICO

JAVIER RUIZ-DE LA CRUZ1, ALFONSO VASQUEZ-LÓPEZ1, AXEL P. RETANA-SALAZAR2, JOSÉ ANTONIO MORA-AGUILERA3
AND ROBERTO JOHANSEN-NAIME4

1Centro Interdisciplinario de Investigación para el Desarrollo Integral Regional (CIIDIR), Unidad Oaxaca, Instituto Politécnico Nacional. Calle Hornos 1003. 71230, Santa Cruz Xoxocotlán, Oaxaca, México

2Programa de Especial Interés Institucional en Biología Aplicada (PUA), Centro de Investigación en Estructuras Microscópicas (CIEMIC), Ciudad de la Investigación, Universidad de Costa Rica

3Colegio de Postgraduados (CP), Instituto de Fitosanidad, km 36.5, Carr. México-Texcoco, Montecillo, Edo. de México, México 56230

4Instituto de Biología, Universidad Nacional Autónoma de México (IBUNAM), Coyoacán, México DF

*Corresponding author: E-mail: ruizj777@gmail.com

ABSTRACT

We describe Aeolothrips romanruizi sp. nova that has been recently discovered in mango orchards in the Isthmus region of Oaxaca in southern Mexico. Aeolothrips romanruizi sp. nova exhibits an ornamentation of the mesonotum and metanotum very different from others in this genus, except A. microstriatus, which is similarly ornamented; but these 2 species differ in forewing color pattern, body size and some other characters of chaetotaxy. A key to the Aeolothrips species of Central America and Mexico is provided.

Key Words: fruit, Aeolothrips microstriatus, predator, SEM

RESUMEN

Se describe una nueva especie del género Aeolothrips que ha sido recolectada en el cultivo de mango en la región del Istmo de Oaxaca en el sur de México. En las especies descritas del género Aeolothrips la ornamentación del meso y metanoto es completamente distinta de la descrita aquí, solo A. microstriatus es similar y la nueva especie difiere de esta en el patrón de color del ala anterior, el tamaño corporal y otros caracteres referentes a la quetotaxia. Se anexa una clave para las especies de Aeolothrips de Centro América y México.

Palabras Clave: fruta, Aeolothrips microstriatus, depredador, SEM

Insect predators are one of the most important agents in insect pest management practices, especially in those scenarios where there are few known parasitoids to control microarthropod pests (Sánchez-Ruiz et al. 1997). Predatory thrips species of Thysanoptera: Aeolothripidae have been studied as potential biological control agents. For example, Frankliniorthris orizabensis Johansen 1974 has received much attention as a possible biological control agent of thrips species that are harmful to crops (Hoddle 2003b).

Members of Aeolothripidae are medium-sized, usually with dark brown bodies about 2.5mm long (Mound & Marullo 1996). Adults and larvae of many species in this family appear to be facultative predators of other small arthropods, in that they feed on both floral tissues as well as on thrips and mites that live in flowers. Some species are almost certainly exclusively phytophagous (Tyagi et al. 2008), but in the warmer parts of the world, a considerable number of species are predators (Hoddle 2003a). Worldwide, about 250 species are recognized in 26 genera of Aeolothripidae (Mound & Marullo 1996).

Studies in avocado groves in search of natural enemies of Scirtothrips perseae Nakahara 1997 have identified predator species in Aeolothrips, Aleurodothrips, Frankliniorthris, Leptothrips, Scolothrips, and Karnyothrips as possible biological control agents (Hoddle et al. 2002; Cambero-Campos et al. 2011) for this pest.

Here we describe a new species of the genus Aeolothrips that has recently been discovered in mango crops in the Isthmus region of Oaxaca in southern Mexico. This predatory thrips may be important in controlling many species of phytophagous thrips that attack this crop.

Aeolothrips romanruizi sp. nova.
Material

HOLOTYPE ♀. MEXICO, Oaxaca, San Pedro Tapanatepec, N 16°27’18.5” W 94°13’23.5”, 46 m asl. Paratypes: 14 ♀♂, same data the holotype. Holotype and 4 paratypes deposited in the collection IBUNAM of the Universidad Autonoma de Mexico, 5 paratypes deposited in the collection of the Universidad de Costa Rica and 5 paratypes deposited in the Centro Interdisciplinario de Investigación para el Desarrollo Integral Regional (CIIDIR), IPN-Unidad Oaxaca.

Color. Body mostly dark brown. Legs with dark brown femora and tibiae. Wings pale translucent with two brown bands longer than wide (Fig. 1A). Major setae dark brown.

Antennal segments I-IX dark brown, except segment III (and extreme base of segment IV) which is completely yellow (Fig. 1B). Antennal segments III-V longer than wide and cylindrical,

Fig. 1. Phase contrast photographs of Aeolothrips romanruizi sp. nova. A) Ventral view of the body, B) Antenna, C) Dorsal view of the head, and D) Mouth cone and maxillary palpi well developed, with 3 segments.
with parallel sides and with several rows of microtrichia. Segments VI-IX forming a style, sensoria on III-IV well developed, linear and longer than half the length of the segment (Fig. 3A).

Head. As long as wide, with many randomly-placed, long, thin setae in the postocular region. Ocellar setae short. Back of the head with widely-spaced striations. Well-developed eyes with multiple ommatidia, the eye is longer in the ventral face than on the dorsal face (Figs. 1C and 3B). Mouth cone long and strong, maxillary palpi well developed, with 3 segments (Fig. 1D).

Prothorax. Wider than long, with many discal setae, anteromarginals setae reduced, postermarginal setae stronger and longer than the other setae on the pronotum. Postermarginal setae I more developed than postermarginals II and III. Discal region without ornamentation with several discal setae shorter than postermaginals I and II (Figs. 2A and 3B). Ferna entire.

Pterothorax. Meso and metanotum with many closely spaced striations (Fig. 2B). Ventral region with many discal setae on the meso-and metasternum (Figs. 2C and 3C).

Wings. Broad with transverse veins evident and well developed between the longitudinal veins (Figs. 2D and 3D).

Abdomen. Terga smooth, sterna IV-VI without discal setae (Fig. 3D). Ovipositor well developed with many very small teeth (Fig. 3C).

---

Fig. 2. Phase contrast photographs of *Aeolothrips romanruizi* sp. nova. A) Prothorax. B) Pterothorax, mesonotum and metanotum with many closely spaced striations. C) Mesosternum and metasternum with many discal setae, and D) Wing, pale translucent with transverse veins evident and well developed between the longitudinal veins.
Sizes in µm of morphological traits of the holotype: total body length= 1850, total length of the antenna = 372.5; I = 30, II = 55, III = 95, IV = 92.5, V = 57.5, VI-VIII = 10, IX = 12.5, pedicel length of antennal segments III and IV, 7.5 and 2.5 respectively; am = 15, amm = 15, PMI = 25, PMII = 20, PMIII = 15, = 430 ovipositor.

Male

Unknown.
Etymology

The species name is dedicated to the memory of Roman Ruiz Sánchez in recognition of his dedication and hard work as an evangelical pastor.

Discussion

Specimens of *Aeolothrips romanruizi sp. nova* collected in Oaxaca possess the following characters (those in italics are considered diagnostic of *Aeolothrips* by Mound & Marullo (1996)): antenna with 9 segments, sensory in segments III-IV linear VI-IX short and condensed to form a unit, compound eyes prolonged ventrally, maxillary palpi with 3 segments, head and pronotum without setae, posteromedial pair of setae on the metanotum, forewing with 1 or 2 bands of dark color with clear apex, abdominal sternites IV-VI with setae and without discal setae marginal or ancillary, sternite VII with 2 pairs of accessory setae submarginal.

The previously described species of *Aeolothrips* have ornamentation of the mesonotum and metanotum different from that of *A. romanruizi sp. nova*. In most species the ornamentation of the mesonotum is striated and with widely spaced lines, and usually the metanotum is reticulated. The only described species showing ornamentation similar to that of *A. romanruizi sp. nova* is *microstriatus* (Hood 1935).

*Aeolothrips romanruizi sp. nova* is known only from the holotype, from a male collected in Panama, and from a specimen collected in Brazil by an anonymous reviewer that has not been described because of insufficient material. Hood (1935) stated that the species, *A. microstriatus*, differs from others by having a bicolored body, especially in the abdomen, antennae with light brown segments, a single band on the anterior part of the wing I, and unique ornamentation of the pterothorax. The new species *A. romanruizi sp. nova* has an entirely dark brown body (Fig. 1A), the segments of the antenna are dark brown with the exception of III, which is bright yellow (Fig. 1B). The wing has 2 dark brown bands and the many striations on the mesonotum and metanotum of the pterothorax with many closely spaced together (Fig. 2D), similar to *microstriatus*.

Table 1. Comparison between the principal characters relating to sexual dimorphisms in the most abundant *Aeolothrips* species in America, namely, the color patterns of the body, antennae and wings, as well as claspers, setae and tubercles in males.

<table>
<thead>
<tr>
<th>Species</th>
<th>Claspers in male at IX</th>
<th>Body (Color)</th>
<th>Sexae in male</th>
<th>Tubercles in male</th>
<th>Antennomere III color</th>
<th>Color of Wings</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Aeolothrips fasciatus</em></td>
<td>✓</td>
<td>Similar</td>
<td>X</td>
<td>✓</td>
<td>✓</td>
<td>Darker</td>
</tr>
<tr>
<td><em>Aeolothrips intermedius</em></td>
<td>✓</td>
<td>Similar</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>Similar</td>
</tr>
<tr>
<td><em>Aeolothrips albicinctus</em></td>
<td>X</td>
<td>Similar</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>Similar</td>
</tr>
<tr>
<td><em>Aeolothrips vittipennis</em></td>
<td>X</td>
<td>Similar</td>
<td>X</td>
<td>X</td>
<td>✓</td>
<td>Darker</td>
</tr>
<tr>
<td><em>Aeolothrips melaleucus</em></td>
<td>✓</td>
<td>Similar</td>
<td>—</td>
<td>✓</td>
<td>—</td>
<td>Similar</td>
</tr>
<tr>
<td><em>Aeolothrips fuscus</em></td>
<td>✓</td>
<td>Similar</td>
<td>X</td>
<td>X</td>
<td>✓</td>
<td>Darker</td>
</tr>
<tr>
<td><em>Aeolothrips kuwanaii</em></td>
<td>✓</td>
<td>Similar</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>Similar</td>
</tr>
<tr>
<td><em>Aeolothrips crucifer</em></td>
<td>✓</td>
<td>Similar</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>Similar</td>
</tr>
<tr>
<td><em>Aeolothrips hartleyi</em></td>
<td>✓</td>
<td>Similar</td>
<td>X</td>
<td>X</td>
<td>✓</td>
<td>Darker</td>
</tr>
<tr>
<td><em>Aeolothrips hesperus</em></td>
<td>✓</td>
<td>Similar</td>
<td>X</td>
<td>X</td>
<td>✓</td>
<td>Similar</td>
</tr>
<tr>
<td><em>Aeolothrips collaris</em></td>
<td>✓</td>
<td>Similar</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>Similar</td>
</tr>
<tr>
<td><em>Aeolothrips auricestus</em></td>
<td>✓</td>
<td>Similar</td>
<td>X</td>
<td>X</td>
<td>✓</td>
<td>Similar</td>
</tr>
<tr>
<td><em>Aeolothrips brunnepictus</em></td>
<td>Condition of material is not adequate to make reliable assessments</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

✓ = Present, X = Absent, and — = No data.
dark in males and clear in females. Furthermore, and consistent with the key by Mound & Marullo (1996), the color pattern of the body and wings remains constant between female and male Aeolothrips. Consequently these well studied characters are widely used in the segregation of species within Aeolothrips.

Among the most notable color variations of the wings that are widely used in the separation of species are; (1) the type of the banding of wing I, (2) the width of the bands, and (3) the presence or absence of a longitudinal band on the posterior edge of wing I. In the descriptions the wing has arbitrarily been divided into the sections anterior and posterior, dividing the wing into the fraction close to the body and the other fraction distant from the body which includes the apical end of the wing.

The correct terms for the two parts are proximal, the part nearest to the body, and distal the part including the apical end. In this text we use the terms proximal and distal.

In the new species, *A. romanruizi sp. nova*, described in this paper the color pattern consists of a dark brown body and a pale translucent wing with two discontinuous dark brown bands. In contrast the body of *A. microstriatus* is bicolored; being brownish red and the wings have a dark band, according to the original description of Hood (1935). In view of the stability of the coloration of the 2 genders of *Aeolothrips* in which wing color pattern is of importance in the separation of species, we consider that the metanotum striations and the distinct wing color pattern of *A. romanruizi sp. nova* indicate that it belongs to the *Aeolothrips microstriatus* group.

On the other hand, the widely different distribution of *A. microstriatus* and the new species, *A. romanruizi sp. nova* found in Oaxaca, Mexico, makes it difficult to assume that it is the female of *microstriatus*. The wing color pattern of *A. romanruizi sp. nova* seems to approach the new species more to other Mexican species, but differing in the structure of the metanotum.

### Key to Central American and Mexican Species of *Aeolothrips*

1a) Body bicolored .......................... 2

1b) Body entirely dark in color .......................... 3

2a) Forewing with one dark band in the second fourth, abdominal segments III-VIII pale .......................... *microstriatus* Hood 1935

2b) Forewing with two dark bands, abdominal segments II-III pale .......................... *bicolour* Hinds 1902

3a) Forewing with posterior margin with a dark area well defined from base to apex, eventually a dark transverse band may be arise from this longitudinal dark margin .......................... 4

3b) Forewing with two transverse dark bands, posterior margin pale between bands .......................... 5

4a) Head length shorter than 190 µm .......................... *major* Bailey 1951

4b) Head length longer than 220 µm .......................... *mexicanus* Priesner 1924

5a) Antennal segment III largely dark brown, yellowish brown in basal half .......................... *duvali* Moulton 1927

5b) Antennal segment III with at least clear yellow in basal three quarters .......................... 6

6a) Antennal segment III clear yellow in basal three quarters, metanotal sculpture weakly reticulated .......................... *surcalifornianus* Johansen 1989

6b) Antennal segment III totally clear yellow, metanotal sculpture striated with closely spaced lines transverse in anterior third but concentric in posterior area .......................... *romanruizi sp. nova*.

### Acknowledgments

To the Consejo Nacional de Ciencia y Tecnología (CONACyT) for the financial support to carry out this research, derived of the project “Evaluación de nuevas variedades con alto potencial productivo y diagnostico y control de plagas de importancia económica del mango en Guerrero, Veracruz, Chiapas y Oaxaca”. Alcides Sánchez-Monge for his comments on the original draft, Dr. Odalisca Broedy-Shadid for the revision of the English narrative, Alexander Rodríguez-Arrieta for his cooperation, and the project “Estudio morfológico y genético de los estados inmaduros de thrips (Thysanoptera:Insecta) de relevancia económica en Hispanoamérica”, 810-Bl-224. Also an anonymous reviewer provided information regarding the existence of this material in South America.
REFERENCES CITED


