

## Colloque d'écophysiologie animale – CEPA 3<sup>e</sup> édition



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# Ecophysiology of elephants to better understand their crop selection: first results of a case study in Monts de Cristal, Gabon

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# Context

➤ **Elephant species :** All species are vulnerable or endangered (IUCN red list)

## 1- Poaching for ivory



Solutions: Anti-poaching campaigns.  
They MUST be maintained.

## 2-Habitat loss



Solutions: Good practice guides

## 3- Human-elephant conflicts



Solutions: most are only “aspirin” treatments  
(Barnes, 2002)

# Context

## ➤ Elephant damages on crops:

(Walker 2012;  
Abernethy et al. 2013)

↔ human-elephant conflicts

**(1) less conservation action support from local people**

**(2) poverty increase with up to 100% income decrease**



## ➤ Ecophysiology (among others fields) is suitable to:

- investigate how physiology matters on animal life processes;
- Know mechanisms behind population declines and achieve tangible conservation outcomes (*Bradshaw 2003*);
- use non-invasive indicators (parasites and hormones) in wildlife (*Brayan, 2013*).

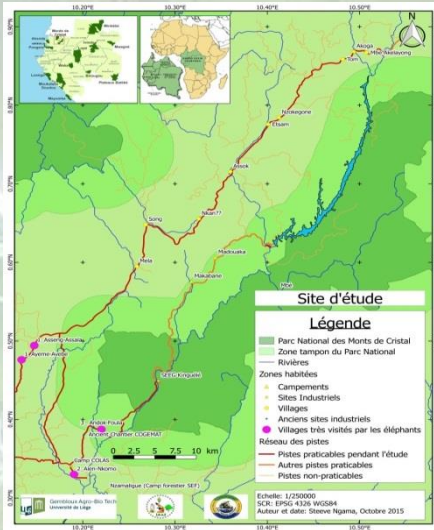
# Purpose

Using parasitism and stress hormone levels as ecophysiological parameters to:

- know how if stress level matters on elephant crop raiding behavior;
- better understand elephant crop selection depending on its parasitic status.

# Field sampling in Gabon

- Gabon: high forest cover with a large forest elephant population and lots of human elephant conflicts du to damages on crops.
- Opportunistic samplings in Monts de Cristal NP: twice per month in a 30 km bush road recce surveyed by car to avoid collection on a single elephant group.



- Systematic sampling: in six elephant trails or recces (0.5km each) during two weeks of every season (Munshi-South 2011).



Elephant fresh dungs (<72h) and orts nearby were collected.



# Laboratory analyses

We measured parasite loads in dung using McMaster technic and stress hormone levels in feces with Enzyme immunoassays (EIA) methods.



## Statistics

We used the R® software to: perform principal component analyses (PCA), check normality with the Shapiro–Wilk test; and compare means with the Kruskal wallis non-parametric test.

## Elephants choose what they eat

- No differences of parasite load levels and stress hormone levels between individuals eating crops (take as the same food item) and those eating natural food
- There are differences when crops are taken differently.

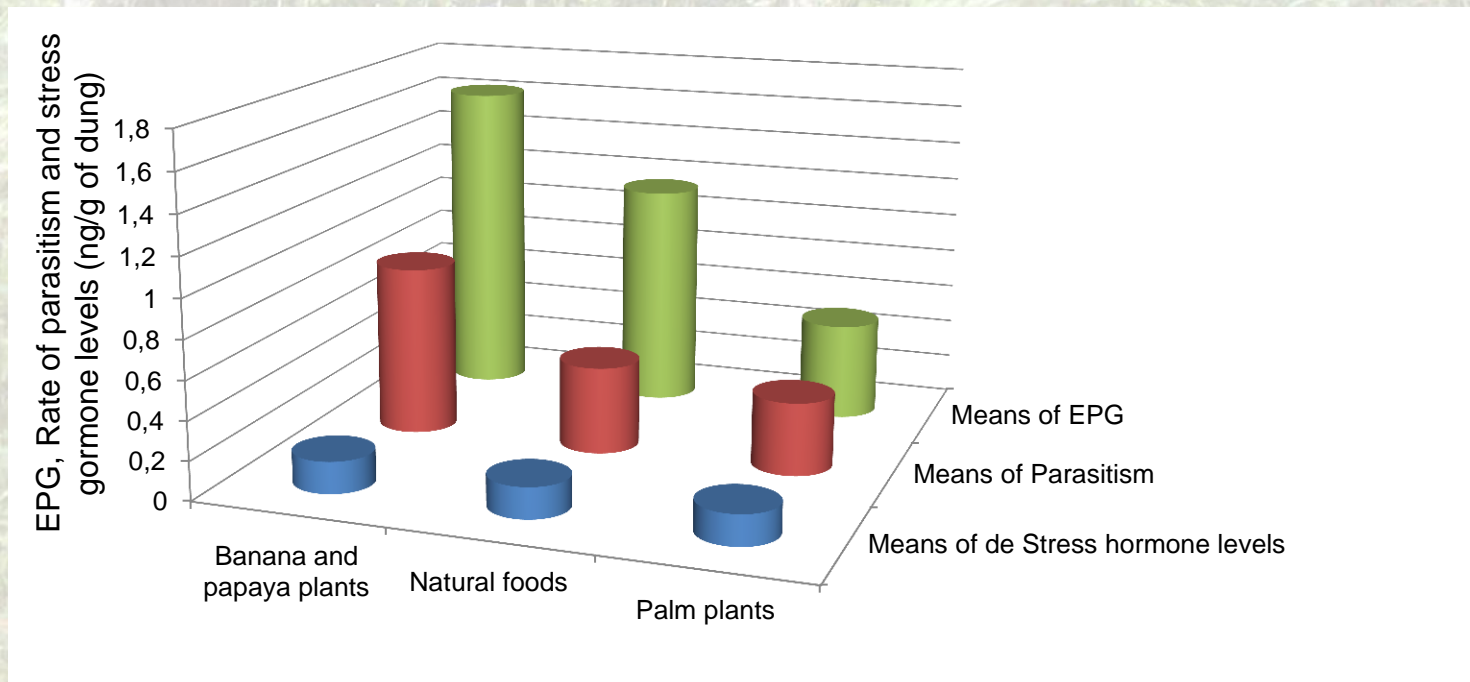


Fig.1: EPG = number of eggs per gram of feces. There are higher parasite loads in dungs of elephants eating banana and papaya plants than in those of elephants eating natural food resources species or palm plants.

## Same pattern of crop selection according to seasons

Table.1: Data from two rainy seasons of means comparisons. Means in the same columns with different letters are significantly different.

	Means of EPG	Means of Parasitism	Means of Stress hormone levels
<b>Means Season.1</b>	<b>13.89±1.7<sup>E</sup></b>	<b>0.61±0.5<sup>E</sup></b>	<b>39.68±16.6<sup>E</sup></b>
Banana and papaya plant eaters	11.67±0.7 <sup>a</sup>	<b>0.83±0.4<sup>a</sup></b>	34.19±15.9 <sup>a</sup>
Natural food eaters	<b>15.01±2<sup>b</sup></b>	0.50±0.4 <sup>b</sup>	42.43±16.8 <sup>a</sup>
<b>Means Season.5</b>	<b>8.33±1.2<sup>F</sup></b>	<b>0.44±0.3<sup>F</sup></b>	<b>40.46±19.5<sup>E</sup></b>
Banana and papaya plant eaters	<b>30.0±1.4<sup>c</sup></b>	<b>0.91±0.8<sup>c</sup></b>	<b>61.58±14.6<sup>c</sup></b>
Natural food eaters	6.25±1.1 <sup>d</sup>	0.38±0.5 <sup>d</sup>	36.50±20.7 <sup>c</sup>
Palm plant eaters	5.01±0.7 <sup>d</sup>	0.38±0.5 <sup>d</sup>	39.14±17.8 <sup>c</sup>
<b>Overall means</b>	<b>11.11±1.5</b>	<b>0.53±0.5</b>	<b>40.07±17.8</b>

There are higher parasite loads in dung of elephants eating banana and papaya than in those of elephants eating natural food resources species.

**Elephants may raid on banana and papaya for parasitism concerns; palm plant for energy.**

Many questions remain: Different elephant selection pattern on banana plants



Banana leaves eaten by elephants in Monts de Cristal NP.



Banana farm completely destroyed by elephants in Monts de Cristal NP.

**We need to confirm these results by assessing this trend according the all four seasons and with regard to reproduction hormones.**



# Thank you !

