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Presence of the invasive tick *Rhipicephalus (Boophilus) microplus* in Dioila Circle (Mali)

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Abstract

The aim of this study was to demonstrate the presence of the *Boophilus microplus* tick in the Dioïla cercle. It involved the analysis of 216 cattle samples from the communes of Kaladouougou and Massigui at the end of the dry season and during the rainy season. Ticks collected during both seasons identified using an electric binocular magnifier, then counted by species at the Laboratoire Central Vétérinaire in Bamako. A total of 4316 ticks obtained. The invasive tick *Boophilus microplus* was the most abundant (32.48%), followed by *Boophilus geigy* (29.12%), *Boophilus annulatus* (21.17%) and *Boophilus decoloratus* (2.96%).

This study confirms the presence of the invasive tick *Boophilus microplus* in the cercle de Dioïla.

Keywords: *Boophilus microplus*, Dioïla, Mali

1. Introduction

Animal diseases are a major constraint to the development of livestock farming in Mali. Among these pathologies, tick-borne diseases occupy an important place causing significant economic losses [5]. Studies carried out in Mali on the parasites responsible for babesiosis and on the vectors, revealed the presence of *Babesia bigemina* bovine babesiosis, with a maximum serological prevalence of 57.5% for *Babesia bigemina* in the Sikasso region, compared with 38.1% in the District of Bamako [10, 15]. Another study carried out in 2013 in southern Mali [1] revealed the presence of the invasive tick *Rhipicephalus (Boophilus) microplus*, considered to be the most important cattle tick in the world [8]. It recognized worldwide as the vector of babesiosis caused by *Babesia bigemina* and *bovis*, and anaplasmosis caused by *Anaplasma centrale* [8]. *Boophilus microplus* introduced into West Africa through the importation of live cattle from Brazil to Côte d'Ivoire [12]. It subsequently invaded Benin, Burkina Faso, Mali and Togo [8]. In Brazil, losses due to the direct and indirect impact of this tick estimated at two billion (2, 000, 000, 000) US dollars [1]. Today, *Boophilus microplus* is a threat to livestock farming in West Africa in general, and Mali in particular [12].

2. Materials and Methods

Ticks collected from cattle constituted the main biological material.

The study took place in 2 communes of the cercle de Dioïla in the Sudanian zone, with 3 villages per commune. In each village, 3 herds sampled, with 3 cattle per herd comprising at least 50 head. Ticks collected from cattle at the end of the dry season and during the rainy season. Ticks collected from both sides of the animal in 7 predefined anatomical regions: "ear", "head-neck", "dorsal region", "abdomen-legs", "ano-genital region", "tail" and "feet". Ticks preserved in Falcon tubes containing a 70 °C ethanol solution. The tubes marked with the site code, animal identification number and date of collection. The tubes placed in a tube crate for transport to the laboratory.

2.1 Tick identification

Ticks were identified at the Laboratoire Central Vétérinaire in Bamako using an electric binocular magnifier. Identification was based mainly on morphological characteristics. Ticks were placed in Petri dishes under the lens of the magnifying glass. Ticks carrying *Babesia bovis* and *Babesia bigemina* were counted by species.

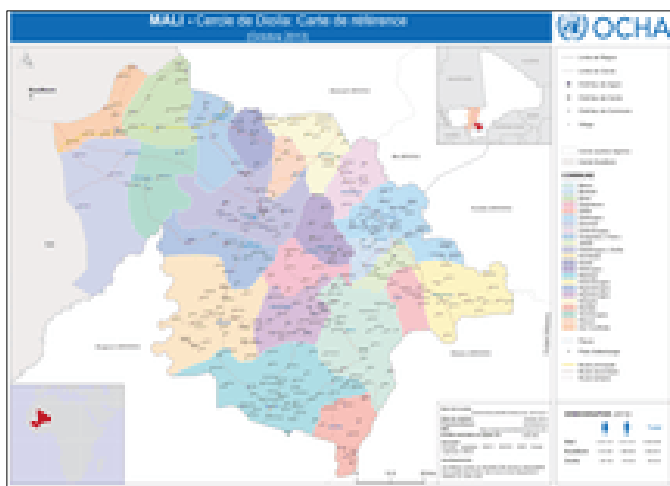


Fig 1: Map of the Dioila Circle

using Stata software version 12.1. The test of χ^2 person used to compare the variables

3. Results

4.316 ticks belonging to three genera were collected in the study area. The tick species collected were *Amblyomma variegatum*, *Hyalomma marginatum rufipes*, *Hyalomma inpressum*, *Boophilus microplus*, *Boophilus annulatus*, *Boophilus geigy* and *Boophilus decoloratus*. 3.701 individuals of the four species of ticks that carry bovine babesiosis were identified. Among these vectors of bovine babesiosis, the invasive tick *Boophilus microplus* was the most abundant with an overall abundance rate of 32.48%, followed by *Boophilus geigy* 29.12%, *Boophilus annulatus* 21.17% and *Boophilus decoloratus* 2.96%. *Boophilus microplus* is also present in all the villages in the study area. The other three species identified do not transmit bovine babesiosis. These were *Amblyomma variegatum* 12.72%, *Hyalomma marginatum rufipes* 1.29%, and *Hyalomma inpressum* 0.23%.

2.2 Data analysis

The data entered using Microsoft EXCEL 2010 and analysed

Table 1: Numbers of *Boophilus microplus* and the three other vectors of bovine babesiosis in the villages of the study area

Villages	Numbers of animaux	<i>B. microplus</i>	<i>B. annulatus</i>	<i>B. geigy</i>	<i>B. decoloratus</i>	<i>A variegatum</i>	<i>H marginatum rufipes</i>	<i>H inpressum</i>
Dioila city	36	193	142	260	05	62	06	04
Fouga	36	428	173	224	42	46	08	00
Koba	36	135	146	177	09	199	15	01
Konze	36	205	236	194	28	33	09	00
Massigui -village	36	178	59	158	13	146	11	00
Tenimbougou	36	263	158	244	31	63	07	05
Total	216	1402	914	1257	128	549	56	10

Table 2: Abundance *Boophilus microplus* in the villages

Villages	<i>Boophilus. microplus</i>	Total ticks	Abundances (%)
Dioila -city	193	672.	28.72
Fouga	428	921	46.47
Koba	135	682	19.79
Konze	205	705	29.07
Massigui -village	178	565	31.50
Tenimbougou	263	771	34.11
Total	1402	4316	32.48

Table 4: Abundance *Boophilus geigy* dans les villages

Villages	<i>Boophilus. geigy</i>	Total ticks	Abundances (%)
Dioila -city	260	672.	38.69
Fouga	224	921	24.32
Koba	177	682	25.95
Konze	194	705	27.51
Massigui -village	158	565	27.96
Tenimbougou	244	771	31.64
Total	1257	4316	29.12

Table 3: Abundance *Boophilus annulatus* in the villages

Villages	<i>Boophilus. annulatus</i>	Total ticks	Abundances (%)
Dioila -city	142	672.	21.13
Fouga	173	921	18.78
Koba	146	682	21.40
Konze	236	705	33.47
Massigui -village	59	565	10.44
Tenimbougou	158	771	20.49
Total	914	4316	21.17

Table 5: Abundance *Boophilus decoloratus* in the villages

Villages	<i>Boophilus. decoloratus</i>	Total ticks	Abundances (%)
Dioila -city	05	672.	0.74
Fouga	42	921	4.56
Koba	09	682	1.31
Konze	28	705	3.97
Massigui -village	13	565	2.30
Tenimbougou	31	771	4.02
Total	128	4316	2.96

Table 6: Abundance *Amblyomma variegatum* in the villages

Villages	<i>Amblyomma variegatum</i>	Total ticks	Abundances (%)
Dioila -city	62	672.	9.22
Fouga	46	921	4.99
Koba	199	682	29.17
Konze	33	705	4.68
Massigui -village	146	565	25.84
Tenimbougou	63	771	8.17
Total	549	4316	12.72

Table 7: Abundance *Hyalomma marginatum rufipes* in the villages

Villages	<i>Hyalomma marginatum rufipes</i>	Total ticks	Abundances (%)
Dioïla -city	06	672.	0.89
Fouga	08	921	0.86
Koba	15	682	2.19
Konzé	09	705	1.27
Massigui -village	11	565	1.94
Tenimbougou	07	771	0.90
Total général	56	4316	1.29

Table 8: Abundance *Hyalomma impressum* dans les villages

Villages	<i>Hyalomma impressum</i>	Total ticks	Abundances (%)
Dioïla -city	04	672.	0.59
Fouga	00	921	0.00
Koba	01	682	0.14
Konzé	00	705	0.00
Massigui -village	00	565	0.00
Tenimbougou	05	771	0.64
Total	10	4316	0.23

4. Discussion

The presence of the *Boophilus microplus* tick in the cercle de Dioïla could be explained by cross-border transhumance of cattle herds from southern Mali and the cercle de Dioïla to the Republic of Côte-d'Ivoire. The same observation was made by ADAKAL *et al* [1]. The high abundance of *Boophilus microplus* compared with the other three vectors of bovine babesiosis is due to the invasive nature of this tick and its ability to establish itself to the detriment of native species such as *R. (Boophilus) annulatus*, *R. (Boophilus) geigy* or *R. (Boophilus) decoloratus* [14]. It can also be explained by the fact that *Boophilus microplus* is resistant to all conventional acaricides available on the market [14,13]. The same results found by ALASSANE TOURE *et al*, and Ingenieur conseil [2-7] who found that *Boophilus microplus* is the most dominant species in the central, eastern, western and northern regions of Côte d'Ivoire. Our results differ from those obtained by TEEL and al. [15], who described the presence of three vectors of bovine babesiosis, namely *R. (B) annulatus*, *R (B) geigy* and *R (B) decoloratus*.) In the present study, the *Boophilus decoloratus* tick had the lowest infestation abundance in all the villages concerned. This may be due to the replacement factor of this species by the *Boophilus microplus* tick. The same observation was made by MADDER M [9].

5. Conclusion

This study confirms the presence of the invasive tick *Boophilus microplus* in the cercle of Dioïla. It also shows that this tick is more abundant than the three other species responsible for bovine babesiosis in Mali.

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