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## **Jumping Plant-lice of the Family Triozidae (Hemiptera: Psylloidea) from Cameroon: Biodiversity and Host Plants**

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**Abstract:** From 1994 to 2006, field studies undertaken in Cameroon permitted to enrich the biodiversity of psyllids of Triozidae family. Thirty Five species of triozids exist in Cameroon, among which 28 species was captured during this survey and 7 other species were cited in the literature review. Two genus were identified: *Trioza* and *Pauropsylla*. Seventeen new species exist and 2 species previously described elsewhere in the Afrotropical region were captured in Cameroon for the first time. The Triozidae psyllids fauna from Cameroon is enriched of 19 species. The damages caused by these psyllids are mainly the apparition of pit galls or crypts on leaves, leaves are folded and sometimes wrapped, deformed with necrosis.

**Key words:** Biodiversity, psyllid, Triozidae, *Trioza*, *Pauropsylla*, Cameroon

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### **INTRODUCTION**

Cameroon is one of the largest sub-Saharan country situated in the Central Africa at the extreme North-East of the Gulf of Guinean with a surface area of 475 000 km<sup>2</sup>. It has a particular geobotanical position linking the dense forest in the South, the sudano-saharien in the North and the grass field in the Western part of the country. Cameroon is delimited in the South by three countries Gabon, Congo and Equatorial Guinea; in the West by Nigeria; in the East by Central Africa Republic and in the North by Chad. Cameroon climate's is diverse and strongly influenced by orography (Suchell, 1988). Climates of Cameroon are of inter tropical climates, which are usually hot, humid and dry. As others tropical countries, Cameroon forest is very rich and diversify in term of number of species of plants and animals. The local fauna inventory should constitute an important basis to reach the objectives defined in the Convention on the Biological Diversity (CBD, 1992). This Convention adopted during the summit of Rio de Janeiro in 1992 recommends the conservation and the sustained use of the biodiversity. The conservation and the sustained use of the global biodiversity require inventories of species described and the taxonomic of unknown species. In several groups, in particular those rich in number of species as it is the case of Insects, only a little proportion of existing species is described. This situation has been considered as the obstacle of the taxonomy.

Insects are the most diverse class of organism, of which a large proportion is associated with plant (Hammond, 1990). Jumping plant-lice or psyllids form a moderate-size group of Hemiptera Sternorrhyncha. The biology of psyllids was studied by Hodkinson (1974). They feed on plant-sap,

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usually from the phloem and are generally highly host specific (Burckhardt and Ouvrard, 2007). Psylloids are usually associated with dicotyledons and related species often develop on related host taxa (Burckhardt, 2005). Higher psylloid taxa are typically associated with a single plant taxon (Hodkinson, 1974; Hollis and Broomfield, 1989; Burckhardt and Basset, 2000), but contain a few members that develop on unrelated plant suggesting an evolutionary process that includes both cospeciation and host shifts (Burckhardt and Ouvrard, 2007). Currently, 3000 known species of psyllids are described through the world and the number of non-described species is estimated more than 5000 specimens (Mifsud and Burckhardt, 2002). Hollis (2004) stated that the 3000 species are described in 235 recognized genus distributed universally, but with a larger diversity in the tropical regions and the temperate regions of the South. The known species are mainly those of the temperate and subtropical regions of the glob. The family Triozidae constitutes with some 60 species over a third of the Central European psyllid fauna (Burckhardt *et al.*, 1991). This family constitutes with 68 species in four genus (*Afrotrioza*, *Pauropsylla*, *Trichodermes*, *Trioza*) in the afrotropical region (Hollis, 1984). In Cameroon, Hollis (1984) recognizes 14 species, 7 of *Trioza* genus and 7 of *Pauropsylla* genus. Recent field works in Cameroon indicated that more than 14 species of Triozidae family exist within the Cameroon psyllids fauna. Triozids, pests of cultivated plants and important forest timbers, are very little known in tropical Africa in general and in Cameroon in particular. It is important to better know all the species involved and to study their biology and the damages that they caused to their host plants in order to undertake an integrated pest management. The aim of this work was to study the biodiversity of psyllids of Triozidae family and to list all the species recorded in Cameroon and their host plants. The damages caused by these psyllids were described.

## MATERIALS AND METHODS

Psyllids were collected in 12 regions in Cameroon from 1994 to 2006 (Table 1). Psyllids were captured with the help of an entomological net of 0.5 mm mesh size and with the help of a mouth aspirator. Host plants and only accessible branches (< 2 m high) were visually searched at random. Psyllids seen on the lower four feet of canopy were captured with the help of the mouth aspirator. We also used the entomological net to capture other specimens. These insects were preserved in the 70% alcohol. The collection is kept in the Laboratory of Zoology, University of Yaounde I (LZUY) and in the Naturhistorisches Museum Basle, Switzerland (NHMB). Psyllids were identified under stereomicroscope using Hollis (1984)'s keys for identification of Afrotropical Triozidae. Host plants were identified and kept in National Herbarum at Yaounde (Cameroon).

## RESULTS

Two thousands one hundred and ninety six triozids of different developmental stages were captured of which 1494 belong to *Trioza* genus (380 males, 355 females and 759 larvae) and 702 belong to *Pauropsylla* genus (288 males, 353 females and 61 larvae). Thirty five species of triozids exist in Cameroon. Twenty-eight species were collected during this survey and 7 other species were cited by Hollis (1984) from Cameroon (Table 1). Within this fauna, 24 species are of *Trioza* genus and 11 species are of *Pauropsylla* genus. We discovered 13 undescribed species of *Trioza* genus and 4 undescribed species of *Pauropsylla* genus. Triozids feed on different host plants of 12 families: Rutaceae (1 specie), Menispermaceae (2 species), Combretaceae (1 species), Apocynaceae (3 species), Flacourtiaceae (1 species), Ebenaceae (1 species), Rubiaceae (2 species), Moraceae (9 species), Annonaceae (2 species), Rhamnaceae (1 species), Euphorbiaceae (1 species), Clusiaceae (1 species) and 6 unknown host plants.

Here is the list of the material examined.

Table 1: List of known and unknown species of triozids (Hemiptera, Triozidae) from Cameroon with their host plants, the region where species were collected for the first time and references cited for known species

Species	Hostplants	Regions (first record of any specimen)	Code	References
<i>Trioza erytraea</i>	<i>Citrus</i> sp., <i>Clausena anisata</i> (Rutaceae)	Yaounde : 11°31'N, 3°51'E	LZUYTA15	Hollis (1984)
<i>T. medleri</i> Hollis	<i>Rauwolfia vomitoria</i> (Apocynaceae)	Mt Eloundem (Yaounde): 11°31'N, 3°51'E	LZUYTA9	Hollis (1984)
<i>T. xylopi</i> Hollis	<i>Xylopi</i> sp. (Annonaceae)	Mt Kala (Mbankomo): 11°24'N, 3°47'E	LZUYTA10	Hollis (1984)
<i>T. anomalicornis</i> Hollis	<i>Drypetes leonensis</i> (Euphorbiaceae)	Mt Eloundem (Yaounde): 11°31'N, 3°51'E	LZUYTA11	Hollis (1984)
<i>T. fuscivena</i> Hollis	<i>Ficus</i> sp. (Moraceae)	Bansoa: 10°14'N, 5°28'E	LZUYD27	Hollis (1984)
<i>T. boxi</i> Hollis	Unknown	Mt Eloundem (Yaounde): 11°31'N, 3°51'E	LZUYTA12	
<i>T. ghaneensis</i>	<i>Harungana madagascariense</i> (Clusiaceae)	Limbe: 9°12'N, 4°01'E	LZUYL5	
<i>T. bamenda</i> Hollis	Unknown			Hollis (1984)
<i>T. bussei</i> Hollis	<i>Kickxia</i> sp. (Apocynaceae)			Hollis (1984)
<i>T. camerounensis</i> Hollis	Unknown			Hollis (1984)
<i>T. mirificornis</i> Hollis	Unknown			Hollis (1984)
<i>Trioza</i> sp.n.1	<i>Stephania abyssinica</i> (Menispermaceae)	Bamendjou: 10°20'N, 5°23'E	LZUYTA17	
<i>Trioza</i> sp.n.2	<i>Stephania</i> sp.	Mfou: 10°20'N, 5°23'E	LZUYTA18	
<i>Trioza</i> sp.n.3	<i>Combretum</i> sp. (Combretaceae)	Mt Messa (Yaounde) : 11°31'N, 3°51'E	LZUYTA16	
<i>Trioza</i> sp.n.4	<i>Funtumia elastica</i> (Apocynaceae)	Ebolowa: 11°09'N, 2°55'E	LZUYTA19	
<i>Trioza</i> sp.n.5	<i>Caloncoba welwitche</i> (Flacourtiaceae)	Mt Messa (Yaounde) : 11°31'N, 3°51'E	LZUYTA14	
<i>Trioza</i> sp.n.6	<i>Diospyros hoyleana</i> (Ebenaceae)	Mt Kala (Mbankomo): 11°24'N, 3°47'E	LZUYTA13	
<i>Trioza</i> sp.n.7	Rubiaceae	Santchou: 9°58'N, 5°17'E	LZUYD10	
<i>Trioza</i> sp.n.8	<i>Ficus</i> sp. (Moraceae)	Dschang: 10°04'N, 5°26'E	LZUYD31	
<i>Trioza</i> sp.n.9	<i>Xylopi hypolampra</i> (Annonaceae)	Mt Kala (Mbankomo): 11°24'N, 3°47'E	LZUYK35	
<i>Trioza</i> sp.n.10	<i>Lasiodiscus mannii</i> (Rhamnaceae)	Ebolowa: 11°09'N, 2°55'E	LZUYE7	
<i>Trioza</i> sp.n.11	<i>Tarenna</i> sp. (Rubiaceae)	Mt Kala (Mbankomo): 11°24'N, 3°47'E	LZUYK44	
<i>Trioza</i> sp.n.12	Unknown	Mt Kala (Mbankomo): 11°24'N, 3°47'E	LZUYK34	
<i>Trioza</i> sp.n.13	Unknown	Titié (Dschang): 10°04'N, 5°26'E		
<i>Pawopsylla la trichaeta</i> Hollis	<i>Ficus sur</i> (Moraceae)	Yaounde: 11°31'N, 3°51'E	LZUYTA5	Hollis (1984)
<i>P. longipes</i> Hollis	<i>Ficus</i> sp. (Moraceae)	Yaounde: 11°31'N, 3°51'E	LZUYTA6	Hollis (1984)
<i>P. septima</i> Hollis	<i>Ficus thonningii</i> (Moraceae)	Abong-Mbang: 13°11'N, 3°59'E	LZUYTA7	Hollis (1984)
<i>P. mistura</i> Hollis	<i>Ficus abutilifolia</i> (Moraceae)	Yaounde: 11°31'N, 3°51'E	LZUYTA8	Hollis (1984)
<i>P. eastopi</i> Hollis	Unknown			Hollis (1984)
<i>P. tatricea</i> Hollis	Unknown			Hollis (1984)
<i>P. proxima</i> Hollis	<i>Ficus thonningii</i> (Moraceae)			Hollis (1984)
<i>Pawopsylla</i> sp.n.1	<i>Ficus</i> sp. (Moraceae)	Dschang: 10°04'N, 5°26'E	LZUYD4	
<i>Pawopsylla</i> sp.n.2	<i>Ficus</i> sp. (Moraceae)	Dschang: 10°04'N, 5°26'E	LZUYD7	
<i>Pawopsylla</i> sp.n.3	<i>Ficus</i> sp. (Moraceae)	Dschang: 10°04'N, 5°26'E	LZUYD8	
<i>Pawopsylla</i> sp.n.4	<i>Ficus</i> sp. (Moraceae)	Bamendjou: 10°20'N, 5°23'E	LZUYD20	

***Trioza* Genus**

- *Trioza erythrae* Del Guercio, Citrus psyllid (LZUY TA15): 21 males, 18 females and 12 larvae, Center Province, Nkolbisson (Yaounde), 15 x 1992 (JL Tamesse); 1 male, 4 females and 20 larvae, Center Province, Nkolbisson (Yaounde), 21 I 2006 (JL Tamesse and W Yana); 1 female, Center Province, Nkolbisson (Yaounde), 1 v 2006 (JL Tamesse and W Yana); 2 males, 3 females and 1 larvae, South Province, Nkoemvone, 25 ii 2006 (JL Tamesse and YP Mveyo Ndankeu); 8 males and 5 females, South Province, Nkolandom, 22 iv 2006 (JL Tamesse and YP Mveyo Ndankeu); 11 males, 19 females and 1 larvae, Center Province, Ngomedzap, 23 vi 2006 (JL Tamesse and YP Mveyo Ndankeu); 3 males and 3 females, South Province, Nkolandom, 26 v 2006 (JL Tamesse and YP Mveyo Ndankeu).
- *Trioza medleri* Hollis, psyllid of *Rauvolfia vomitoria* (LZUY TA9): 4 males, 2 females and 2 larvae, Center Province, Mount Eloundem (Yaounde), 12 ii 1994 (JL Tamesse).
- *Trioza xylophia* Hollis, psyllid of *Xylophia* sp. (LZUY TA10): 3 males and 2 females, Center Province, Mount Kala (Mbankomo), 23 xii 2003 (JL Tamesse).
- *Trioza anomalicornis* Hollis, psyllid of *Drypetes leonensis* (LZUY TA11): 6 males, 3 females and 10 larvae, Center Province, Mount Eloundem (Yaounde), 7 ii 1998 (JL Tamesse) ; 10 males and 17 females, Center Province, Mount Eloundem (Yaounde), 21 ii 2006 (JL Tamesse and W Yana). 5 males, 3 females and 33 larvae, Center Province, Mount Kala (Mbankomo), 22 iii 2006 (JL Tamesse and W Yana) ; 2 males and 2 females, Center Province, Nkomilong (Mbankomo), 29 iv 2006 (JL Tamesse and W Yana) ; 2 males and 4 females, Center Province, Mount Kala (Mbankomo), 27 iv 2006 (JL Tamesse and W Yana) ; 11 males, 6 females and 1 larvae, Center Province, Mount Kala (Mbankomo), 26 v 2006 (JL Tamesse and W Yana) ; 1 male and 1 female, Center Province, Mount Kala (Mbankomo), 28 vi 2006 (JL Tamesse and W Yana) ; 1 female, South Province, Nkoemvone, 29 I 2006 (JL Tamesse and YP Mveyo Ndankeu) ; 2 males and 2 females, South Province, Nkoemvone, 25 ii 2006 (JL Tamesse and YP Mveyo Ndankeu) ; 5 males and 3 females, Center Province, Mbalmayo, 04 iii 2006 (JL Tamesse and YP Mveyo Ndankeu) ; 1 female, South Province, Nkolandom, 22 iv 2006 (JL Tamesse and YP Mveyo Ndankeu).
- *Trioza fuscivena* Hollis, psyllid of *Ficus* sp. (LZUY D27) : 28 males, 18 females and 123 larvae, West Province, Bansa, 28 iii 2006 (JL Tamesse and VJ Dzokou).
- *Trioza boxi* Hollis, host plant unknown (LZUY TA12) : 3 males, 2 females and 8 larvae, Center Province, Mount Eloundem (Yaounde), 12 viii 2004 (JL Tamesse).
- *Trioza ghaneensis* Hollis, psyllid of *Harungana madagascariensis* (LZUY L5): 6 males, 8 females and 10 larvae, South West Province, Mabeta (Limbe), 6 viii 2006 (JL Tamesse).
- *T. bamenda* Hollis (Hollis, 1984)
- *T. bussei* Hollis (Hollis, 1984)
- *T. camerounensis* Hollis (Hollis, 1984)
- *T. mirificornis* Hollis (Hollis, 1984)
- *Trioza* sp.n.1, psyllid of *Stephania abyssinica* (LZUY TA17): 15 males, 15 females and 18 larvae, West Province, Bamendjou, 15 viii 2001 (JL Tamesse), 6 males, 9 females and 67 larvae, West Province, Foto (Dschang), 27 I 2006 (JL Tamesse and VJ Dzokou).
- *Trioza* sp.n.2, psyllid of *Stephania* sp. (LZUY TA18): 2 males, 2 females and 7 larvae, Center Province, Mfou, 29 viii 2004 (JL Tamesse).
- *Trioza* sp.n.3, psyllid of *Combretum* sp. (LZUY TA16): 4 males, 9 females and 6 larvae, Center Province, Mount Messa (Yaoundé), 27 viii 1994 (JL Tamesse).
- *Trioza* sp.n.4, psyllid of *Funtumia elastica* (LZUY TA16): 15 males, 10 females and 25 larvae, South Province, Ebolowa, 12 xii 1994 (JL Tamesse); 4 males, 2 females and 48 larvae; South Province, Nkoemvone, 28 I 2006 (JL Tamesse and YP Mveyo Ndankeu); 12 males, 13 females and 4 larvae, South Province, Nkoemvone, 29 I 2006, (JL Tamesse and YP Mveyo Ndankeu); 2 males and 1 female, Center Province, Ngomedzap, 23 vi 2006, (JL Tamesse and YP Mveyo

Ndankeu); 7 males and 14 females, South Province, Nkoemvone, 25 ii 2006 (JL Tamesse and YP Mveyo Ndankeu); 8 males and 18 females, South Province, Nkolandom, 22 iv 2006 (JL Tamesse and YP Mveyo Ndankeu); 4 males and 5 females, South Province, Nkoemvone, 26 ii 2006 (JL Tamesse and YP Mveyo Ndankeu); 2 males and 5 females, South Province, Nkolandom, 26 v 2006 (JL Tamesse and YP Mveyo Ndankeu).

- *Trioza* sp.n.5, psyllid of *Caloncoba welwitschii* (LZUY TA16): 7 males, 7 females and 6 larvae, Center Province, Mount Messa (Yaounde), 7 ii 1998, (JL Tamesse); 11 males, 12 females and 2 larvae, West Province, Massagam, 21 vii 2006 (JL Tamesse and VJ Dzokou); 3 males and 6 females, Center Province, Leboth (Okola), 28 iii 2006 (JL Tamesse and W Yana); 1 male and 2 females, Center Province, Nkolbisson (Yaounde), 29 iii 2006, (JL Tamesse and W Yana); 2 males and 1 female, Center Province, Nkolbisson (Yaounde), 1 v 2006 (JL Tamesse and W Yana); 9 males and 6 females, Center Province, Nkolbisson (Yaounde), 25 v 2006, (JL Tamesse and W Yana); 9 males and 5 females, Center Province, Nkolbisson (Yaounde), 26 vi 2006 (JL Tamesse and W Yana).
- *Trioza* sp.n.6, psyllid of *Diospyros hoyleana* (LZUY TA13): 22 females, 13 males and 5 larvae, Center Province, Mount Kala (Mbankomo), 20 ix 1997 (JL Tamesse); 4 males, 1 female and 1 larva, Center Province, Nkomilong (Mbankomo), 23 I 2006 (JL Tamesse and W Yana); 2 females, Center Province, Mount Kala (Mbankomo), 24 ii 2006 (JL Tamesse and W Yana); 4 males and 1 female, Center Province, Mount Kala (Mbankomo), 23 iii 2006 (JL Tamesse and W Yana); 1 male and 3 females, South Province, Nkolandom, 26 v 2006 (JL Tamesse and YP Mveyo Ndankeu).
- *Trioza* sp.n.7, psyllid of an unidentified Rubiaceae (LZUY D10): 10 males, 12 females and 51 larvae, West Province, Santchou, 11 ii 2006 (JL Tamesse and VJ Dzokou); 10 males, 6 females and 150 larvae, West Province, Lingang, 21 xi 2005 (JL Tamesse and VJ Dzokou).
- *Trioza* sp.n.8, psyllid of *Ficus* sp. (LZUY D31): 1 male and 1 female, West Province, Dschang, 7 iii 2006 (JL Tamesse and VJ Dzokou).
- *Trioza* sp.n.9, psyllid of *Xylopi hypolampra* (LZUY K35): 20 males, 15 females and 10 larvae, Center Province, Mount Kala (Mbankomo), 27 iv 2006 (JL Tamesse and W Yana); 41 larvae, South Province, Nkoemvone, 28 i 2006 (JL Tamesse and YP Mveyo Ndankeu); 2 males, 6 females and 42 larvae, South Province, Nkoemvone, 29 i 2006 (JL Tamesse and YP Mveyo Ndankeu).
- *Trioza* sp.n.10, psyllid of *Lasiodiscus mammii* (LZUY E7): 1 male and 4 females, South Province, Nkoemvone, 28 i 2006 (JL Tamesse and YP Mveyo Ndankeu); 1 male and 1 female, South Province, Nkolandom, 26 v 2006 (JL Tamesse and YP Mveyo Ndankeu); 3 males, 1 female and 32 larvae, Center Province, Ngomedzap, 23 vi 2006 (JL Tamesse and YP Mveyo Ndankeu).
- *Trioza* sp.n.11, psyllid of *Tarenna* sp. (LZUY K44): 12 males, 8 females and 10 larvae, Center Province, Mount Kala (Mbankomo), 27 vii 2006 (JL Tamesse and W Yana).
- *Trioza* sp.n.12, host plant unknown (LZUY K34): 27 males and 14 females, Center Province, Nkomilong (Mbankomo), 29 vi 2006 (JL Tamesse and W Yana); 13 larvae, Center Province, Mount Nkomilong (Mbankomo), 27 v 2006 (JL Tamesse and W Yana).
- *Trioza* sp.n.13, host plant unknown (LZUYD58): 2 females, West Province, Foto (Dschang), 15 xi 2006 (JL Tamesse and VJ Dzokou).

#### ***Pauropsylla* genus**

- *Pauropsylla trichaeta* Pettey, psyllid of *Ficus sur* (LZUY TA5) : 20 males, 30 females and 18 larvae, Center Province, Yaounde, 17 vii 1994 (JL Tamesse) ; 2 males, 1 female and 4 larvae, West Province, Bamendjou, 4 ii 2006 (JL Tamesse and VJ Dzokou) ; 12 males and 10 females, West Province, Foto (Dschang), 19 I 2006 (JL Tamesse and VJ Dzokou) ; 9 males and 8 females, West Province, Lingang (Dschang), 14 ii 2006 (JL Tamesse and VJ Dzokou) ; 3 males and 4 females,

West Province, Lingang (Dschang), 15 ii 2006 (JL Tamesse and VJ Dzokou) ; 48 males and 53 females, West Province, Lingang (Dschang), 22 iii 2006 (JL Tamesse and VJ Dzokou) ; 1 male and 2 females, Center Province, Soa, 28 iv 2006 (JL Tamesse and W Yana) ; 3 females, Center Province, Soa, 24 v 2006 (JL Tamesse and W Yana) ; 4 males, Center Province, Soa, 27 vi 2006 (JL Tamesse and W Yana).

- *P. longipes* Hollis, psyllid of *Ficus* sp. (LZUY TA6) : 5 males and 4 females, Center Province, Yaoundé, 30 xii 1994 (JL Tamesse) ; 2 males and 1 female, Center Province, Nkolbisson (Yaounde), 29 iii 2006 (JL Tamesse and W Yana) ; 1 male and 2 females, Center Province, Nkolbisson (Yaounde), 29 v 2006 (JL Tamesse and W Yana) ; 2 males and 5 females, Center Province, Nkolbisson (Yaounde), 26 v 2006 (JL Tamesse and W Yana).
- *P. septima* Hollis, psyllid of *Ficus thomningii* (LZUY TA7): 4 males, 7 females and 10 larvae, East Province, Abong Mbang, 4 viii 2004 (JL Tamesse).
- *P. mistura* Hollis, psyllid of *Ficus abutilifolia* (LZUY TA8): 20 males, 18 females and 20 larvae, Center Province, Yaounde, 19 ix 2001 (JL Tamesse).
- *P. eastopi* Hollis, host plant unknown (Hollis, 1984)
- *P. tatricea* Hollis, host plant unknown (Hollis, 1984)
- *P. proxima* Hollis, psyllid of *Ficus thomningii* and *Ficus* sp. (Moraceae) (Hollis, 1984)
- *Pauropsylla* sp.n. 1, psyllid of *Ficus* sp.1 (LZUY D4): 40 males, 45 females and 3 larvae, West Province, Lingang (Dschang), 23 I 2006 (JL Tamesse and VJ Dzokou); 3 males and 5 females, West Province, Foto (Dschang), 15 ii 2006 (JL Tamesse and VJ Dzokou); 31 males, 41 females, 1 larvae, West Province, Lingang (Dschang), 27 I 2006 (JL Tamesse and VJ Dzokou).
- *Pauropsylla* sp.n. 2, psyllid of *Ficus* sp.2 (LZUY D7): 27 males, 34 females and 2 larvae, West Province, Lingang (Dschang), 13 I 2006 (JL Tamesse and VJ Dzokou).
- *Pauropsylla* sp.n. 3, psyllid of *Ficus* sp.3 (LZUY D8): 21 males, 28 females and 1 larvae, West Province, Dschang, 13 I 2006 (JL Tamesse and VJ Dzokou); 13 males, 23 females and 2 larvae, West Province, Dschang, 27 I 2006 (JL Tamesse and VJ Dzokou).
- *Pauropsylla* sp. 4, psyllid of *Ficus* sp.4 (LZUY D20): 20 males and 29 females, West Province, Mboum (Bamendjou), 17 ii 2006 (JL Tamesse and VJ Dzokou).

## DISCUSSION

According to Hollis (1984), 14 species of Triozidae family (7 species of *Trioza* and 7 species of *Pauropsylla*) were identified from Cameroon. The present study permits us to enrich the psyllid fauna of Triozidae family from Cameroon. A total of 35 species of Triozidae family was identified; 28 species were captured during this survey and 7 other species were described from Cameroon by Hollis (1984). 24 species belong to the *Trioza* genus and 11 species belong to the *Pauropsylla* genus. 17 species were undescribed of which 13 species belong to *Trioza* genus and 4 species belong to *Pauropsylla* genus. Five species of *Trioza* (*T. erytrae*, *T. medleri*, *T. xylopi*, *T. anomalicornis*, *T. fuscivena*) and 4 species of *Pauropsylla* (*P. trichaeta*, *P. longipes*, *P. septima*, *P. mistura*) previously knew from Cameroon (Hollis, 1984) were captured during this study and 2 species of *Trioza* (*T. boxi*, *T. ghaneensis*) knew elsewhere in the Afrotropical region (Hollis, 1984) were captured in Cameroon for the first time. Four species of *Trioza* (*T. bamenda*, *T. bussei*, *T. camerounensis*, *T. mirificornis*) and 3 species of *Pauropsylla* (*P. eastopi*, *P. tatricea*, *P. proxima*) knew from Cameroon (Hollis, 1984) were not captured during this survey.

Host plants of triozids belong to 12 different plants families: Rutaceae, Menispermaceae, Combretaceae, Apocynaceae, Flacourtiaceae, Ebenaceae, Rubiaceae, Moraceae, Annonaceae,

Rhamnaceae, Euphorbiaceae, Clusiaceae and 6 unknown host plants. Considering the list of host plants cited by Hollis (1984), it is important to note that Flacourtiaceae, Rubiaceae and Clusiaceae plants family are new for the first time as triozids host plants in the Afrotropical region. The Triozidae host plants are more diversified in Cameroon than the Central European triozids species host plant (Burekhardt *et al.*, 1991). In that region, Triozidae species developed on Herbaceous plants particularly of the families Asteraceae, Apiaceae and Rosaceae and overwinter as adults develop on conifers (Burekhardt *et al.*, 1991).

Some of the host plants of triozids from Cameroon had various economical and pharmaceutical importances. The most important one is Citrus which is a cultivated plant in all tropical and subtropical regions. Citrus fruits constituted the first world production of fruits and they play an important role in the human food since they are very rich in essential oils and in vitamin C (Huet 1971). The other plants are used in the African traditional medicine: *Stephania abyssinica*; *Caloncoba welwitchii* (Ake-Assi *et al.*, 1978); *Diospyros hoyleana* (Bouquet *et al.*, 1971); *Xylopi* sp. (Aseku and Adeniyi, 2004). The phytochemical studies permitted to isolate the active compound capable to fight efficiently against some pathogenic germs of the man: the antibacterial flavonoides isolated from Combretaceae (Martini *et al.*, 2004); the combretastatines isolated from Combretaceae that, according to Lawrence *et al.* (2004), block the cell division and would permit to limit the cellular proliferation in the case of cancer; the quinones isolated on *Diospyros hoyleana* for therapeutic use (Bouquet *et al.* 1971). The studies of Ayissi and Nyadedzor (2003) showed that the excerpts of *Clausena anisata* have inhibitory effects on the multiplication of the HIV 1 and HIV 2, AIDS viruses.

Triozids caused severe damages on their host plants. The sap feeding activity on host plant caused a stress to the plant; the injection of toxins to the plant tissues provokes the degeneration of leaves, buds or the whole plant; the distortion of leaves, the apparition of necrosis, pit galls or crypts on leaves and stems occurred during larval development.

Adults of *T. erytrae* feed and laid their eggs preferentially on youngest buds (Fig. 1). In period of higher proliferation, the number of adults per bud can be up to 30 individuals per bud (Fig. 2). The larvae develop themselves at the lower face of the leaves (Fig. 3) and during the larval development process, these larvae provoked the apparition of pit galls or crypts at the upper face of the leaves thus attacked (Fig. 4). In the nursery, the non protected young plants has their leaves puffed up, deformed and sometimes wrapped (Fig. 5). These young plants were weak and unfit for commercialisation (Tamesse and Messi, 2002). This species is a vector of bacteria causing citrus greening disease in Cameroon (Hollis, 1984; Tamesse *et al.*, 1999).

Damages caused by *Trioza* sp.n.1, psyllid of *Stephania abyssinica* (Fig. 6), *Trioza* sp.n.2, psyllid of *Stephania* sp., *Trioza* sp.n.3, psyllid of *Combretum* sp., *Trioza* sp.n.4, psyllid of *Funtunia elastica* (Fig. 7), *Trioza* sp.n.8, psyllid of *Ficus* sp., *Trioza* sp.n.10, psyllid of *Lasiodiscus mannii*, *Trioza medleri*, *Trioza anomalicornis* and *Trioza fuscivena* on their host plants were usually leaves with pit galls or crypts; these leaves were wrapped, deformed and discoloured.

*Trioza* sp.n.5, psyllid of *Caloncoba welwitchii* (Fig. 8), *Trioza* sp.n.6, psyllid of *Diospyros hoyleana*, *Trioza* sp.n.9, psyllid of *Xylopi hypolampra* (Fig. 9), *Trioza* sp.n.7, psyllid of an unidentified Rubiaceae, *Trioza* sp.n.11, psyllid of *Tarenna* sp., *Trioza ghaneensis* and *Trioza xylopi* didn't provoke pit galls on leaves of their host plants but these leaves were wrapped, deformed, discoloured and sometimes with necrosis.

Damages caused by *Pauropsylla trichaeta* (Fig. 10), *P. mistura* (Fig. 11), *P. septima*, *Pauropsylla* sp.n. 1, psyllid of *Ficus* sp.1, *Pauropsylla* sp.n. 2, psyllid of *Ficus* sp.2, *Pauropsylla* sp.n. 3, psyllid of *Ficus* sp.3 and *Pauropsylla* sp.n. 4, psyllid of *Ficus* sp.4 on their host plants are pit galls or crypts on leaves.





Fig. 1: Adults of *T. erytraea* feed on young buds of *Citrus sinensis*



Fig. 2: Many adults feeding and laying eggs on a single bud of *Citrus sinensis*



Fig. 3: Young leaves with larvae on the lower face of the leaves



Fig. 4: Pits galls or crypts induced by larvae of *T. erythrae* on the upper face of the leaves



Fig. 5: Comparison of the development level of three young plants; two were attacked by *T. erythrae* and the middle one was avoid for psyllid attacks



Fig. 6: Pits galls on *Stephania abyssinica*



Fig. 7: Damages on *Flumaria elastica*: pits galls, discolouration and deformation of Leaves



Fig.8 : Damages on *Chlorocbea wedvitzkii*: discolouration, necrosis and drying up of leaves



Fig. 9: Damages on *Xilopiz hypoleucopis* : leaves wrapped and deformed



Fig. 10: Damages on *Ricus sur*: pits galls, leaves deformed



Fig. 11: Damages on *Ricus abutilifolia*: pits galls, leaves wrapped and deformed

### CONCLUSIONS

In Cameroon, 35 species of psyllids of Triozidae family were recorded, of which 24 species belong to the *Trioza* genus and 11 species belong to the *Psaropsylla* genus. The present survey permitted to record in Cameroon 17 undescribed species and 2 species previously described elsewhere in the Afrotropical but unknown from Cameroon. The presence of 5 species previously described from Cameroon is confirmed. Triozids host plants had various economical and pharmaceutical importances. Damages caused by these insects on their host plants are mainly pit galls or crypts, deformation and discolouration of leaves and necrosis. Then, it is important to pursue these works notably by completing the taxonomic and biology studies of psyllids of Triozidae family in Cameroon in order to undertake an integrated pest management against species with economic and pharmaceutical interests.

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