

Project Update: December 2020

Aims and Objectives

The major goal of our project is to see if bats are good pest suppressors in cacao plantations and how this pest suppression affects cacao productivity. Our project is divided in two phases: 1) conduct mist-netting sessions to see what bat species occur in the cacao plantations; and 2) do an exclusion experiment to detect changes in cacao productivity and to see what is causing these changes.

Activity 4 - Mist-netting

In August (wet season) more eight nights of mist-netting in eight cacao farms were conducted. We capture 68 bats from 13 species. Although in the dry season insectivorous bats represented almost 70% of all captures (see June update for more details), during this season they only represented 40% of all captures (Figure 1). Nevertheless, the most common insectivorous bat species were gleaners, which are the ones most likely to eat the pest (*Brown Capsid*, *Sahlbergella singularis*; Hemiptera) due to its life cycle.

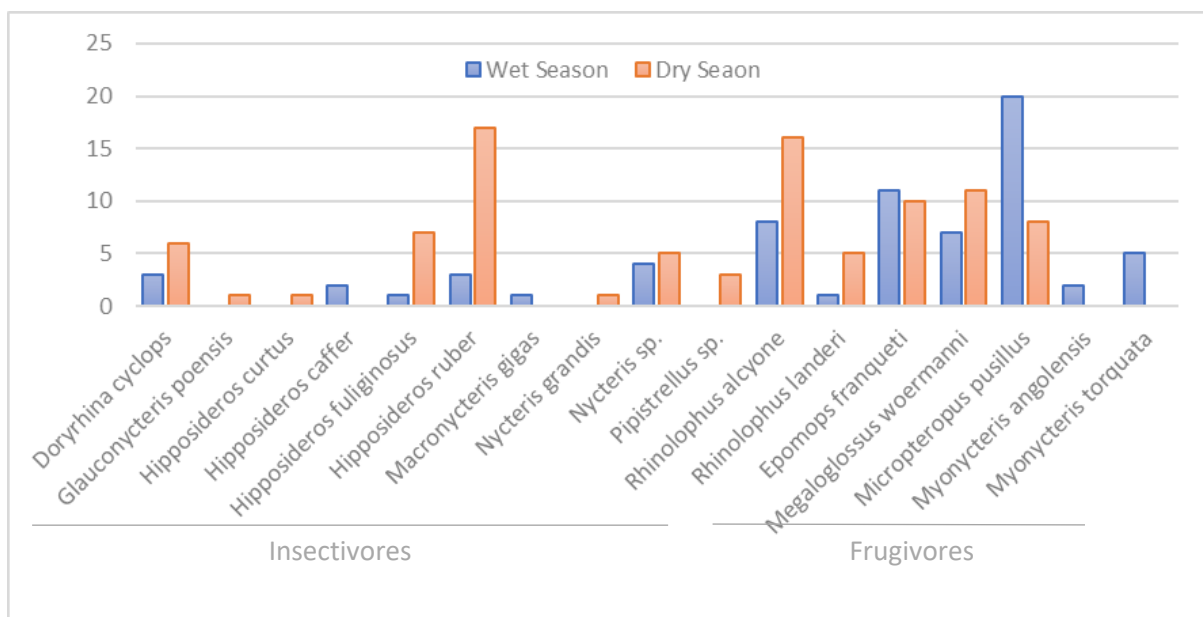


Figure 1 – Bats captured during eight nights of mist-netting in each season in eight cacao plantations, Cameroon.

Activity 2 - Monitoring phase

To be able to correlate the absence of bats with the increase/decrease of a specific arthropod group, we are monitoring arthropod communities. Our entomologist, Alan Wandji, was able to conduct more four visits to each plantation since the June. Differences between exclusions and controls were similar to the ones observed in the past (see June update for more details). However, only after finishing the monitoring (more three months) we will be able to see if those differences are significant and if these patterns are consistent throughout the harvesting season (from August to February). Also, during this period some exclusions needed maintenance (e.g.,

broken ropes or cracked poles), which was done by our colleague Patrick Jules Atagana (Figure 3).



Figure 3 – Patrick Jules Atagana reinforcing with rope an exclosure.

Activity 3 - Crop yield

Cocoa harvesting occurs once per year and in our trees the first ripe pods start appearing in July. Since then, we have been collecting in each visit all ripe pods from the control and exclosures trees (Figure 4). After collecting all pods, we measured for each pod its length, diameter, weight, and number of beans. To have a more precise estimate for the yield, we also measured the wet and dry weight of the beans inside of each pod (Figure 4). The dry weight is final product that farmers sell, hence the best representation of farmer profit. All metrics were strongly correlated with the dry bean weight (Table 1 and Figure 5). This shows that maybe weighing the entire pods would be a good estimate for the yield, which is easier and more feasible to measure in any project than collecting and drying all the beans.



Figure 4 –Harvested ripe pods (left) and cacao beans drying in the sun (right).

Table 1 – Pearson correlation coefficient between the different metrics used to measure the cacao yield.

Correlation	Length (cm)	Diameter (cm)	Weight pod (g)	Number of beans	Wet beans weight (g)	Dry beans weight (g)
Length (cm)	1.000					
Diameter (cm)	0.985	1.000				
Weight pod (g)	0.950	0.942	1.000			
Number of beans	0.952	0.955	0.899	1.000		
Wet beans weight (g)	0.955	0.955	0.936	0.967	1.000	
Dry beans weight (g)	0.967	0.977	0.934	0.966	0.969	1.000

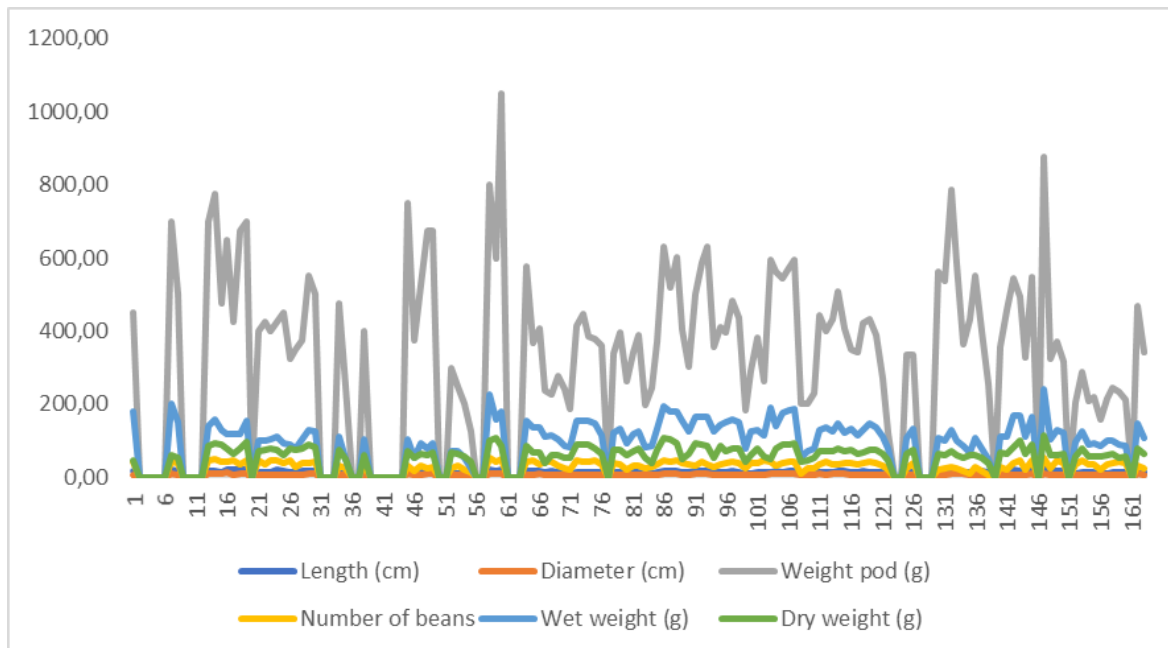


Figure 5 – Plot showing the relation between the different metrics used to measure the cacao yield.

Future

- -We will visit the plantations 3 more times, once per month until February.
- -Harvesting of cacao pods will last also for more 3 months
- -Analysis of results
- -Activity 5: Information dissemination (due to Covid-29 this activity probably will be postponed).