



SPECIES DIVERSITY OF PYRGOMORPHIDAE (ORTHOPTERA: CAELIFERA) GRASSHOPPERS IN THE NORTH WEST REGION OF CAMEROON

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ABSTRACT

A pioneer survey of the North West Region of Cameroon to evaluate Pyrgomorphidae grasshopper species diversity was carried out from January to September 2017. Actual field collections and a search of literature for records of grasshoppers were made. Field collections included 64 specimens that comprising six identified species representing six genera and five tribes in the subfamily Pyrgomorphae and family Pyrgomorphidae. The six species: *Chrotogonus senegalensis*, *Dictyophorus griseus*, *Parapetasia rammei*, *Pyrgomorpha vignaudii*, *Taphronota thaelephora*, and *Zonocerus variegatus*, were recorded for the first time in the North West Region of Cameroon. However, these species were also found in scattered literature for Cameroon. These results indicate a potential for high Pyrgomorphidae species diversity in the North West Region of Cameroon.

Keywords: Pyrgomorphidae, species, diversity, North West Region, Cameroon.

INTRODUCTION

Pyrgomorphidae is one of the families in the superfamily Acridoidea which belongs to the order Orthoptera. The superfamily Acridoidea is known to be divided into eleven families that include Pyrgomorphidae that is African in origin. The family Pyrgomorphidae is made up of only one subfamily Pyrgomorphae with some 29 genera and about four hundred or so known species. The majority of Pyrgomorphae species are from tropical and subtropical countries. The African and Malagasy faunas are the richest, but the group probably originated further east. Madagascar, Australia, the Papuan sub region and Central and South America all have their own very distinctive tribes and genera. The African and Malagasy faunas have been reported the richest in the world (Kevan and Akbar, 1964). This family is important in that it contains some species of agricultural importance attacking forage and crop plants where ever they are found (Jat *et al.*, 2010). *Zonocerus variegatus* is known to feed on a wide range of food and cash crops that include plantation crops such as coffee and banana as well as a wide variety of subsistence crops, most importantly cassava (Chapman *et al.*, 1986). *Zonocerus variegatus* is a known veritable pest that has been reported to attack 64 cultivated crop, cash plants and weed plants

(Nonvieller, 1984; Chapman *et al.*, 1986; Chiffaud and Mestre, 1990). *Atractomorpha lata*, a Pyrgomorphidae grasshopper, is a known pest of rice in the Asian continent. The species was first reported among 87 insects that were injurious to food crops in Taiwan as early as 1916. This species has since been placed on the list of insect pests in Korea (Anonymous, 1972) and in Japan where it is a major pest of soya bean foliage (Kobayashi *et al.*, 1972). In 2007, *A. lata* was placed on a list of insect pests found on 132 Medicinal plant species in the garden of the Sancheong – gun Agricultural Development Technology Centre in Sancheong, Gyeonsangnamdo (Lee *et al.*, 2007). *Taphronota thaelephora*, another Pyrgomorphidae grasshopper, is a pest of food and cash crops in the West Region of Cameroon, however of low magnitude. It is reported to attack cash crops such as coffee (Nonvieller, 1984) and has been shown to feed on over 10 food and cash crops in the laboratory (Seino *et al.*, 2001).

One of the major studies on the Orthoptera Fauna in Cameroon was published by Mestre and Chiffaud (2009). They recorded 16 Pyrgomorphidae species in Cameroon. However, the list presented is considered to be grossly incomplete because all the regions of Cameroon were not considered. Only scattered information on Pyrgomorphidae

diversity in Cameroon has been published by various researchers: Dirsh (1965) recorded 14 species; Nonveller (1984) recorded two species amongst insects of agricultural interest in the West and Centre Regions; Seino *et al.* (2001) investigated the food preferences of *Taphronota thaelephora* Stal. collected from Mbouda in the West Region; Seino *et al.* (2013) published an inventory of Acrididae and Pyrgomorphidae grasshoppers and in the same year (Seino *et al.*, 2013b) described the bio-ecology of Pyrgomorphidae species in the Menoua Division of the West Region of Cameroon; Kekeunou *et al.* (2013, 2015) investigated the agricultural importance of *Zonocerus variegatus* in the Humid Forest Zone in Southern Cameroon and also worked on the morphology, development and reproduction of *Pyrgomorpha vigneaudii*. Finally, Seino and Dongmo (2015) described the karyotype of *Pyrgomorpha vigneaudii* collected from the Campus of the University of Bamenda in the North West region of Cameroon.

In spite of these scattered records, a checklist of Pyrgomorphidae grasshoppers in Cameroon is grossly incomplete. Considering the increasing habitat degradation occurring in the North West Region of Cameroon, there is need for a more recent survey.

Based on the specimens collected during this survey, a preliminary inventory of Pyrgomorphidae fauna in the North West Region of Cameroon is presented. Colour images of dried - preserved specimens are provided for future comparisons. This study is also a first checklist of Pyrgomorphidae from a survey of the North West Region of Cameroon. It adds to the scattered publications on the Pyrgomorphidae fauna for Cameroon.

MATERIALS AND METHODS

Study site

The aim of the study was to explore the Pyrgomorphidae fauna of the North West Region of Cameroon. The North West Region of Cameroon lies between latitudes 5°43' and 7°9'N and longitudes 9°13' and 11°13'E. and covers an area of about 17,400 km² (Gp-Derudep, 2006). It is found in the agro-ecological zone of the high plateau of Cameroon that has an average yearly rainfall ranging from 1500-2000 mm. The altitudes vary from 400 m to 3000 m above sea level. Vegetation is principally savannah and forest in the lower non-mountainous areas. The soil is fertile and the main occupation of inhabitants is agriculture and cattle rearing (Neba, 1991). Politically the North West Region is divided into seven Divisions that include Boyo, Bui, Donga-Mantung, Menchum, Mezam, Momo and Ngoketundjia with the following respective administrative headquarters-Fundung, Kumbo, Nkambe, Wum, Bamenda, Mbengwi, and Ndop. For convenience, the grasshoppers used for this study were collected from the respective administrative headquarters of the seven divisions that make up the North West Region.

Materials

The materials used to collect the grasshoppers included a 60 cm diameter insect sweep nets, mineral water bottle cages prepared with the method of Popov (1990), a death chamber provided with cotton soaked in Ethyl acetate, an HTC D816h telephone, insect pins, setting boards and insect boxes supplied with naphthalene balls.

Method

Grasshopper species were collected from the seven divisions that make up the North West Region of Cameroon by sweeping on fields, farms and surrounding bushes. Insects found perching on crop plants were handpicked. Only Pyrgomorphidae specimens were retained and used for this study. Collection of the insects was done from January to July 2017. All collections were day collections between 8 am and 12 noon and from 4 pm till 6 pm being hours when temperatures are low permitting the grasshoppers to come out of their hiding to feed. Collections were not made on rainy days. Immediately upon collection, the insects were placed in mineral water bottle cages, taken to the lab, killed in ethyl acetate, pinned on setting boards and then photographed. The material used for the study included some 64 specimens.

Identification

Preliminary identification was done with the help of keys and available literature. Confirmation of identities of the species was done by Entomologists in the Department of Animal Biology and Physiology, Faculty of Science, university of Yaounde 1, Cameroon. The dry-mounted identified specimens were then used to start an entomological collection for the Department of Biological Sciences, Faculty of Science in The University of Bamenda, Cameroon.

Photography

The identified specimens were placed on a white setting board and photographed using a HTC D816h phone with a digital camera equipped with a 8 mega pixels lens.

RESULTS AND DISCUSSION

Distribution and species richness

This is a first and preliminary inventory of Pyrgomorphidae fauna of the North West Region in Cameroon. This inventory is based on field collections in the seven divisions (Boyo, Bui, Donga Mantung, Mechum, Mezam, Momo and Ngoketungia) that make up the region. A total 64 specimens were collected during the survey representing six genera, five tribes and six species. The six Pyrgomorphidae species identified are shown in Figure 1 and Table 1.



A. *Chrotogonus senegalensis*



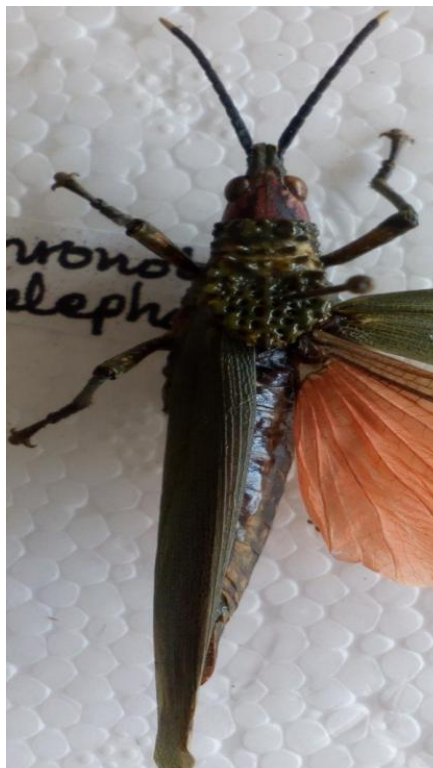
B. *Dictyophorus griseus*



C. *Parapetasia rammei*



D. *Pyrgomorpha vignaudii*



E. *Taphronota thaelephora*



F. *Zonocerus variegatus*.

Figure 1. Pyrgomorphidae species collected from the North West Region (NWR) of Cameroon during this survey.

The highest number of species was collected from Mezam Division (6 species) while the lowest was collected from Momo Division (2 species). *Parapetasia rammei* and

Zonocerus variegatus were found in most of the divisions in the region while *Taphronota thaelephora* was found in only two divisions that included Mechum and Mezam

(Table2). Considering the distribution of Pyrgomorphae in the North West Region, the results indicated a similarity of habitats in the seven divisions of the region.

In addition to the field collections, information on the presence of Pyrgomorphae species in Cameroon was also

accessed from literature. Table 3 revealed that the six Pyrgomorphae species identified in the present study have been recorded in several different publications that concern the Orthoptera of Cameroon. A checklist is presented in which the species are arranged in alphabetical order

Table 1. Pyrgomorphae species collected from the North West Region of Cameroon for this study.

S/N	Species
1	<i>Chrotogonus senegalensis</i>
2	<i>Dictyophorus griseus</i>
3	<i>Parapetasia rammei</i>
4	<i>Pyrgomorpha vignaudii</i>
5	<i>Taphronota thaelephora</i>
6	<i>Zonocerus variegatus</i>

Table 2. Species of Pyrgomorphae (Pyrgomorphae) recorded from different divisions in the North West Region of Cameroon between January and July 2017.

Species	Division						
	Boyo	Bui	Donga -Mantung	Menchum	Mezam	Momo	Ngoketungia
<i>Chrotogonus senegalensis</i>	X	X	X		X		X
<i>Dictyophorus griseus</i>		X		X	X	X	
<i>Parapetasia rammei</i>		X	X	X	X		X
<i>Pyrgomorpha vignaudii</i>	X	X	X		X		X
<i>Taphronota thaelephora</i>				X	X		
<i>Zonocerus variegatus</i>	X			X	X	X	X
Total number of species	3	4	3	4	6	2	4

Table 3: Checklist of Cameroon Pyrgomorphae species found in the North West Region compiled from literature search.

S/N	Scientific name	Reference for records in Cameroon (in general)
1	<i>Chrotogonus senegalensis</i>	Mestre and Chiffaud (2009)
2	<i>Dictyophorus griseus</i>	Dirsh (1965); Mestre and Chiffaud (2009); Seino <i>et al.</i> (2013)
3	<i>Parapetasia rammei</i>	Dirsh (1965)
4	<i>Pyrgomorpha vignaudii</i>	Mestre and Chiffaud (2009); Kekeunou <i>et al.</i> (2015); Seino <i>et al.</i> (2015)
5	<i>Taphronota thaelephora</i>	Nonveller (1984); Seino <i>et al.</i> (2001)
6	<i>Zonocerus variegatus</i>	Dirsh (1965); Kekeunou <i>et al.</i> (2006); Seino <i>et al.</i> (2013)

CHECKLIST

General classification of the family Pyrgomorphae

Order	:	Orthoptera
Suborder	:	Caelifera
Super family	:	Pyrgomorphae, Brunner von Wattenwyl 1874
Family	:	Pyrgomorphae, Brunner von Wattenwyl 1874
Subfamily (<i>only one exist</i>)	:	Pyrgomorphae, Brunner von Wattenwyl 1874

Chrotogonus senegalensis (Krauss 1877)

Tribe : Chrotogonini, Bolivar 1904
 Materials : 2 males and 6 females
 Division in which collected : Mezam, Bui, Boyo, Momo, Donga Mantung, Mechum

Dictyophorusgriseus (Reiche and Fairmaire 1849)

Tribe : Dictyophorini, Kirby 1902
 Materials : 1 males and 6 females
 Division in which collected : Mezam, Bui, Boyo, Momo, Donga Mantung, Mechum

Parapetasiarammei (Sjostedt 1923)

Tribe : Dictyophorini, Kirby 1902
 Materials : 1 males and 6 females
 Division in which collected : Mezam, Bui, Boyo, Momo, Donga Mantung, Mechum

Pyrgomorpha vignaudi (Guerin-Meneville 1847)

Tribe : Pyrgomorphini, Brunner von wattenwyl 1874
 Materials : 2 males and 7 females
 Division in which collected : Mezam, Bui, Boyo, Momo, Donga Mantung, Mechum

Taphronota thaelephora (Stal 1758)

Tribe : Taphronotini, Bolivar 1884
 Materials : 3 males and 6 females
 Division in which collected : Mezam, Bui, Boyo, Momo, Donga Mantung, Mechum

Zonocerus variegatus (Linnaeus 1758)

Tribe : Phymateini, Bolivar, 1904
 Materials : 12 males & 6 females
 Division in which collected : Mezam, Bui, Boyo, Momo, Donga Mantung, Mechum

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CONCLUSION

Actual field collections and literature search revealed six Pyrgomorphidae species in the North West region of Cameroon. The six species identified represented six genera and five tribes in the subfamily Pyrgomorphinae. The results indicate a high potential for Pyrgomorphidae species diversity in the region.

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