

## SHORT COMMUNICATION

# First record of Psocodea (Psocoptera) on coffee (*Coffea canephora*) in the Brazilian Amazon (Rondônia state)

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## ABSTRACT

There is much information regarding the association of Psocoptera and coffee as stored grain pests and little is known about their presence in coffee plants. We conducted a survey in a coffee plantation of *Coffea canephora* in the municipality of Candeias do Jamari, Rondônia state, Brazil, where we obtained the first record of a coffee plant as a host of Psocoptera in the Brazilian Amazon region, and the first record of a representative of the family Archipsocidae (*Archipsocus lenkoi*) for the state of Rondônia. The psocid population was concentrated and not evenly distributed over the survey area, which indicates an irregular distribution pattern. We have not detected damage or injury to the coffee plants and therefore we cannot consider these psocids as a pest in the coffee plantation.

**KEYWORDS:** psocid, coffee plants, host, Archipsocidae, agricultural pests

## Primeiro registro de Psocodea ('Psocoptera') em café (*Coffea canephora*) em Rondônia, na Amazônia brasileira

### RESUMO

Há muita informação sobre a associação de Psocoptera e café como peste em grãos armazenados, mas pouco se sabe sobre sua presença nas plantas do café. Nós realizamos uma amostragem em uma plantação de café de *Coffea canephora* no município de Candeias do Jamari, Rondônia, onde obtivemos o primeiro registro de uma planta de café como hospedeira de Psocoptera na Amazônia brasileira e o primeiro registro de um representante da família Archipsocidae (*Archipsocus lenkoi*) para o estado de Rondônia. A população de psocídeos estava concentrada e não distribuída uniformemente na área de amostragem, o que indica um padrão de distribuição irregular. Não detectamos danos ou injúrias nas plantas de café e, portanto, não podemos considerar esses psocídeos como uma praga na plantação de café.

**PALAVRAS-CHAVE:** psocídeos, planta do café, hospedeiro, Archipsocidae, praga agrícola

The insect order Psocodea has non-parasitic representatives that comprise the Psocoptera group, which are usually named psocids, barklice or booklice. They are free-living herbivores or detritivores, feeding on microflora and organic debris on the surface of vegetation and other substrates (New 1987; Mockford 1993; Lienhard 1998). Most occur on or under the bark and foliage of trees or shrubs, feeding on fungi, lichens, pollen, and fragments of dead insects, while others live in organic debris, under rocks, caves and in bird nests (Lienhard and Smithers 2002; Bland and Jaques 2010; Triplehorn and Johnson 2011).

There are a few species of Psocoptera of agricultural importance, adapted to live in warehouses, food stores, bulk

grain, food processing facilities and kitchens, with a diet based on cereals, mainly rice, corn, wheat, and their derivatives (Sedlacek *et al.* 1995; Athanassiou *et al.* 2009; Ahmedani *et al.* 2010; Valbuza *et al.* 2017), coffee (Casteels *et al.* 1995; Stejskal *et al.* 2015), cocoa (Casteels *et al.* 1995) and tobacco (Mashaya 1999).

There are 460 known species of Psocoptera in Brazil, distributed in 97 genera and 30 families (Silva Neto and García Aldrete 2020). *Archipsocus* Gurney (Psocomorpha: Archipsocidae) is a fascinating genus of Psocoptera that occurs in tree bark and is notable for its gregarious behavior. *Archipsocus* has 81 described species with a cosmopolitan distribution, except in the western Palearctic region, where

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the genus is documented only as a fossil (Engel and Perkovsky 2006). The genus was first recorded in North America in 1934, when an abundant species was discovered near New Orleans and was considered a pest (Gurney 1939).

The list of Psocoptera from Brasil includes 20 species of *Archipsocus* distributed in the states of Amazonas, Roraima, Pará, Mato Grosso, Bahia, Rio de Janeiro, São Paulo, and Paraná (Silva Neto and García Aldrete 2020). Nine species are listed for the Brazilian Amazon, namely *A. brasilianus* Enderlein, *A. broadheadi* Badonnel, *A. cervinus* New, *A. costalimai* New, *A. gurneyi* Mockford, *A. indentatus* Mockford, *A. lineatus* New, *A. minutillus* New and *A. mockfordi* New (Silva Neto and García Aldrete 2020). Eight species of Psocoptera are listed for the northern Brazilian state of Rondônia (*Dolabellopsocus intermedius* Eertmoed; *Euplocania badonneli* New & Thornton; *Triplocania lamasoides* Silva Neto, Rafael & Garcia Aldrete; *T. rondoniense* García Aldrete; *Graphopsocus cruciatus* Linnaeus; *Lachesilla patula* Garcia Aldrete; *Cervopsocus medialis* New and *Epipsocus pereirai* Badonnel), but so far no record of the family Archipsocidae exists for the state (Silva Neto and García Aldrete 2020). Here we report, for the first time, the occurrence of Psocoptera associated on coffee plants in the Brazilian Amazon and the first record of a representative of Archipsocidae in the state of Rondônia.

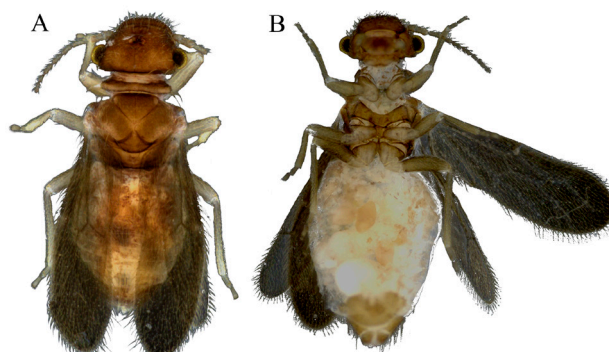
The observations were made in a coffee plantation of *Coffea canephora* Pierre ex Froehner (Rubiaceae) in the municipality of Candeias do Jamari, Rondônia state (Brazil), (8°56'41.81"S, 63°42'38.27"W), during a survey of Psocoptera occurrence, distribution and density in coffee plants, to evaluate whether they behave as a pest. The specimens were collected in five-year-old coffee trees, planted at a spacing of 1 m between plants and 3 m between rows. The plantation comprised 20 rows and 100 plants per row. Observations were made randomly in June 2019, in 10 coffee plants in each of five rows, resulting in a total of 50 plants sampled. From each sampled plant, we removed four branches with ripe and dry fruits grouped in the rosettes, one branch from the middle third of each face of the plant. The collected material was transported to the Entomology Laboratory of Embrapa Rondônia (Porto Velho, Rondônia state, Brazil), where the psocids were detected and examined. Adults and nymphs were counted. The occurrence of psocids was quantified (total, per line and per plants) and according to phase of development (adults and nymphs).

Collected psocids were identified by a specialist in Psocoptera (M. Cutrim) at the Laboratory of Urban and Forensic Systematic Entomology (Laboratório de Entomologia Sistemática Urbana e Forense – LESUF) at Instituto Nacional de Pesquisas da Amazônia – INPA (Manaus, Amazonas state, Brazil). The identification was based on the original descriptions of the Brazilian *Archipsocus* species. Six adult females were dissected in 80% alcohol and their parts mounted

on slides with Canada balsam. Photographs of the mounted parts were taken with a Leica DFC500 digital camera attached to a Leica M205C stereomicroscope, connected to a computer with the Leica Application Suite LAS V3.6 software, which includes an auto-montage module (Syncrosopy software). The specimens mounted on slides were deposited in the invertebrate collection of INPA.

We collected 337 psocid individuals, of which 57 specimens, both adults and nymphs, all females, were identified as *Archipsocus lenkoi* Badonnel (Figure 1). We recorded 204, 33, 98, 2 and 0 individuals in lines 1, 2, 3, 4 and 5, respectively (Table 1). Line 1 contained 60.5% of sampled individuals, line 2, 9.8% and line 3, 29.1%. The number of individuals varied from 0 to 64 per line, and from 0 to 20 per tree.

The occurrence of *Archipsocus lenkoi* Badonnel in *Coffea canephora* in the state of Rondônia, Brazil, is hereby confirmed. This record is both the first record of a coffee plant (*Coffea* spp.) as a host of Psocoptera in the Brazilian Amazon and the first record of a representative of the family Archipsocidae in Rondônia. With this record, the number of species of the genus *Archipsocus* recorded for the Brazilian Amazon increases to 10 and the distribution of this genus in the region extends



**Figure 1.** Habit of a female of *Archipsocus lenkoi* collected on a coffee tree in Rondônia state, in the southwestern Brazilian Amazon. A – dorsal view; B – ventral view. This figure is in color in the electronic version.

**Table 1.** Number of adults and nymphs of *Archipsocus lenkoi* sampled on 10 coffee trees in each of five tree lines in a plantation in Rondônia state, Brazil. Average  $\pm$  standard deviation for 50 trees.

Line	Adults	Nymphs	Total
1	61	143	204
2	11	22	33
3	33	65	98
4	2	0	2
5	0	0	0
<b>Total</b>	107	230	337
<b>Average</b>	2.1 $\pm$ 4.2	4.6 $\pm$ 9.3	6.7 $\pm$ 13.4

to the state of Rondônia, being the ninth species of the order Psocoptera recorded for this state (Figure 2).

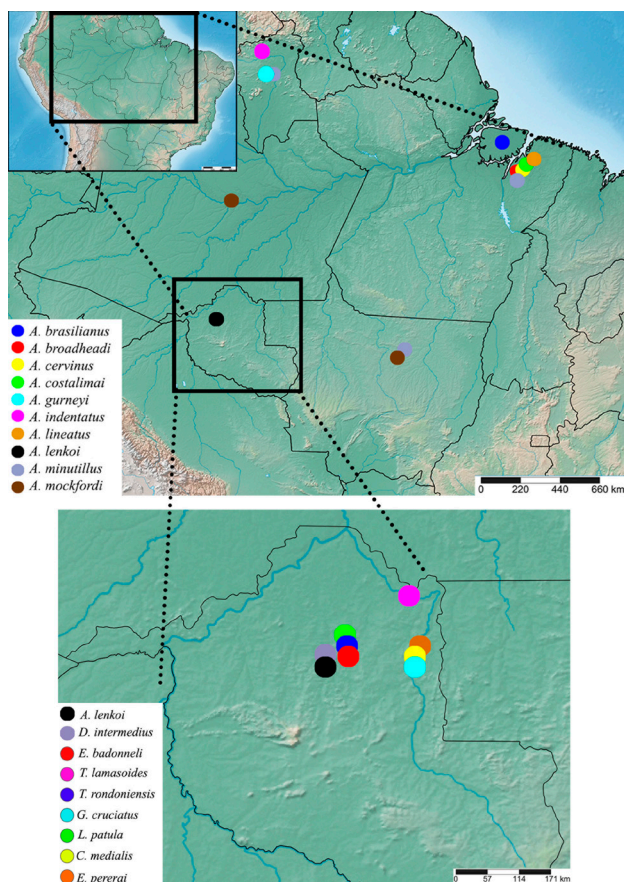
Until now, *A. lenkoi* had only been recorded in its type locality in the southeastern state of São Paulo, in 1978. Both Rondônia and São Paulo are large coffee producers, occupying the third and fifth place, respectively, in coffee production in Brazil, Rondônia being the third largest national producer of *Coffea canephora* (Conab 2020). There is much information regarding the association of Psocoptera and coffee as a pest in stored grain (Casteels *et al.* 1995; Stejskal *et al.* 2015), but there is only limited information about the occurrence of Psocoptera on coffee plants, including fruits, from Puerto Rico (Borkhataria *et al.* 2012), Indonesia (Hasnah *et al.* 2019) and Brazil, in the state of Minas Gerais (Tomazelli *et al.* 2010).

These results indicate that the population was concentrated and not evenly distributed over the total sampling area. Possibly, these psocids have a pattern of irregular or aggregated distribution. Some species of pest arthropods are not uniformly distributed throughout the cultivated area, such as the coffee berry borer *Hypothenemus hampei* Ferrari, 1867 (Souza and Reis 1997), the mealybug *Dysmicoccus texensis*, Tinsley, 1900

(Souza *et al.* 2007) and the coffee red mite *Oligonychus ilicis*, McGregor, 1917 (Franco *et al.* 2010). *Archipsocus lenkoi* showed some characteristics of agricultural pests in the sampled plantation such as an apparent distribution pattern consistent with that of pest species, and development of its reproductive cycle on the plants. However, we did not detect any injury on the plants and, therefore, with the present evidence, *A. lenkoi* cannot be considered to be a coffee pest in Rondônia.

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**Figure 2.** Distribution of the ten species of *Archipsocus* recorded in the Brazilian Amazon and the nine species of Psocoptera recorded in Rondônia state (southwestern Brazilian Amazon), including the record of *Archipsocus lenkoi* reported in here. This figure is in color in the electronic version.

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