THE TARGET ON PIROGUE: A NEW TOOL TO CONTROL TSETSE FLIES OF THE PALPALIS GROUP, VECTORS OF HUMAN AND ANIMAL AFRICAN TRYpanosomoses IN WEST AFRICA

INTRODUCTION

• Among other countries, the Republic of Guinea, especially its coastal region is currently the west African country with the more active sleeping sickness foci, Kagbadouno et al., 2012; Simarro et al., 2013).

• However, the geographical situation of this region (islands and mangrove) makes the access difficult.

• The only mean of transportation in the mangrove is the pirogues people use to get to their sites of activities: travelling to the continent, cultivating, fishing, collecting charcoal wood, etc.

Women collecting oysters (A) and wood (B) in Mangrove
INTRODUCTION

- Humans frequently and constantly bitten by tsetse flies during their movements, and so are at very high risk of contracting sleeping sickness.
- Traps and targets exist, that are attractive to tsetse, and can kill them when they are impregnated of insecticides ( [3-6] Laveissière et al., 1981; Laveissière et al., 1973; Esterhuizen et al., 2011; Rayaisse et al., 2011).
- These devices are generally deployed on the banks of the rivers, in a stationary position, and kill the tsetse that come to land on it.
INTRODUCTION

• With regards to the high number of tsetse flies biting people in pirogues during their activities in the mangrove, one may assume that the pirogue itself with humans in, does attract the tsetse and that this may constitute an effective tool of vector control, provided it has device that can kill the insects

• So, why not to use target as mobile bait to kill the tsetse, and to provide a prophylactic effect to people the most at risk of getting gambiense sleeping sickness?
MATERIAL AND METHODS

• Experiment undertaken in the game reserve of Folonzo (~09° 54’ N, 04° 36’ W), southern Burkina Faso (No HAT).

• Immediate vicinity constituted of gallery forest with *Syzygium guineense* as predominant trees species (Rayaisse et al., 2009).

• Work occurred at end of April – beginning of May, e.g. during hot and dry season, where daily mean temperature and hygrometry were 30°C.
MATERIAL AND METHODS

Captures devices

✓ A stationary target (0.75x0.50 Net Blue Net; Rayaisse et al; 2011; Plate 1A)
✓ The same type of target, but mounted on a pirogue, (Plate 1B).

Both system covered with sticky film (Mohamed-Ahmed and Mihok, 2009), to allow tsetse counting

The difference between the two baits is that, contrarily to the stationary target, the target on pirogue is mobile, because it is moved at low speed by a coxswain on ~100 m up and down the site during the two hours of capture.
MATERIAL AND METHODS

- Comparisons made in the morning (8 – 10 am) and in afternoon (3 – 5 pm), so during two hours in every period.
- 14 replications per period.
- For every capture period (morning or afternoon), tsetse were counted per species and sex after the two hours.
- Catches normalized using a log10(n+1) transformation, and then subjected to ANOVA.
- The analysis made was to assess if the type of target (stationary or mobile) had a significant effect on catch.
**RESULTS**

### Global captures

- 4 tsetse species

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Period</th>
<th>G. tachinoides</th>
<th>G. p. gambiensis</th>
<th>G. m. submorsitans</th>
<th>G. medicorum</th>
<th>All species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stationary</td>
<td>Morning</td>
<td>313</td>
<td>239</td>
<td>552</td>
<td>127</td>
<td>72</td>
</tr>
<tr>
<td></td>
<td>Afternoon</td>
<td>503</td>
<td>179</td>
<td>682</td>
<td>187</td>
<td>157</td>
</tr>
<tr>
<td>Pirogue</td>
<td>Morning</td>
<td>816</td>
<td>418</td>
<td>1234</td>
<td>314</td>
<td>229</td>
</tr>
<tr>
<td></td>
<td>Afternoon</td>
<td>840</td>
<td>346</td>
<td>1186</td>
<td>477</td>
<td>286</td>
</tr>
</tbody>
</table>

| Proportion | 66% | 28% | 5% | 1% | 100 |

| G. medicorum | 22 | 16 | 38 | 4380 |
RESULTS

Comparison between trapping periods – Stationary target

• Stationary target caught more *G. p. gambiensis* in the afternoon than in the morning (21.59±0.74 vs 12.37±0.76; p=0.02).

• For *G. tachinoides*, the difference was only significant with males (daily mean catches of 20.58±0.54 in the morning and 33±0.15 in the afternoon, p=0.004) but was not significant for total catches (36.24±0.55 in the morning and 46.21±0.40 in the afternoon).

• No difference was observed in *G. m. submorsitans* captures between the two periods (2.37±0.82 in the morning and 1.13±0.80 in the afternoon).
RESULTS

Comparison between trapping periods – Target on pirogue

• Contrarily to the stationary target, no difference observed for *G. p. gambiensis* between the two periods for the target on pirogue, (mean catches of 30.05±1 in the morning and 44.69±0.58 in the afternoon).

• As for the stationary target, more *G. tachinoides* in the afternoon than in the morning (114.88±0.43 vs 78.62±0.55; p=0.02).

• Captures of *G. m. submorsitans* also significantly higher in the afternoon than in the morning (9.89±1.37 vs 2.30±1.32; p<0.001).
RESULTS

Figure 3. Mean catches of *G. p. gambiensis* in the morning (A) and in the afternoon (B)

Mobile/immobile = 3.61, p<0.001

Mobile/immobile = 1.39, p<0.001
RESULTS

Figure 3. Mean catches of *G. tachinoides* in the morning (A) and in the afternoon (B).
RESULTS

Figure 3. Mean catches of *G. m. submorsitans* in the morning (A) and in the afternoon (B).

Mobile/immobile = 1

Mobile/immobile = 8; P<0.001
DISCUSSION - CONCLUSION

• Whatever the species or the period, the target on pirogue always caught more tsetse than the stationary one.

• Already known that species of the morsitans group are highly responsive to mobile bait (target) operated on the ground (Kasilagila, 2003; Gates & Williamson, 1984).

• This statement is confirmed in our case where in the afternoon, the target on the pirogue caught up to 8 times more G. m. submorsitans than the stationary..
DISCUSSION - CONCLUSION

• It is the first time that such a result is obtained for the riverine species *G. tachinoides* and *G. p. gambiensis*.

• Promising tool to help tsetse densities decrease, and thus protect humans in habitats where tsetse control is difficult to implement, i.e. mangrove and rivers.

• Further work should assess the remanence of the insecticide on targets in these humid settings,

• Also need to investigate how local communities (fishers, and people using the pirogues) would perceive this tool.