37th ISCTRC meeting – Mombasa, Kenya

Comparative effectiveness of two prototypes of biodegradable traps for vectors of animal trypanosomes in Burkina Faso

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Animal trypanosomosis

- A major obstacle to livestock development and food security in sub-Saharan Africa affecting around 50 million heads of livestock and representing nearly 9 million km^2 infested **(FAO, 2025)**

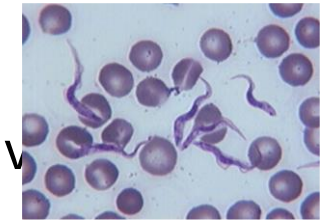
Benefits

- **Sources of revenue** (rural communities)
- **Food security**
- **10 to 20%** of the country's GDP **(FAO, 2018)**

Challenges

- Health challenges
- **Global agricultural impact of the disease: $4.75** billion per year
- **Economic losses: $1 to $1.2** billion **(FAO, 2025)**

Causative Agents



Trypanosoma

- African trypanosomes are transmitted by biological vectors (Glossina) and mechanical v
  (Tabanids, Stomoxes, etc.).

- **Biological Vector**



Glossina (tse-tse fly)

- **Mechanical Vectors**



Tabanids (taon)



Stomoxys

- Haematophagous diptera have an extremely important role in human and animal health **(Mavoungou et al., 2008, Bouyer et al., 2011)** → **making it important to study their diversity**

Vector Control

❑ **Control Strategy:**



Chemotherapy



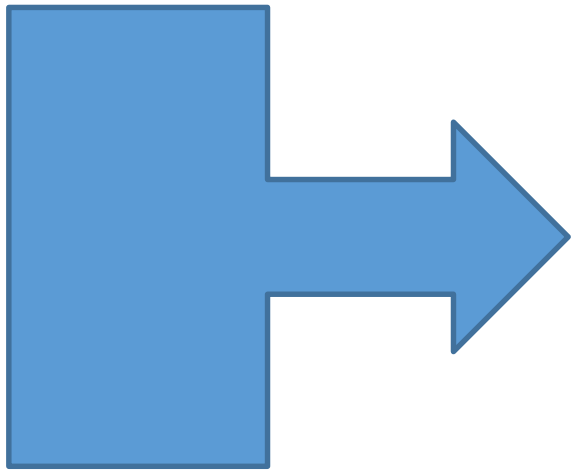
Vector Control

❑ Trapping represents an effective tool for the study, monitoring, protection and ecological control of vectors **(Bouyer et al., 2005).**



Introduction 4/5

Conventional control approaches have shown limitations in terms of sustainability and environmental impact



COMBAT Project: Improving trapping tools has emerged as a promising, environmentally friendly, and economically viable solution

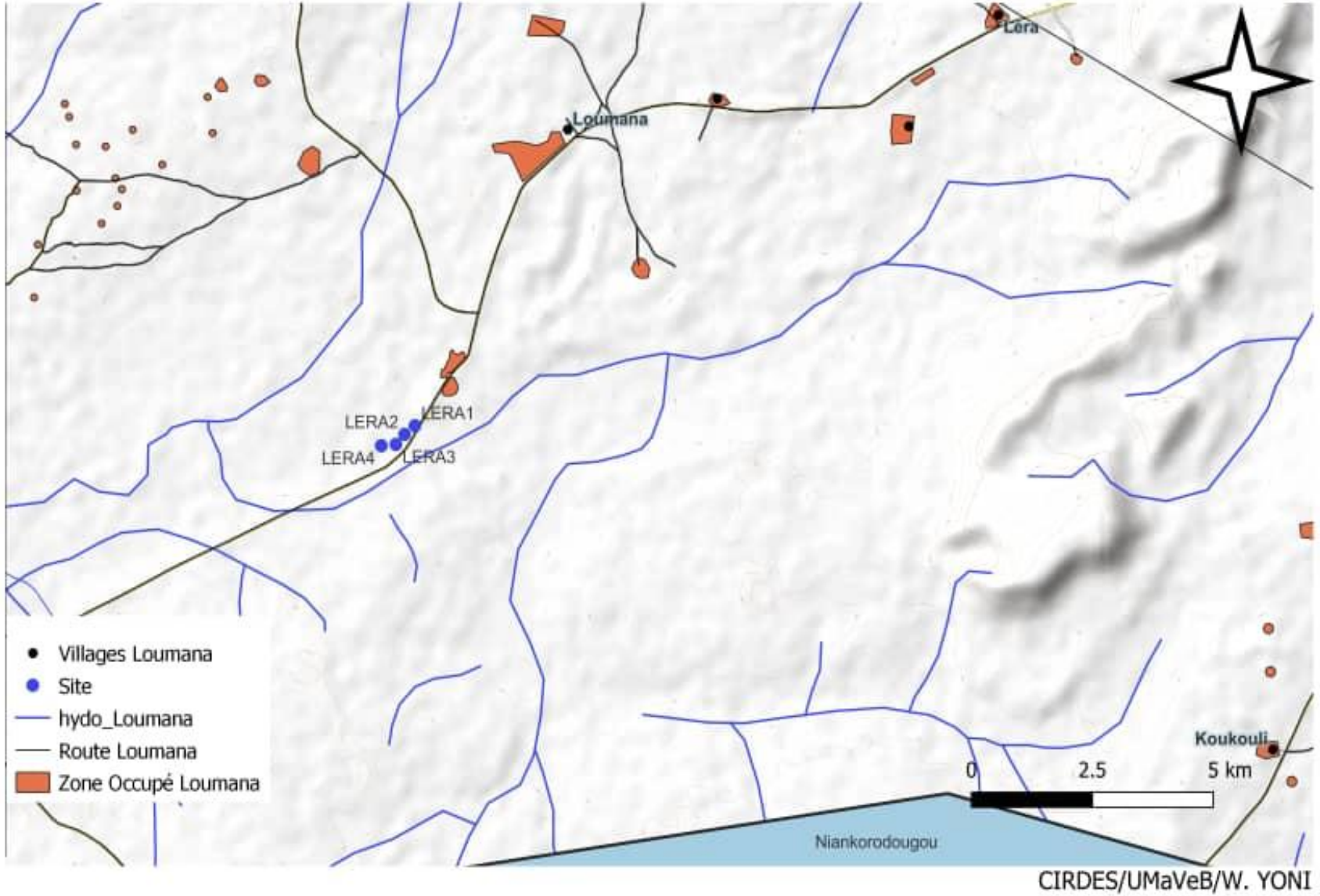
Objective



To compare the effectiveness of two BioFlyTrap models (P23d+ and P38) with the reference traps (Nzi and Vavoua) used in West Africa

Latin Square Biotrap Sites

Study Site 1/1



- **Exploratory mission** with 20 georeferenced traps deployed for 48 hours **(Collaboration DELMA)**
- **ADT:** (10.2 à 17.3 flies /T/D)
- **Province of Leraba**

Figure 1 : Study site

Material used :



(1) Vavoua Trap (V)



(2) Nzi Trap (N)



(3) P38 Prototype



(4) P23d+ Prototype

Reference traps VS **Biodegradable traps**

Figure 2 : Material

Methods

- **Experimental design:** 4x4 Latin square with four replicates (16 days of trapping).
- **Trap locations:** savannah area, georeferenced and spaced 100m apart.
- **Exposure duration:** 24 hours. Then separated, counted, and identified under a binocular microscope using identification keys.
- **Some specimens are conserved for future molecular analyses**





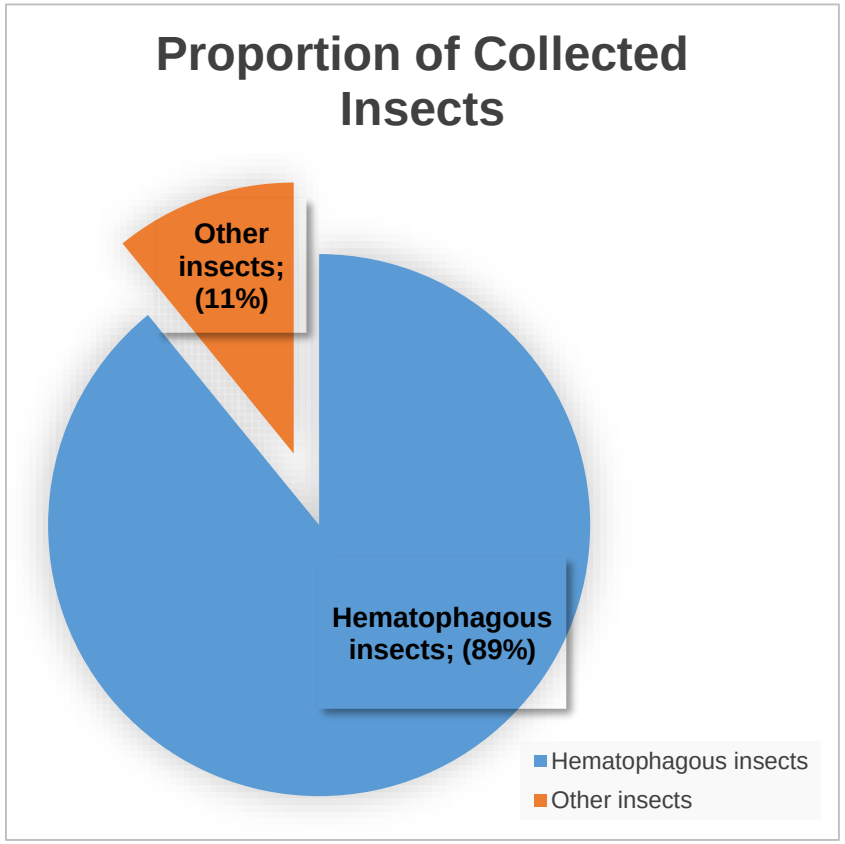
Results & discussion (1/5)

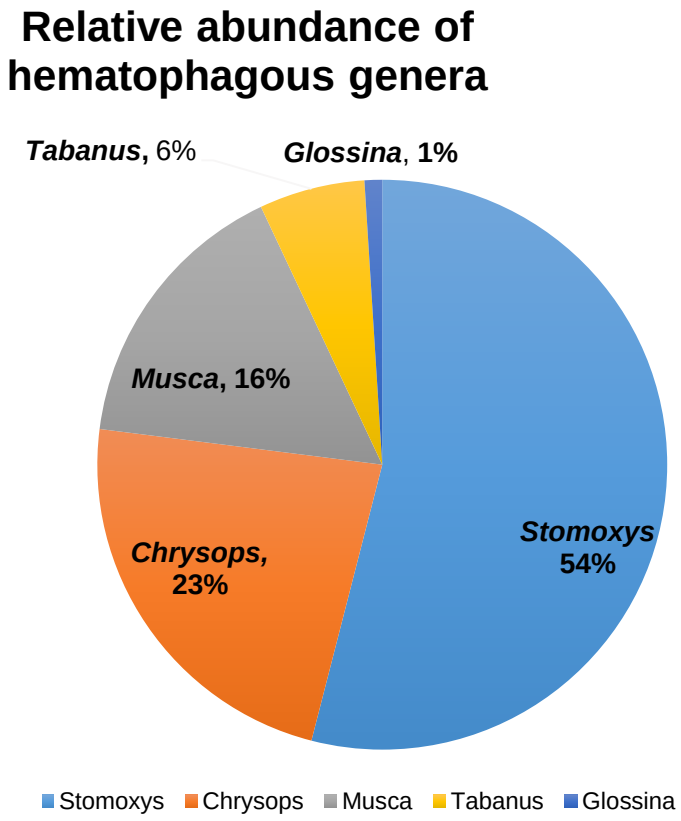
Diversity of haematophagous insects captured

Order	Family	Genera	Species	Effectif
Diptère	Tabanidae	*Tabanus*	•*Tabanus gratus*	90
			•*Tabanus biguttatus*	2
			•*Tabanus par*	89
			•*Tabanus taeniola*	153
		Chrysops	•*Chrysops distinctipennis*	2,824
			•*Chrysops longicornis*	15
		Atylotus	•*Atylotus fuscipes*	261
			•*Atylotus agrestis*	94
		Ancala	•*Ancala fasciata*	1
	Muscidae	*Stomoxys*	•*Stomoxys calcitrans*	149
			•*Stomoxys niger*	6,486
		Musca	•*Musca crassirostris*	1,1
			•*Musca sp*	799
	Glossinidae	*Glossina*	*Glossina palpalis gambiensis*	5
	Autres sp.			172
Total				13,734

- **13,734** insects captured,
- **12,240** hematophagous insects **(89.12%)**
- **14 haematophagous species of 7 genera**

Abundance of haematophagous insect genera





- **Stomoxys (54%)** predominant
- **Chrysops (23%)**
- **Musca (16)**
- **Tabanus (6%)**

Results similar to those of **Mavoungou et al. (2007) and Zinga et al. (2014)** who showed a high abundance of Stomoxys in open environments

Figure 3: Relative abundance of identified hematophagous genera

Trap Comparison: *Tabanus*

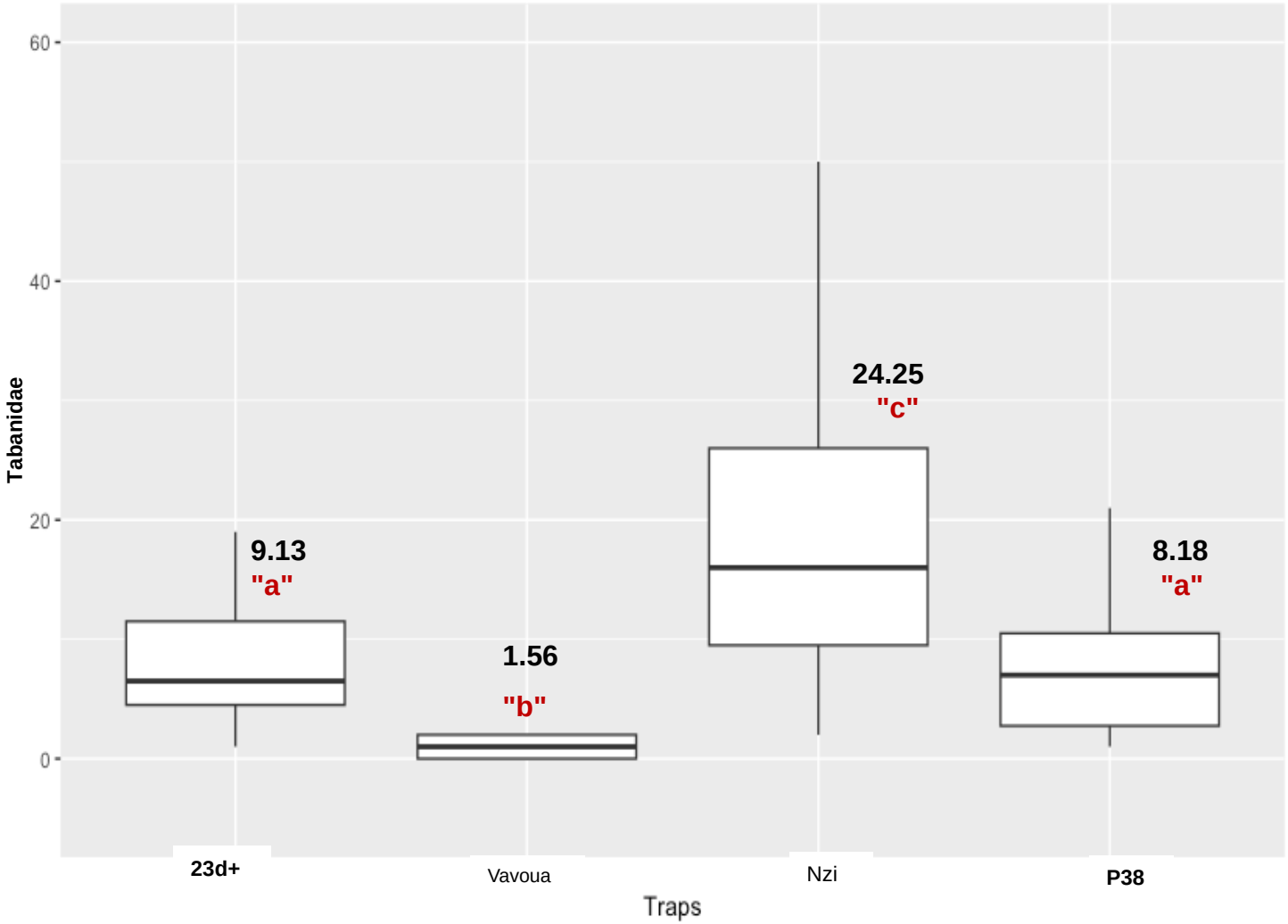


Figure 3: Distribution of Tabanidae by type of trap (23d+, Vavoua, Nzi, P38).

- **Four species** of Tabanidae captured
- **Nzi :** statistically significant best performance (ADT : **24.25 flies/t/d)**
- **BioFlyTrap** (**23d+** ; **P38**) : Good results
- **Vavoua:** least efficient
- BioFlyTrap remains competitive
- Nzi: historically effective for Tabanidae **(Laveissière, 1994; Gilles et al.,2007 ; Lindh et al., 2009).**

Trap comparison: *Stomoxys*

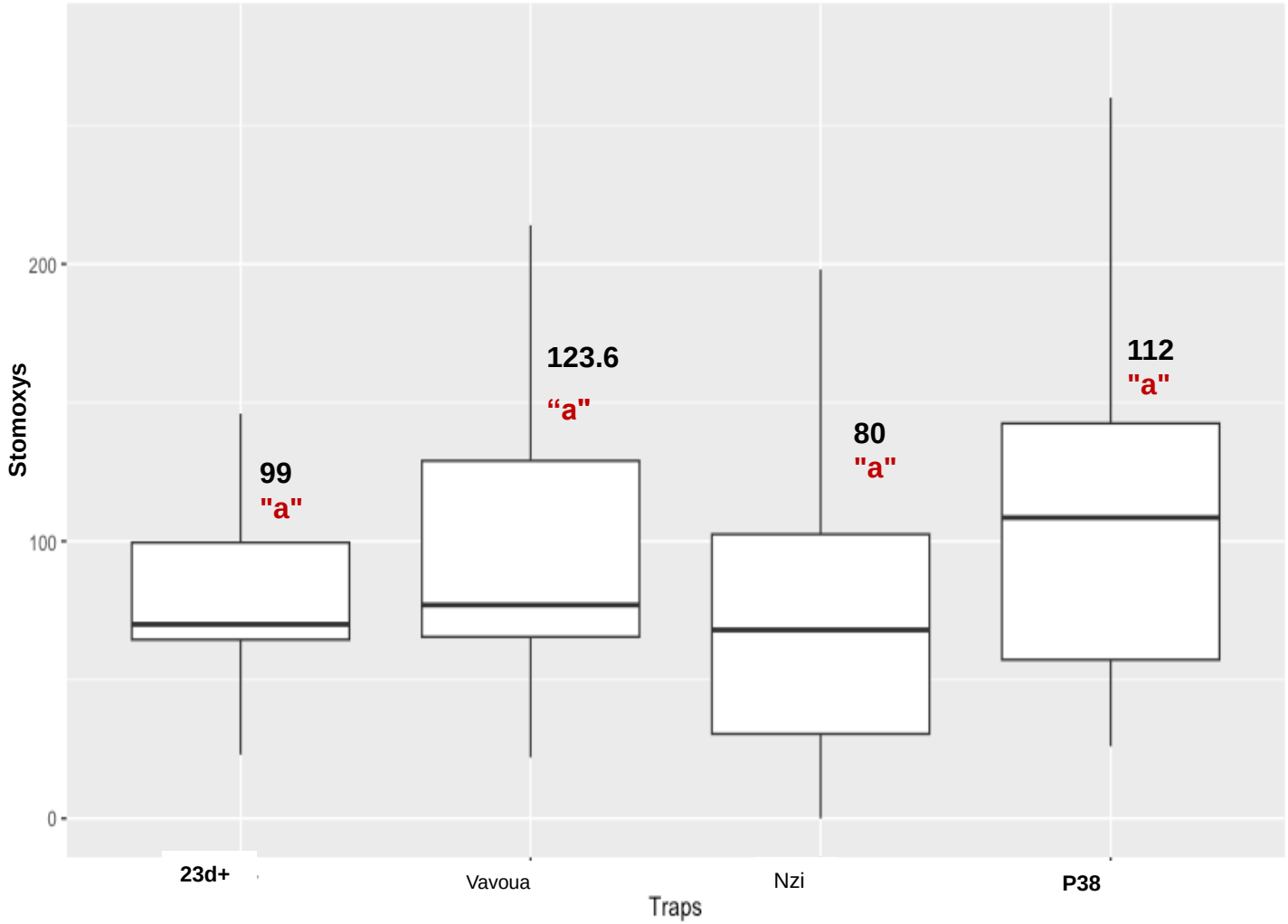


Figure 6 : Comparison of Stomoxys by Type of Trap

- **No significant difference (p > 0.05);**
- Several trap models could have comparable effectiveness **(Gilles et al., 2005; Duvallet, 2010); Mihok (2002)**
- P38 relatively trapped more *Stomoxys* than all other traps

Trap Comparison: *Chrysops*

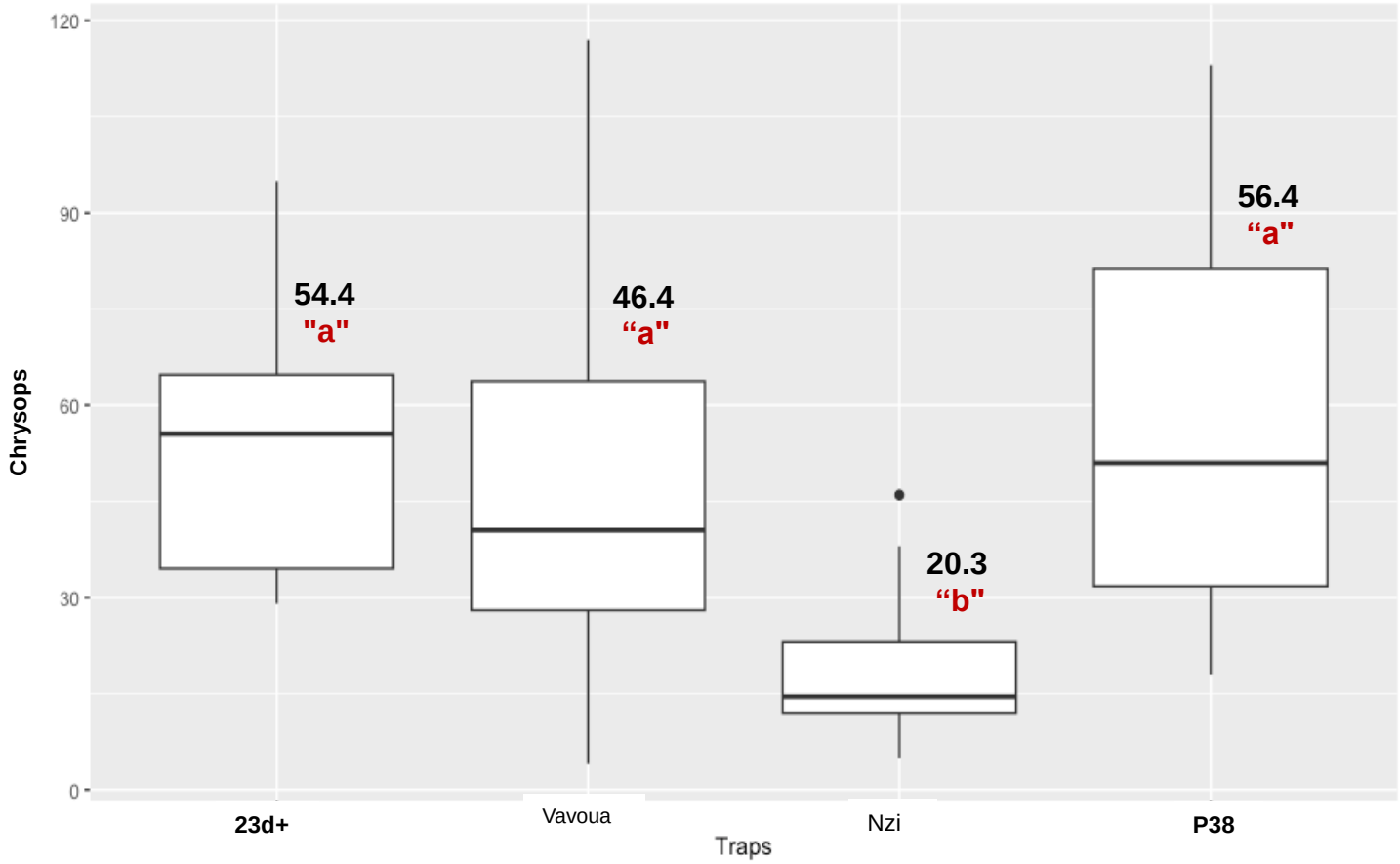


Figure 9 : Comparison of Chrysops catches by type of trap

- **23d+, P38, and Vavoua**: similar performance
- **Nzi** less suitable for Chrysops **Duvallet and Gouteux (2004)**
- **Nzi** optimized for Tabanidae but less effective for Chrysops **Mihok et al., (1995)**

Conclusion & Perspectives

- **BioFlyTrap P23d+ and P38 remain competitive**: innovative, high-performance tools suitable for capturing various haematophagous species.

- The demonstrated effectiveness of biodegradable trap prototypes represents a major advance in the fight against animal trypanosomosis. **Their use can strengthen trypanosomosis vector control programs.**

- These innovations pave the way for more sustainable, environmentally viable vector control strategies, , thereby contributing to food security and human well-being.

Promote their integration into integrated vector control strategies, while continuing evaluations under various conditions and cost-effectiveness studies.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101000467

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