Hemiptera associated with cocona (*Solanum sessiliflorum* Dunal), in Tingo María, Huánuco

Hemiptera asociados con la cocona (*Solanum sessiliflorum* Dunal), en Tingo María, Huánuco

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ABSTRACT

The present study aims to publicize the various Hemiptera that are associated with the aerial part of this cultivate, in order to establish management strategies within the cocona cultivation. We have collected 14 species of Hemiptera insects of which eleven are phytophagous and three are predators. We have found 12 insect species listed above for cocona, such as *Leptoglossus zonatus* Dallas, *Cyphonia clavata* Fab., *Edessa rufomarginata* De Geer, *Edessa. aff. aulacosterna* Stål, *Euryophthalmus humilis* (Drury), *Oebalus* sp., *Proxys punctulatus* (Pal. de Beauv.), *Arvelius porrectipinus* Breddin, *Cyphonia clavata* Fab., *Aphis gossypii* Glover, *Planococcus* sp. and the predator *Zelus* sp.. We present two species of biological control agents have not been previously registered in cocona, such as *Rhinacloa* sp. and *Nabis* sp..

Keywords: Hemípteros, phytophagous, biological controllers.

RESUMEN

El presente trabajo tiene por finalidad, dar a conocer los diferentes hemípteros que están asociados con la parte aérea de este cultivo, a fin de poder establecer estrategias de manejo dentro del cultivo de la cocona. Se han colectado a 14 especies de insectos de Hemiptera de las cuales once son fitófagos y tres son predadores. Se han hallado a 12 especies de insectos citadas anteriormente para cocona, tales como *Leptoglossus zonatus* Dallas, *Cyphonia clavata* Fab., *Edessa rufomarginata* De Geer, *Edessa. aff. aulacosterna* Stål, *Euryophthalmus humilis* (Drury), *Oebalus* sp., *Proxys punctulatus* (Pal. de Beauv.), *Arvelius porrectipinus* Breddin, *Cyphonia clavata* Fab., *Aphis gossypii* Glover, *Planococcus* sp. y el predador *Zelus* sp.. Se presentan a dos especies de controladores biológicos que no han sido registradas anteriormente en cocona, como son *Rhinacloa* sp. y *Nabis* sp..

Palabras clave: Hemiptera, fitófagos, controladores biológicos.

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INTRODUCTION

The cocona is one of the native fruit that is gaining economic importance lately in the Alto Huallaga. This Solanaceae is well adapted to acidic or slightly alkaline soil rich in organic matter, its production starts from 7 months after planting (Adriazola, 1991; Carbajal & Balcázar, 2004; Balcázaret *al.*, 2011). In the Amazon, the presence of several Solanaceae species growing naturally in neighboring areas and in areas where they are grown Cocona, are an important source of infestation. This justifies the study of the phytophagous entomofauna cocona, as this will allow efficient handling. Should be regarded as insects that has no immediate importance in the short term can become a problem very damaging, since insects are also adapted to farming systems created by producers (Silva Filho, 1998).

Insects of fruit crops in the Amazon are poorly understood both in the Brazilian Amazon and in the Peruvian Amazon, on the other hand the increasing development of cultivated areas, and the introduction into the new production systems fruit favor increased insect populations, whether known or new (Ronchiteles & Hamada, 1991). By sampling and study of agroecosystems, including search and promotion of health and their conservation can accomplish obtaining optimal levels of agricultural production, and the protection of human health and social welfare (Matsonet *al.*, 1997).

In the Amazon jungle of Peru found a lot of native fruit of the family Solanaceae as cocona (*Solanum sessiliflorum* Dunal), also known as tupiro, topiro, tomatoof Indian, lulo chocoano, appleandpeachof Orinoco (Pahlen, 1977; Salick, 1989; Silva Filho, 1994; Medina *et al.*, 2008).

The cocona seems to be native to the eastern slopes of the andes of Peru, Ecuador and Colombia, especially in the former country. This species occurs naturally between 200 and 1000 meters, also known cultivation was introduced about 50 years ago (Villachica, 1996; Flores, 1996; Gómez, 1997). The cocona grows in areas with average temperatures between 18 and 30 °C, without the presence of frost and rainfall between 1500 and 4500 mm annual.

It does best in partial shade during the early stages of development, requires good sunlight during the fruiting period. It is adapted to both low fertility acid soils as neutral and alkaline soils of good fertility, with textures ranging from clay to sandy. He is grown in areas with altitudes from sea level to 1,500 mamsl (Flores, 1997).

In the Amazon where cocona grown, wild Solanaceae are an important source of infestation. Should be regarded that an insect that has no immediate importance in the short term can become a major problem, since insects are also adapted to farming systems created by producers (Silva Filho, 1998).

According to Couturier (1988), most of the insect species are associated with known cocona other solanaceous cultured as those found in the region of Manaos, Brasil: *Planococcus pacificus* Cox, *Ferrisia virgata* Cockerel y *Pseudococcus maritimus* Eichhorn (Hemiptera, Pseudococcidae); *Aphis gossypii* Glover (Hemiptera, Aphididae); *Corythaica cyathicollis* Costa (Hemiptera, Tingidae); *Arvelius porrectipinus* Breddin, *Edessa rufomarginata* De Geer y *Banasa irata* F. (Hemiptera, Pentatomidae); también *Phyrdenus muriceus* Germar y *Cryptorhynchinae* gen. sp. indet. (Coleoptera, Curculionidae); *Alcidion deletum* Bates (Coleoptera, Cerambycidae); *Colapsis aff. aerea* Lefevre (Coleoptera, Chrysomelidae) y *Manduca sexta* L. (Lepidoptera, Sphingidae). Gómez (1997) y Carbajal y Balcázar (2004) Pentatomidae) apparently does not affect the production of fruits. recorded for Alto Huallaga to *Planococcus pacificus* Cox (Hemiptera, Pseudococcidae) on the ripe, the calix, the flower stalks and limbs of the branches; *Aphis gossypii* Glover. (Hemiptera, Aphidae) on leaves;

Atta cephalotes (L.) (Hymenoptera, Formicidae) as defoliator, to *Solenopsis saevissima* Fr. Smith (Hymenoptera, Formicidae) causing pitting the harvesters; *Phyrdenus muriceus* Germar (Coleoptera, Curculionidae) producing necrosis and cause deformities in young fruits and paralyze growth;

Corythaica cyathicollis Costa (Hemiptera, Tingidae) that produce yellow spots; *Edessa rufomarginata* DeGeer (Hemiptera, Pentatomidae) apparently does not affect the production of fruits.

This study aims, to publicize the Hemiptera that are associated with the aerial part of this culture, in order to establish management strategies and crop protection of cocona.

MATERIALS AND METHODS

Location of the study area

This research was developed in experimental fields belonging to the Universidad Nacional Agraria de la Selva, geographically located in the province of Leoncio Prado, Department of Huanuco, during the months of January to December 2011. These fields are located on the right bank of the Huallaga River. It has the following coordinates: longitude $75^{\circ} 59' 52''$ South latitude $09^{\circ} 17' 08''$, 610 mamsl.

Figure 1. Location of the study area

Ecology of the study area

According to the map of life zones Holdridge system made by the study area is in the wet forest - Subtropical (bmh - St) between 600 y 1800 mamsl. Represents an area of life almost nothing or nothing altered.

The estimated bioclimatic box is characterized by an average of the total annual rainfall 3500 mm, with variations between 3000 y 4000 mm, about.

The annual average temperature is estimated at 21°C by and large. The evapotranspiration is located about 0.35 %, indicating the nature of this association perhumid. The highlight of this ecosystem consists of a set of high and low hills and the foothills of the mountain down, heavily dissected. The soils are very shallow and high runoff, without interest, this ecosystem is in the concept of protected lands, where there should be a proper policy for the conservation of natural resources and to regulate the hydrological regime (Holdridge, 1960).

Method of evaluation

Samples were taken from the main stem, of the leaves (beam and underside), flower buds, flowers and fruits according to the phenological status of the plant. The collection of arthropods was done manually for some phones, for flying and very mobile collection network used. The collected material was placed in labeled plastic bottles white, 45 ml capacity with a tight lid. In the laboratory, the specimens were placed in vials 70% alcohol for subsequent determination. Specimens were sent to the Museum of Entomology at the Servicio Nacional de Sanidad Agraria for identification.

RESULTS AND DISCUSSION

Phytophagous hemipterous present in the cultivate of cocona

Leptoglossus zonatus Dallas (Hemiptera: Coreidae), found to *L. zonatus* in cocona, in flower buds, flowers and fruits, although authors like Panizzi (2004), information that is commonly found in corn, as Hernández & Ramírez (2002), those who reported affecting pecan *Carya illinoensis* (Wangenh.) in Brasil, and is not considered a major pest damage despite its harvest time. Also Pineda (1999), indicates a predominant pest in sorghum in Nicaragua, along with the Manual Técnico Buenas Prácticas de Cultivo en Pitahaya (2000) in pods pitahaya (*Hylocereus costaricensis* (F.A.C. Weber) Britton & Rose), and Trabanino (1998) who meet in tomato beans, maize and sorghum. It is also reported by Anteparra & Miranda (2010) and Balcázar *et al.* (2011),

associated with cocona in the Alto Huallaga, like them we do not know yet what its true significance and its effect on the reproductive organs of cocona.

Figure 2. *Leptoglossus zonatus* Dallas

***Edessa rufomarginata* De Geer**

(Hemiptera: Pentatomidae), is often seen on flower buds, flowers and fruits of Cocona, coinciding with Couturier (1988), cocona who reported in the area of Iquitos and Balcázaret *al.* (2011) those who cite for Alto Huallaga. There are also records *Edessa* sp. on camu camu (*Myrciaria dubia* H.B.K. Mc Vaugh) in Pucallpa producing buds dry juice and eating the fruits of camu camu producing discolored spots (Couturier, *et al.*, 1992; Iannaconeet *al.*, 2007).

Figure 3. *Edessa rufomarginata* DeGeer

Edessa. aff. aulacosterna

Stål (Hemiptera: Pentatomidae), this insect has been seen sporadically in cocona in this geographic area, and was cited by Balcázaret *al.* (2011). Although authors like Iannaconeet *al.* (2007) recorded in the Pucallpa, affecting camu camu.

Figure 4. *Edessa. aff. aulacosterna* Stål

***Oebalus* sp.** (Hemiptera: Pentatomidae), this specie is cited by Anteparra & Miranda (2010); and Balcázaret *al.* (2011), on cocona in Alto Huallaga, we have not noticed any of these insect damage in cocona, however Guevara *et al.* (2008) indicate that it is a grass and legume phytophagous, causing damage to corn crops in several producing areas of the world.

Figure 5. *Oebalus* sp.

***Proxys punctulatus* (Pal. de Beauv.)**

(Hemiptera: Pentatomidae), cocona is registre in Alto Huallaga by Anteparra & Miranda (2010); Balcázaret *al.* (2011), seemingly minor economic. It is found in cotton in New Mexico, United States (Greenet *al.*, 2006), Is also common in rice, affecting the spikes in Brazil (Ferreira *et al.* 2001).

Figure 6. *Proxys punctulatus* (Pal. de Beauv.)

Arvelius porrectipinus Breddin, (Hemiptera: Pentatomidae), has been observed for the first time in Alto Huallaga, although occasionally, and we have not related harm, although Coutourier(1992) records for this species in Manaos, Brazil affecting cocona.

Figure 7. *Arvelius porrectipinus* Breddin

Dysdercus sp. (Hemiptera: Pyrrhocoridae), is the first record of a species of the genus *Dysdercus* sp. in flower buds and fruits of cocona, however Díaz & Zamora (2003) cited in the departments of San Martin and Ucayali, affecting the cotton plantations.

Figure 8. *Dysdercus* sp.

Euryophthalmus humilis (Drury) (Hemiptera: Pyrrhocoridae), is observed frequently in cocona, but apparently have no economic importance, coinciding with Anteparra & Miranda (2010); Balcázar *et al.* (2011), those cited in the Alto Huallaga. This species was also found by Díaz & Zamora (2003) in cotton, in the departments of San Martin and Ucayali.

Figure 9. *Euryophthalmus humilis* (Drury)

Cyphonia clavata Fab. (Hemiptera: Membracidae), was frequently seen flying over plants cocona. It was recorded by Anteparra & Miranda (2010); Balcázar *et al.* (2011) in this area. On the other hand Couturier y Gonzales (1994) mentioned in the capirona (*Calycophyllum spruceanum* Benth.) in Iquitos.

Figure 10. *Cyphonia clavata* Fab.

Aphis gossypii Glover (Hemiptera: Aphididae), we observed the aphid *A. gossypii* in small populations and very focused, in flower buds, flowers and fruits of cocona some in each of the assessments, this species was found in cocona by Carbajal & Balcázar (2004); Anteparra & Miranda (2010); Balcázar *et al.* (2011), affecting cocona causing direct damage to the crop, as both nymphs and adults the sap sucking foliage, especially the terminal meristem.

Figure 11. *Aphis gossypii* Glover

***Planococcus* sp.** (Hemiptera: Pseudococcidae), we also note the presence of *Planococcus* sp. in flowers, leaves and some of the fruits of Cocona, coinciding with Silva Filho (1998) who reports that the species *Planococcus pacificus* Cox., form large colonies on the tips of the branches of the plant and in the stem and calyx of ripe fruit.

Figure 12. *Planococcus* sp.

Hemipterous predators present in the culture of cocona

***Nabis* sp.** (Hemiptera: Nabidae), we have found a kind of *Nabis* sp. as generalist predator, including larvae of Lepidoptera, as referred (Rioja *et al.*, 2006) and Veramendi & Lam (2011).

Figure 13. *Nabis* sp.

***Rhinacloa* sp.** (Hemiptera: Miridae), was found on cocona flowers, however Herrera (1963), reports of host plants *Rhinacloa* spp. in our area are potatoes (*Solanum tuberosum* L.), beans (*Phaseolus vulgaris* L.), crotalaria (*Crotalaria juncea* L.), and the weed *Ambrosia artemisioides*. But it seems cotton (*Gossypium* sp.), his favorite host plant, where eggs are fed from different lepidoptera such as *Heliothis virescens* (F.), *Anomis texana* Riley and *Scrobipalpula absoluta* (Povolny), as well as lepidopteran larvae, cecidomids, whiteflies and aphids.

Figure 14. *Rhinacloa* sp.

***Zelus* sp.** (Hemiptera: Reduviidae), is found frequently in cocona, this predator is cited Anteparra & Miranda (2010); Balcázar *et al.* (2011) for Alto Huallaga, authors as Ohashi & Urdampilleta (2003) is cited predando to *Epitrix* sp. and the complex of aphids in tobacco in Argentina; Mendoza & Gaulle (2006) recorded as the driver budworm larvae sugar cane in Ecuador. In Piura is cited by Villarreal (2002), as a predator of aphids and larvae of Lepidoptera. En Tumbes is cited by Lozano (1998), who observed in soybean to *Zelus* sp. predator larvae of *Anticarsia gemmatilis* Hübner.

Figure 15. *Zelus* sp.

Table 1. Hemiptera present in the cultivate of cocona

	Orden	Family	Especies
	Hemiptera phytophagous present in the cultivate of cocona		
1	Hemiptera	Coreidae	Leptoglossus zonatus Dallas
2		Pentatomidae	Edessa rufomarginata De Geer
3		Pentatomidae	Edessa. aff. aulacosterna Stål
4		Pentatomidae	Oebalus sp.
5		Pentatomidae	Proxys punctulatus (Pal. de Beauv.)
6		Pentatomidae	Arvelius porrectipinus Breddin
7		Pyrrhocoridae	Dysdercus sp.
8		Pyrrhocoridae	Euryophthalmus humilis (Drury)
9		Membracidae	Cyphonia clavata Fab.
10		Aphidae	Aphis gossypii Glover
11		Pseudococcidae	Planococcus sp.
	Hemiptera Predators present in the cultivate of cocona		
12		Reduviidae	Zelus sp.
13		Miridae	Rhinacloa sp.
14		Nabidae	Nabis sp.

CONCLUSIONES

- We have collected 14 species of insects of Hemiptera of which eleven are phytophagous and three are predators.
- We have been found 12 insect species listed above for cocona, such as phytophagous *Leptoglossus zonatus* Dallas, *Cyphonia clavata* Fab., *Edessa rufomarginata* De Geer, *Edessa. aff. aulacosterna* Stål, *Euryophthalmus humilis* (Drury), *Oebalus* sp., *Proxys punctulatus* (Pal. de Beauv.), *Arvelius porrectipinus* Breddin, *Cyphonia clavata* Fab., *Aphis gossypii* Glover, *Planococcus* sp. and the predator *Zelus* sp..
- We present two species of biological control agents have not been previously registered in cocona, such as *Rhinacloa* sp. and *Nabis* sp..

ACKNOWLEDGMENTS

The author's sincere thanks go to Walter Diaz Burga, Director of Museum of Entomology of Servicio Nacional de Sanidad Agraria (SENASA) of Peru, for his help in the identification of species of Hemiptera.

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