Triatoma sordida Stål 1859 (Hemiptera, Reduviidae: Triatominae) in Palms of Northeastern Argentina

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Several palms species provide an important habitat for triatomines and associate vertebrates in tropical America. The objective of this work is to identify the triatomine species living in the palms of rural areas in the Province of Corrientes, and to estimate the potential epidemiological risk they represent for the residents of nearby houses.

The survey was carried out in a palm community in Colonia Laurel, Department San Roque, Province of Corrientes, Argentina. Samplings were performed in October, November and December 1998; January, February and March 1999; May and June 1999. Thirty palms: 27 (90%) Butia yatay *(Mart.) Becc. and 3* Acrocomia aculeata *(Jacq.) Lodd ex Mart. were dissected.* Triatoma sordida *Stål 1859 was found in 96.2% of* B. yatay *and in all the* A. aculeata *palms. A total of 272 live* T. sordida *was collected; 36 of them (13.2%) were found in bird nests in the frond and the remainder in other locations of the tree. The mean number of triatomines per palm was 9.6 (range 1-60, mode 2).* T. sordida *was collected during all the sampling months and all stages were present at all seasons. The highest population density was reached in spring and the lowest in autumn.* Trypanosoma cruzi *was detected in 38.5% in feces of 174 examined insects and identified as such, both by microscopical examination and PCR.*

This is the first finding of T. sordida *populations in* B. yatay, *an endemic palm of South America distributed in southern Brazil, Uruguay and northeastern Argentina. The high infection prevalence found in this work suggests that* T. sordida *plays an essential role in the maintenance of the wild* T. cruzi *transmission cycle in northeastern Argentina.*

Key words: *Triatoma sordida* - palms - wild triatomines - *Butia yatay* - Argentina

In America, palm trees have been found infested with different species of triatomines. The most frequently cited are *Rhodnius prolixus*, *R. neglectus*, *R. pictipes*, *R. nasutus*, *R. pallescens*, *R. neivai*, *R. robustus*, *Triatoma maculata*, *T. pseudomaculata*, *T. dimidiata*, *T. sordida*, *Panstrongylus megistus*, *P. lignarus*, *Eratyrus mucronatus* and *E. cuspidatus* (Barretto et al. 1969, Forattini et al. 1971, Gamboa 1973, Feliciangeli & Torrealba 1977, Whitlaw & Chaniotis 1978, D' Alessandro et al. 1984, Rossell-Reyes 1984, Diotaiuti et al. 1993).

Regarding their epidemiological role, some species like *R. prolixus* and *P. megistus* are more important vectors of *T. cruzi* than others like *R. robustus*, *R. neglectus* and *R. pictipes*. Palms could also represent dispersion foci of triatomines to human dwellings and peridomestic premises such as chicken houses.

In Argentina there are few records about the presence of *T. sordida* in palm trees (Carcavallo et al. 1988) but neither longitudinal nor systematic studies have ever been performed on triatomine populations colonizing palms.

The aims of this work were to identify the triatomine species living in the palms of rural areas in the Province of Corrientes, as well as to estimate the potential epidemiological hazard that these *T. cruzi* vectors represent for the residents of nearby houses.

MATERIALS AND METHODS

Study area - The survey was carried out in a palm community (Figure) located in Colonia Laurel, Department San Roque, Province of Corrientes, Argentina (29ºS, 58ºW). The area is included in the Humid Eastern District of the Chaqueña Phytogeographic Province. The climate is humid, mesothermal, maximum precipitations occur in March and

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General view of the palm community. First plane: *Butia yatay* Colonia Laurel, Department San Roque, Province of Corrientes, Argentina, 1998-1999

November, while minimum values are registered in June and August (Duarte 1978/80). This area was selected by its typical sylvatic palms and the presence of nearby houses with permanent inhabitants.

S*ampling design* - Samplings were carried out in October, November and December 1998 (spring); January, February and March 1999 (summer); May and June 1999 (autumn). In each sampling, four parallel transects of 300 m in length were placed, 50 m apart from each other, leaving approximately 25 m between the palms and the nearby heterogeneous environments to avoid the border effect. A minimum of four palms per month (one per transect) was selected at random to be dissected.

Palm determination and dissection - Palm species were taxonomically determined using appropriate keys (Henderson et al. 1995). After cutting the palm at the base, it was put on a white cloth to facilitate the detection of escaping insects. Parts sprayed with tetramethrin 0.2% to dislodge bugs, and carefully examined were as follows: the stipe, the axis of the frond bases, the petioles (including the broad ones of fallen dead leaves), the inner spathe of the inflorescence and the fibrous tissue that remains after sheath disintegration. The capture effort was estimated using the time spent by one person to inspect a palm (man/hour). Site data recorded included: palm height and diameter, distance to the nearest dwelling, and the location, if present, of bird nests, vertebrate, and their feces.

Triatomine collection - Palms were considered as infected when any sign of triatomine presence was found, such as dead or live nymphs and adults, eggs and exuviae. Collected triatomines were put in properly labeled plastic jars with pleated filter paper and shipped immediately to our laboratory in Corrientes.

Laboratory studies - The taxonomic determination of triatomines was done using appropriate keys (Lent & Wygodzinsky 1979, Brewer et al. 1983). Insects were grouped according to their developmental stage and sex and their number was recorded.

The feces of triatomines, obtained by abdominal pressure, were diluted 1:1 in 0.85% sodium chloride solution and examined microscopically at 400x for *T. cruzi* detection. *T. cruzi* identification was performed by morphological criteria (Barretto 1965) and the PCR technique. *T. cruzi* DNA was searched from dry triatomine feces collected in Whatman no. 1 paper by using the specific TCZ and Morel primers (Russomando et al. 1996).

RESULTS

Among the 30 palms that were dissected, 27 (90%) were identified as *Butia yatay* (Mart.) Becc. and 3 (10%) as *Acrocomia aculeata* (Jacq.) Lodd ex Mart., both belonging to the Subfamily Arecoidae. The mean length of palms was 5.82 m and the mean stipe diameter was 34 cm. The mean distance of palms to the nearest dwelling was 190.7 m, ranging from 1,000 to 50 m. The mean time of dissection per palm was 2 h (range: 0.55-3 h) and the total capture effort was 8 m/h per palm.

Bird nests were present in 26.7% (8/30) palms and half of them (4/8) belonged to the Furnariidae family.

Evidences of the presence of mammals were recorded in 20% (6/30) palms. Those were: opossum individuals (*Didelphis albiventris*), their nests and feces and/or rodent scats.

The following triatomine species were identified in *B. yatay*: *T. sordida*, *T. platensis* Neiva 1913 and *Psammolestes coreodes* Bergroth 1911. *T. sordida* was the only species found in *A. aculeata*.

In one bird nest built on a *B. yatay* palm we found 16 *T. sordida*, 2 first stage nymphs of *T. platensis* and 4 fifth stage nymphs of *P. coreodes*.

T. sordida was found in 96.2% *B. yatay* and in all the dissected *A. aculeata*.

Table I shows the density and the infestation indexes of triatomines in palms, as well as relative abundance of nymphs and adults, along the seasons.

Most of the palms (80%) were exclusively infested by *T. sordida* nymphs, followed by 13.3% palms with nymphs and adults and one palm harboring only adults.

The whole *T. sordida* population collected was 272 live specimens; 36 of them (13.2%) were found in bird nests located in the palm frond, and the remainder in the axis of the frond and other hiding places spread over the tree. The number of triatomines per palm ranged between 1 and 60 individuals (mean 9.6; mode 2).

T. cruzi infection - Sixty-seven *T. sordida* out of 174 (38.5%) examined insects showed trypanosomes in feces. Their identity as *T. cruzi* was subsequently confirmed by PCR. Infection rate increased linearly with age (regression line: y = 13,8x-25,4, $R^2 = 0.9894$) (Table II). Detailed results on *T. cruzi* infection detected by PCR will be published separately.

TABLE I

Seasonal infestation index, density index and relative abundance of *Triatoma sordida*, *T. platensis* and *Psammolestes coreodes* in palms, 1998-1999, Colonia Laurel, Department San Roque, Province of Corrientes, Argentina

Variables	Spring	Summer	Fall	Total
No. of dissected palms	13	11	6	30
No. of infested palms	13	10	6	20
Infestation Index[a]	100	90	100	96.7
Density Index[b]	12	6.7	9	9.6
Total no. of nymphs and eggs collected	151[c]	67[c,d]	54	272
Total no. of adults collected	6	0	0	6

a: no. of positive palms/no. of examined palms; *b*: no. of collected triatomines/no. of positive palms; *c*: one *T. sordida* egg; *d*: two first stage nymphs of *T. platensis* and 4 fifth stage nymphs of *P. coreodes*

DISCUSSION

This work represents the first longitudinal study published in Argentina about triatomine infestation in palms.

T. sordida was the dominant species collected in *B. yatay* compared with *T. platensis* and *P. coreodes*. This result constitutes the first finding of *T. sordida* in the mentioned palm species, which is endemic of South America and has exclusively been cited for Argentina, Uruguay and State of Rio Grande do Sul in Brazil (Henderson et al. 1995).

TABLE II

Trypanosoma cruzi infection in *Triatoma sordida* developmental stages, Colonia Laurel, Department San Roque, Province of Corrientes, Argentina

Stage	No. collected	No. (%) examined	No. (%) infected
N1	23	4 (17)	0 (0)
N2	48	22 (46)	4 (18)
N3	72	44 (61)	13 (30)
N4	74	61 (82)	28 (46)
N5	48	40 (83)	22 (55)
Adults	6	3	0 (0)
Total	271	174 (64)	67 (38.5)

The high infestation indexes we found in *B. yatay* are similar to those reported for other ensembles of palms and triatomines. Thus, *R. neglectus* and *R. prolixus* were collected in 95 and 92% of examined *Orbignya martiana*, respectively (Bento et al. 1984, D'Alessandro et al. 1984).

On the other hand, the presence of different triatomine species in one single palm is a common fact and usually one of them is dominant due to its frequency and relative abundance. Tonn et al. (1976) confirmed that 75.1% *Acrocomia* sp. was infected by five triatomine species of the following genus: *Eratyrus*, *Panstrongylus*, *Rhodnius*, and *Triatoma*. Feliciangeli and Torrealba (1977) cited *R. prolixus* as the most abundant in *Copernicia tectorum*, coexisting with *T. maculata* in 3.8% palms. Whitlaw and Chanotis (1978) reported the simultaneous presence of *R. pallescens* and *T. dimidiata*, in 91% of *Scheelea zonensis* palms, although the first species was clearly dominant.

In the present work, all dissected *A. aculeata* were exclusively colonized by *T. sordida.* In Brazil, the synonyms species *A. sclerocarpa* was mostly infested by *R. neglectus* and secondarily by *T. sordida* and *P. megistus* (Barretto et al. 1969, Diotaiuti & Dias 1984).

In Uberaba, State of Minas Gerais, Barretto et al. (1969) dissected 232 palms of six different species and collected 949 specimens of *T. sordida*. Infestations recorded (from 17.6 to 50%) were lower than those found in our work. In addition to the mean number of insects per palm, which ranged between 2.1 and 8.3 triatomines, was similar to the densities found in *B. yatay.*

Besides, the only habitat recorded for *R. brethesi* was *Leopoldinia piassava* in the Rio Negro, region of Barcelos, Amazonas (Mascarenhas 1991). This author collected in Urumutum a mean number of 5.04 insects per palm and 1.1 in Rilau, these den-

sities were lower than the registered in the present investigation.

We collected *T. sordida* in all sampled months. The highest population density was reached in spring and the lowest in autumn. The adult presence might have been underestimated since males and females fly to colonize new biotopes. It is worth of mentioning that all instar nymphs were present during the three sampling seasons, suggesting that younger stages endure winter conditions, a situation which has not been observed for other wild triatomine species in Northern Argentina (Wisnivesky-Colli 1994).

Our results indicate that palms represent an advantageous habitat for *T. sordida* because they provide refuge to potential feeding sources such as birds, amphibians, bats, opossums, rodents and reptiles. Besides, adequate microclimatic conditions in those places where triatomines shelter might buffer the high summer temperatures, as it was shown for palms from Venezuela (Pifano 1973, Rossell-Reyes 1984).

The proportion of *T. sordida* infected by *T. cruzi* (38.5%) was higher than rates obtained by Barretto et al. (1969) for *T. sordida* in three palm species (15.3%), although he found a prevalence of 29.3% for those specimens collected from *Orbignya martiana*.

Among the few *T. platensis* and *P. coreodes* caught by us in bird nests, no *T. cruzi* infection was detected, possibly due to the fact that those insects had fed on bird.

Most of the infected triatomines were found in those palms where the presence of *Didelphis albiventris* and rodent feces was recorded. This result is in agreement with Barretto et al. (1969) and Monteiro et al. (1999) who consider opossums and rodents as *T. cruzi* reservoirs in palms.

The high infection prevalence found in this work suggests that *T. sordida* plays an essential role in the maintenance of the wild transmission cycle in northeastern Argentina. On the other hand, leaves, bark and fruits from palms are frequently used by rural inhabitants, giving rise to an important risk of transmission to humans. In particular, fronds and stipes are used in walls and roofs of houses, favoring the passive transport of wild triatomines to the domestic environment, as pointed out by Gamboa (1973) and Pifano (1973) for *R. prolixus* in Venezuela.

Further studies are needed to evaluate the actual risk that palm *T. sordida* populations represent for the inhabitants of nearby houses.

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