doi: 10.17138/TGFT(8)158-161

Short Communication

Pest insects in natural and sown pastures of Paraguay

Insectos plagas en pasturas naturales y cultivadas de Paraguay

HUMBERTO J. SARUBBI AND MARÍA B. RAMÍREZ

Facultad de Ciencias Agrarias, Universidad Nacional de Asunción, San Lorenzo, Paraguay. agr.una.py

Abstract

Paraguayan livestock production is based mainly on the use of natural and sown pastures as basic cattle feed. Several genera of harmful insects reported in forage grasses can cause damage to both yield and quality of forage. A review of the insect collection of the Plant Protection Area of the Faculty of Agrarian Sciences, National University of Asunción was carried out, in order to prepare a list of insects with incidence in grasses. Then random sampling of different species of Poaceae showing insect damage in open areas of paddocks grazed by cattle was carried out during 2014–2017 in all Regions of Paraguay. Thirteen different genera and species of pastures were collected and 20 species of insects were identified in the following orders: Hymenoptera (Formicidae family: 5 species); Isoptera (Termitidae: 3 species); Hemiptera (Cercopidae: 6 species; Lygaeidae: 1 species); Lepidoptera (Noctuidae: 2 species); and Orthoptera (Acrididae: 3 species). The most common forms of damage observed in pastures were: leaf consumption (25%), leaf cutting (25%) and leaf yellowing-drying (35%).

Keywords: Families, identification, predation, sampling.

Resumen

En Paraguay la producción pecuaria se basa principalmente en el uso de pasturas naturales y cultivadas como alimento base para ganado vacuno. En el país se han identificado varios géneros de insectos dañinos que pueden ocasionar daños tanto en la cantidad como la calidad de las gramíneas forrajeras. Inicialmente se realizó una revisión de la colección de insectos del Área de Protección Vegetal de la Facultad de Ciencias Agrarias, Universidad Nacional de Asunción, con el objeto de elaborar un listado de insectos con incidencia en pasturas. Posteriormente, durante los años 2014–2017, se realizaron muestreos al azar en diferentes especies de gramíneas que presentaban daños por insectos en áreas abiertas destinadas al pastoreo de vacunos en los diferentes departamentos de Paraguay. En total fueron colectados 13 diferentes géneros y especies de pastos y se identificaron 20 especies de insectos, de los órdenes Hymenoptera (familia Formicidae, 5 especies); Isoptera (Termitidae, 3 especies); Hemiptera (Lygaeidae y Cercopidae, 1 y 6 especies, respectivamente); Lepidoptera (Noctuidae, 2 especies); y Orthoptera (Acrididae, 3 especies). Los daños más comunes observados en las pasturas fueron daños por consumo de follaje (25%), corte de láminas foliares (25%) y amarillamiento y secado de hojas (35%).

Palabras clave: Familias, identificación, muestreo.

Introduction

Paraguayan cattle ranching has experienced a significant improvement in number and quality in the last 20 years, and Paraguay is the seventh largest beef exporter in the world (ARP 2017). The country currently has 15 million hectares being used for livestock, and sown (5.6 million ha) and natural pastures (10 million ha) are the primary feed source for cattle, since it is the most economic and practical approach to meat production (Glatzle and Stosiek 2001; ARP 2017). This has created an ideal environment for the proliferation of different genera of insects, which can be harmful to forage crops (Fowler 1979; Glatzle 1999; Benítez 2002; Sarubbi 2016). Many

Correspondence: H.J. Sarubbi, Facultad de Ciencias Agrarias, Universidad Nacional de Asunción, Campus Universitario, San Lorenzo, Paraguay. Email: humberto.sarubbi@agr.una.py

of these insects are widely distributed over the American continent and cause a range of symptoms from defoliation to death of plants (Gallo et al. 2002; Brandão et al. 2011). Knowing the distribution and potential hosts of insects and damage caused is an important step in the development of adequate management strategies (Picanço et al. 1999; Nakano 2011).

The objective of this work was to identify harmful insects and determine their distribution throughout Paraguay, plant hosts infested and description of damage caused.

Materials and Methods

First, a review of the insect collection of the Plant Protection Area of the Faculty of Agricultural Sciences, National University of Asunción was carried out, in order to produce a list of registered pests causing damage to pastures. Subsequently, insect collections were carried out at random, during the years 2014–2017, in the 4 seasons of the year (1 collection per season, 16 in total), on different species of Poaceae showing insect damage. The work was carried out in open areas of paddocks destined for cattle grazing in the following Regions: Western Region or Chaco: Alto Paraguay (APY), Boquerón (BOQ), Villa Hayes (VHA); and Eastern Region: Amambay (AMA), Concepción (CON), San Pedro (SPE), Canindeyú (CAN), Caaguazú (CAG)), Alto Paraná (APA), Central (CEN), Cordillera (COR), Paraguarí (PAR), Guairá (GUA), Caazapá (CAZ), Itapúa (ITA), Misiones (MIS) and Ñeembucú (ÑEE). Pasture samples were collected from the following species: *Cenchrus ciliaris* (CC), *Cenchrus purpureus* (CP), *Chloris gayana* (CG), *Cynodon nlemfuensis* (CN), *Digitaria eriantha* (DE), *Megathyrsus maximus* (MM, a range of cultivars), *Paspalum notatum* (PN), *Urochloa brizantha* (UB, a range of cultivars), *Urochloa decumbens* (UD), *Urochloa mosambicensis* (UM), *Urochloa ruziziensis* (UR) and *Urochloa arrecta* × *Urochloa mutica* (UA × UM; tangola grass).

Insect pests were collected, recording date, location, host and type and extent of damage, were photographed and immediately deposited in plastic containers for identification. The collection was manual using an entomological sweep net (50 cm ring diameter and 1 m bag length). The samples were transported to the Entomology Laboratory and examined with a stereoscope for identification. Insects were identified using the following reference sources: Fowler (1979), Kidono (1982), Glatzle (1999), Valério et al. (1999), Gallo et al. (2002), Sarubbi (2016) and Tolotti et al. (2018).

Results and Discussion

Twenty (20) species of insects in the orders Hymenoptera, Isoptera, Hemiptera, Lepidoptera and Orthoptera were found on 12 pasture hosts (Table 1). In Hymenoptera, 6 were in Formicidae family; in Isoptera, 3 were in Termitidae; in Hemiptera, 1 was in Lygaeidae and 6 in Cercopidae; in Lepidoptera, 2 were in Noctuidae; and in Orthoptera, 3 were in Acrididae.

The *Urochloa* and *Megathyrsus* genera represent the most important pasture grasses in the country, and consequently the greatest variety of insects was found on them. A unique case was observed in *Urochloa arrecta* × *U. mutica* (tangola grass), which was the exclusive host of *Blissus antillus* (grass bug). In relation to the occurrence of insects across Regions, some species, such as defoliating ants and cicadas, cover the whole country, while other species are confined to certain regions or places, such as the locust (*Staurorhectus longicornis*) and the cutter ant (*Atta vollenweideri*) in Chaco. The types of damage to pastures most commonly observed were: leaf consumption 25% [caterpillars (*Mocis latipes*, *Spodoptera frugiperda*) and locusts], cutting 25% (cutter ants) and leaf yellowing and drying 35% [grass bug and spittlebug (*Notozulia entreriana* and *Mahanarva fimbriolata*)] (Table 1).

Insects with the highest number of species (12) and distribution were cutter ants and spittlebug as mentioned by Fowler (1979), Kidono (1982), Glatzle (1999), Benítez (2002) and Sarubbi (2016). Valério (2006) and Tolloti et al. (2018) consider that spittlebugs are among the most important harmful insects of tropical pastures, attacking several genera, species and varieties, as observed in this research, as they were present in the whole territory of Paraguay and with a wide host range.

Incidence of *Blissus antillus* in tangola pasture agrees with reports of Valério et al. (1999) and Fazolin et al. (2012), who found that tangola grass (a natural *Urochloa* hybrid) and *Urochloa arrecta* were the only hosts of *Blissus antillus* in Brazil.

The damage caused by termites is considered indirect since this species develops mounds that are obstacles for agricultural machinery, causing loss of useful area in the paddocks.

Occurrence of most of these insects is seasonal and some appear in large numbers at specific times. Some which can cause serious damage are: caterpillars (*Mocis latipes*), bug (*Blissus antillus*) and cicadas (*Notozulia entreriana* and *Mahanarva fimbriolata*), as was mentioned by Gallo et al. (2002) and Tolotti et al. (2018).

Table 1. Insect pests (common name in parenthesis) identified in different pasture species of Paraguay.

Insect order, family and species	Host[1]	Occurrence (Region and collection site)[2]	
Hemiptera: Cercopidae			
Deois flavopicta (Salivazo)	CN, MM, UB	AMA 22°08'03.7" S 56°28'41.4" W CAG 24°57'06.9" S 56°21'46.8" W ITA 27°04'07.2" S 56°36'21.7" W	SPE 23°44'11.4" S 56°29'38.4" W APA 25°27'36.2" S 55°02'34.4" W
Deois mourei (Salivazo)	CN, MM, UB, UD	CEN 25°19'41.1" S 57°31'11.0" W CAG 25°28'10.8" S 56°32'18.3" W MIS 27°07'19.8" S 56°46'40.2" W	SPE 24°05'05.6" S 57°06'17.7" W APA 25°26'06.7" S 54°46'37.3" W
Deois rubropicta (Salivazo)	CN	AMA 22°40'15.7" S 56°02'41.8" W	
Deois schach (Salivazo)	PN, MM, UB	CAG 25°24'37.4" S 55°34'16.6" W	
Mahanarva fimbriolata (Salivazo)	CP, UB	AMA 22°07'39.0" S 56°27'47.4" W SPE 24°02'53.0" S 56°27'33.4" W COR 25°14'51.4" S 57°08'32.7" W CAG 24°57'55.3" S 56°20'58.7" W APA 25°25'09.7" S 55°23'28.5" W MIS 26°59'38.1" S 56°47'25.5" W	CON 23°27'44.1" S 57°24'28.7" W CEN 25°19'40.8" S 57°31'09.8" W PAR 25°30'18.1" S 57°10'07.0" W CAZ 26°09'30.2" S 56°21'49.5" W GUA 25°43'09.9" S 56°11'01.5" W ITA 26°23'41.0" S 55°30'54.4" W
Notozulia entreriana (Salivazo)	CC, CN, CG, DE, MM, UB, UD, UR	BOQ 23°26'20.4" S 60°75'12.5" W VHA 24°55'58.2" S 57°33'50.1" W PAR 26°08'35.0" S 56°42'49.9" W CAG 24°57'08.2" S 56°21'40.9" W ITA 27°12'03.1" S 56°06'51.8" W	APY 20°11'03.6" S 59°32'23.8" W SPE 23°45'02.0" S 56°29'34.2" W CEN 25°19'28.8" S 57°31'16.4" W APA 25°25'48.6" S 55°22'52.6" W
Hemiptera: Lygaeidae			
Blissus antillus (Chinche de las gramíneas)	UA×UM (tangola)	VHA 23°31'54.0" S 58°36'44.2" W	
Hymenoptera: Formicidae			
Acromyrmex heyeri (Akekẽ)	PN	MIS 27°07'35.6" S 56°41'57.3" W	
Acromyrmex landolti fracticornis (Akekẽ kapi´i)	CC, CN, CG, DE, MM, PN, UB, UD, UM, UR	APY 20°10'59.8" S 59°32'18.0" W BOQ 21°58'13.9" S 59°59'59.7" W SPE 23°43'54.8" S 56°29'31.4" W COR 25°14'56.0" S 57°08'51.6" W GUA 25°43'08.3" S 56°11'01.9" W	VHA 23°31'53.7" S 58°36'06.7" W CON 23°24'23.5" S 57°19'29.0" W CEN 25°12'24.8" S 57°24'31.7" W PAR 26°08'38.7" S 56°42'52.1" W MIS 27°07'15.0" S 56°46'44.7" W
Atta capiguara (Ysaú kapi´i)	CN, MM, PN, UB, UD, UR	SPE 23°44'20.7" S 56°29'30.3" W APA 25°10'24.3" S 54°42'01.2" W	CAG 25°24'14.1" S 55°31'56.1" W
Atta laevigata (Ysaú akã vidrio)	CN, MM, PN, UB, UD, UR	CON 22°24'58.6" S 56°41'37.6" W SPE 24°43'13.8" S 56°30'11.3" W	AMA 22°40'21.7" S 55°55'25.5" W
Atta vollenweideri (Ysaú chaco)	CC, CN, CG, DE, MM, UM	APY 20°15'55.1" S 59°32'42.7"W VHA 23°31'60.0" S 58°36'58.2" W	BOQ 22°00'31.8" S 60°00'15.3" W
Isoptera: Termitidae			
Cornitermes bequaerti (Kupi´i takuru chimenea)	CN, MM, PN, UB, UR	CON 23°01'33.2" S 56°35'46.4" W SPE 24°20'37.5" S 56°25'13.2" W	CAN 24°21'23.3" S 55°04'11.6" W CAG 25°24'06.7" S 55°48'49.8" W
Cornitermes cumulans (Kupi´i takuru)	CN, MM, PN, UB, UD, UR	CON 23°24'26.9" S 57°19'36.7" W SPE 24°22'43.4" S 56°25'07.8" W COR 25°04'56.6" S 57°23'22.4" W CAZ 26°09'42.5" S 56°21'44.6" W APA 25°29'15.5" S 54°49'21.4" W	CAN 24°21'34.3" S 55°04'28.6" W CEN 25°19'46.5" S 57°31'23.8" W PAR 25°23'26.2" S 57°03'34.1" W CAG 24°58'48.2" S 56°20'58.9" W MIS 26°40'39.7" S 57°06'04.4" W
Procornitermes striatus (Yvy kupi´i)	CN, MM, PN, UB	CEN 25°19'43.5" S 57°31'10.0" W	
Lepitoptera: Noctuidae			
Mocis latipes (Falsa medidora)	CC, CN, DE, MM, UB	APY 22°02'00.1" S 59°53'14.3" W MIS 26°34'33.7" S 56°54'46.0" W	BOQ 21°58'49.4" S 60°00'24.1" W CAG 24°58'03.7" S 56°21'02.3" W
Spodoptera frugiperda (Cogollero del maíz)	CC, CN, DE, MM, UB, UD, UM, UR	BOQ 23°15'53.6" S 60°43'53.8" W PAR 25°27'44.9" S 57°15'57.8" W APA 25°27'32.4" S 55°02'57.5" W	CAG 24°58'12.1" S 56°21'00.3" W ÑEE 25°57'07.5" S 57°46'37.8" W ITA 27°01'10.2" S 55°55'12.6" W
Orthoptera: Acrididae			
Rammatocerus pictus (Langosta)	CC, CN, MM	APY 20°11'31.4" S 59°31'48.1" W	BOQ 21°06'46.5" S 60°31'23.6" W
Schistocerca cancellata (Langosta migratoria)	CC, CN, CG, MM	APY 20°16'36.3" S 59°07'22.0" W	BOQ 21°19'15.7" S 60°27'10.6" W
Staurorhectus longicornis (Langosta de pastura)	CC, CN, CG, MM	APY 20°11'55.7" S 59°32'03.2" W	BOQ 23°14'35.4" S 60°45'49.6" W

[1]Hosts: CC (*Cenchrus ciliaris*), CP (*Cenchrus purpureus*), CG (*Chloris gayana*), CN (*Cynodon nlemfuensis*), DE (*Digitaria eriantha*), MM (*Megathyrsus maximus*), PN (*Paspalum notatum*), UB (*Urochloa brizantha*), UD (*Urochloa decumbens*), UA×UM (*Urochloa arrecta* × *Urochloa mutica*), UM (*Urochloa mosambicensis*) and UR (*Urochloa ruziziensis*).

[2]Occurrence according to the records of the entomological collection of the Plant Protection Area of the Facultad de Ciencias Agrarias, Universidad Nacional de Asunción and collections made by the authors.

Regions: AMA = Amambay; APA = Alto Paraná; APY = Alto Paraguay; BOQ = Boquerón; CAG = Caaguazú; CAN = Canindeyú; CAZ = Caazapá; CEN = Central; CON = Concepción; COR = Cordillera; GUA = Guairá; ITA = Itapuá; MIS = Misiones; ÑEE = Ñeembucú, PAR = Paraguarí, SPE = San Pedro; and VHA = Villa Hayes.

Conclusions

This study has provided an overview of the range of insects which occur in pastures in Paraguay. Whether or not active measures to control them should be undertaken would depend on the extent of damage they cause and the impact on both pasture production and resultant animal performance. Observations on degree of damage to pastures under a range of conditions should supply some information on which to base decisions.

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(Note of the editors: All hyperlinks were verified 5 May 2020.)

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(Received for publication 8 February 2019; accepted 30 April 2020; published 31 May 2020)