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# Notes on *Parotis baldersalis* Walker (Lepidoptera: Crambidae) as edible caterpillar occurring on *Tabernaemontana* crassa Plum. ex L. (Apocynaceae) at Plateaux Bateke, in Gabon

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**Abstract**
Observations on the occurrence of a *pyraloid* leafroller species on *Tabernaemontana crassa*. Plum. ex L. (Apocynaceae) were carried out from edge bosquet forests near Leconi, Edjouangoulou, Odjouma and Ossouélé villages, in Plateaux Bateke on november 2021, in Gabon. A first part of the study was focused on field assessment of this insect prevalence on it wild host plant, and it use by local residents. The second part aimed to rear some larvae at the Crop Protection Laboratory, University of Sciences and Technologies of Masuku (INSAB/USTM), in order to make a correct species identification from adults. Results revealed that the insect is locally named *Onkukútá*, and 100% of local people recognized to eat and appreciate caterpillar and chrysalid stages of this insect each year. All the surveyed trees (100%) were recorded with infestation characterized by global defoliation on both high and small plants. Incidence occured from larval feeding behavour consisting on rolling dorsally leaf edge, gnawing parachyma and turning foliage to a brown appearance followed often by wilting and leaf dropping. One to tree young larvae could be observed per leaf at early attack stage, but a single one for final larval instars. Attacks were limited on leaves burning, so that host plants refolation was observed some weeks later. Laboratoty rearing allowed emergence of female and male adults of *Parotis baldersalis* Walker (Lepidoptera: Crambidae), and one relate Ichneumonid parasitoid belonging to a genus *Latibulus* Gistel (Hymenoptera: Ichneumonidae). Further studies are to be conducted in order to assess both the insect life cycle within this environment, and it nutrtionnal value.

**Keywords:** Occurrence, *Parotis baldersalis*, *Tabernaemontana crassa*, defoliation, edible insect, plateaux Bateke

## 1. Introduction
The *Tabernaentamontana* genus (Apocynaceae), comprising 110 species is originating from pantropical regions [1], and within 18 species naturally growing in Africa, some are commonly reported to be used both in traditional medicine and ebenistery, as *T. crassa*, *T. africana*, *T. stenosiphon*, and *T. eglandulosa* [1, 2]. In some central african countries like Gabon and Congo, particularly in the Plateaux Bateke areas, *Tabernaentamontana crassa* is a spontaneous tree commonly growing in gallery forests, bosquets, forest regrowth and swamp forest [2]. The wood is locally used for domestic carpentry, mainly cassava crushing board, or mortar [1, 3]. In other ways, as some tropical trees like *Ricinodendron heudlotii* Baill. Perre ex Heckel (Euphorbiaceae), *Tabernaentamontana crassa* is a caduceous tree and an ecological indicator for local Bateke populations, so that it natural leaf dropping occured in dry season, and renewing foliage stage correspond to the raining season coming [3]. In Plateaux Bateke areas, each *T. crassa* refolation in end of september is indicating both environmental change and upcoming hatching of edible caterpillars on this tree from october to november. This specific plant-environmental-insect relation is well known by local residents of Plateaux Bateke in Gabon, but no scientific report has never been provided [3]. Due to this lack, our work aimed first to appreciate local knowledge and importance of the insect, by a social survey in four localities placed from Leconi to Ossouélé. In a second time, we studied the insect in this environment, by monitoring host plants on edges of bosquet forests, and some caterpillars

collected from rolled leaves were brought in to the laboratory for the further observations allowing the insect identification.

## 2. Material and Methods

The present search was carried out to monitor the occurrence of an unidentified edible insect (Lepidoptera) on spontaneous populations of *Tabernaemontana crassa Plum*. ex L. (Apocynaceae) at Plateaux Bateke, from Gabon. The monitoring and surveys were performed at four localities all along a transect of 100km from Leconi to Ossouélé. From these localities, 25 sampling sites (spots) were prospected respectively as represented in table 1 bellow.

**Table 1:** Sampling spots distribution

| Spot rank | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| Leconi (6) | 1°36'07"S 14°16'13"E 532m | 1°36'09"S14°16'21"E 529m | 1°36'17"S 14°16'40"E 540m | 1°36'25"S 14°16'51"E 566m | 1°36'52"S 14°17'28"E 599m | 1°36'51"S 14°17'6"E 605m | - |
| Edjoua-engoulou (6) | 1°30'23"S 14°25'27"E 526m | 1°30'14"S 14°25'21"E 538m | 1°30'05"S 14°25'19"E 525m | 1°30'05"S 14°25'19"E 519m | 1°29'58"S 14°25'21"E 512m | 1°29'54"S 14°25'20"E 511m | - |
| Odjouma (6) | 1°15'55"S 14°26'21"E 545m | 1°15'55"S 14°26'26"E 548m | 1°15'50"S 14°26'21"E 542m | 1°15'15"S 14°26'02"E 514m | 1°15'09"S 14°25'58"E 531m | 1°15'03"S 14°26'00"E 525m | - |
| Ossouélé (7) | 1°04'57"S 14°23'19"E 576m | 1°04'57"S 14°23'15"E 578m | 1°04'57"S 14°22'10"E 556m | 1°04'41"S 14°22'08"E 551m | 1°04'42"S 14°21'58"E 535m | 1°04'47"S 14°21'54"E 540m | 1°04'55"S 14°21'22"E 608m |

A global sampling of 110 peoples were interviewed, according to their willingness, respectivelly 50 individuals at Leconi (20 men and 30 women), 15 individuals at Edjoua-engoulou (5 men and 10 women), 15 individuals at Odjouma (5 men and 10 women), and 30 individuals at Ossouélé (10 men and 20 women).

Local knowledges were collected from a social survey [4] based on four questions: (1) Do you know this insect and this Apocynaceae host plant (if yes, what is the name, and other knowledge) ? (2) Where and when does the insect occurrence take place ? (3) Do you consum and appreciate the insect ? (4) What is your collecting and cooking methods for this insect ? Answers related from first to third questions were limited to 'yes' and 'no', whereas the fourth had to provid the appropriate method.

The field monitoring and laboratory observations allowed to provide the prevalence and injuries on host plants, the behaviour, the identification and description of the insect. Following field methods usually used to evaluate the risk related to the presence of insect pests and diseases [5, 6, 7], each visible tree was counted and it height evaluated. Trees with wilting specific appearence corresponding to the lepidopteran larvae attacks were recorded and the relate occurence calculated. Leaves with new attacks were checked to find and collect the infesting insects. The larval and chrysalid samples were collected from only one locality at road boundary and brought to the laboratory for further rearing and observations. This work constituted preliminary investigation on this edible insect and relate food plant in Gabon, and Central Africa. The collected larvae were reared in plastic rearing boxes covered with muslin cloth under the laboratory conditions, renewing fresh leafs feed after every each three days. Due to the fact that the insect field outspread time occurred before current investigations, larvae were rare in almost trees, and few samples were obtained. Only three host plants allowed to collect five mature larvae and three chrysalids. Specific duration of each single insect individual was followed, from prenymphal to chrysalid, and adult hatching. The d-day adults were pinned and dried according to standard procedures, identified and stored at the Crop Protection Laboratory of University of Sciences and Technologies of Masuku (INSAB/USTM). The insect species and relate food plant were identified using recommanded systematic papers [8, 9, 10] books [11] and the online taxonomic rational database Afromoths (www.afromoths.net).

## 3. Results and Discussion

### 3.1. Consumption and local knowledges

The insect consumption was recognized by all the interviewed people (100%), and both (100%) men and women declared the insect larvae to be tastefully appreciated. According to collecting and cooking methods, 100% of interviewed people reported to pick the later larval stage and chrysalids, under the attacked trees, within joined leaves. The insects are boiled with water and eaten directly in the household, because the harvested quantity is generally small and can not be sold. Once again, theses results are to confirm the entomophagy pratices among Bateke people [12].

### 3.2 Occurrence and local knowledges

The insect occurrence was reported (100%) to take place regularly each year during the edible insects outspread season, from october to november. This knowledge highlighted the Bateke people long tradition about insect and plant relationship [12, 13]. The insect and it host plant names were well known by all interviewed population (100%) so that the caterpillar stage is locally called *Onkunkútá* or *Onkútá*, whereas it feeding tree is named *Ombiina* (for *Tabernaemontana crassa*). This larva is so well known that people had to use a proverb on it, saying: *Onkútá ngáa katsyème ndè kasuruga ma osia*, that means *Onkútá* is so clean that it uses silk to fall from the tree. Current report is to confirm a newly former study [12] in which identification of the host plant was perfomed still the genus *Tabernaemontana* (Aocynaceae), whereas the insect (larva) was determinated as *Psara* sp. (Lepidoptera: Crambidae). This insect misidentifcation was obviously dued to the larval morphology strongly closer to *Psara* genus one.

### 3.3. Prevalence and injuries on host plants

Field investigation allowed to observe 70 host plant individuals of *Tabernaemontana crassa* attacked by the leafroller crambid (Table 1). The insect infestation was observed on all (100%) the accessible plants of the sampling sites located along the road and the forest edge, as small (< 1m), midle (1-3m) and taller (6-12m).

**Table 2:** Prevalence on host plants

| | | Host plant height range | | | | Global prevalence | |
|---|---|---|---|---|---|---|---|
| **Localities** | **Sampling spots** | **< 1m** | **1-3m** | **3-6m** | **6-12m** | **n** | **%** |
| Leconi | 6 | 3 | 4 | 4 | 6 | 17 | 100 |
| Edjouangoulou | 6 | 1 | 2 | 6 | 4 | 12 | 100 |
| Odjouma | 6 | 0 | 4 | 5 | 3 | 12 | 100 |
| Ossouélé | 7 | 2 | 7 | 9 | 15 | 33 | 100 |
| Mean | 6.25 ± 0.5 | 1.5 ± 1.3 | 4.25 ± 2.1 | 6 ± 2.2 | 7 ± 5.5 | 18.5 ± 9.9 | |
| Total | 25 | 6 | 17 | 24 | 28 | 70 | 100 |

The injuries on all trees were characterized by global defoliation on plants of all size. Symptoms of attacked leaves consisted on a brown blight leaf appearence (Fig.1). From early to mature larval stages, caterpillars roll leaf dorsally with silk and make a cell to stay and feed inside starting to eat from the apex of the leaf. On newly attacked leaves, injuries are not usually severe. When the leaf is infested by several larvae, or mature individuals, damage are obviously remarquable, consisting on leaf rolling, with severely attacked leaves becoming crumpled, followed often by a general browning and leaf falling off. Larval feeding damage caused by *P. balseralis* are similar to those of several other spilomeline pyraloids, particularly species of *Parotis* [14].

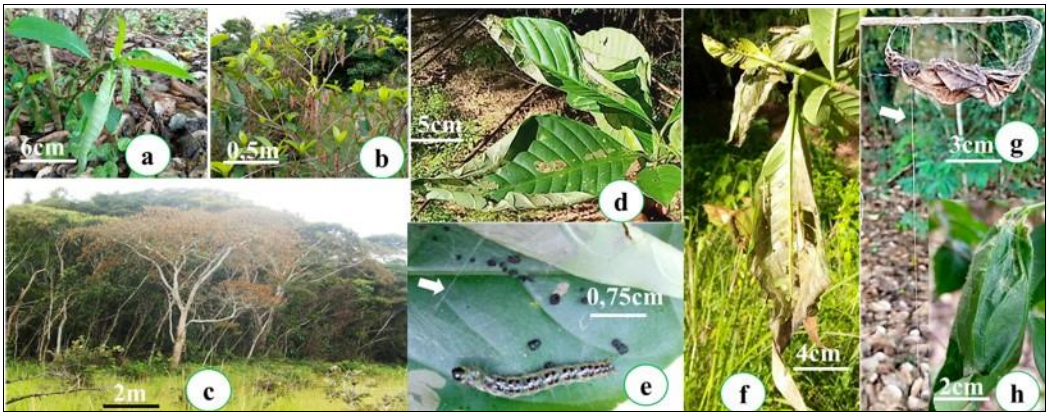


**Fig 1:** Symptoms of *Parotis baldersalis* occurence on the tree

### 3.4. Behaviour observations

The leafroller larvae of *P. baldersalis* occurs on *T. crassa* from october to november, throughout all the Plateaux Bateke area, but we have seen same attacks on *Voacanga africana* at south of Franceville (1°46'50"S; 13°47'24"E 436m), near Onkoua village. Another plant species belonging to the same Apocynaceae family, namely *Rauvolfia vomitoria* was observed with closer attacks at Ossouélé village (1°04'55"S;14°21'22"E) presumably caused by a likely spilomelinae species (with orange head: *Parotis marginata* (Hampson) ?). At early attack stage, first, second and third larval instars can co-exist with one to two individuals per stage, inside the silky tied cell, whereas only a single fully mature larval instars is observed per leaf. First larval instars generally used one half of leaf, whereas fully grown enrolled the entire leaf, wrapping all the leaf parachyma that leads to blight. The imature caterpillars are pale green (Fig.2a, b), but brown yellowish at prenymphal instar (Fig.2c), before pupation (Fig.2d, e). When the larval is about to transform to chrysalid, it falls down the tree toward a slender silky wire, and makes shelter cell tied with silk, joining leaves of underwwod plants, namely leaves of *Milletia laurentii* (Fabaceae), *Markhamia tomentosa* (Benth.) K. Schum.ex Engl. (Bognoniaceae), *Rytigynia senegalensis* Blum (Rubiaceae), *Sapium cornutum* Pax (Euphorbaceae), *Afromomum stipulatum* (Gagnep.) K.Schum (Zingiberaceae) and *Caloncoba welwitschii* (Oliv.) Glg (Flacourtiaceae). Some black ants, *Crematogaster* sp were seen to co-habit on same twigs, but mutualism was not observed. Sometimes, dead larvae are eating by ants (Fig.2 h).

### 3.4. Identification and description

Six larvae brought to laboratory were kept in rearing boxes covered with gaze tissue, until pupation and adult emergence. Five chrysalids were formed, and only four adults emerged with characteristics that allow to identify the specimens as indidviduals of *Parotis baldersalis* Walker (Lepidoptera: Crambidae: spilomelinae). The larva of *P. baldersalis* is pale green, with a black head bearing a white reverse Y (Fig.2a, b). The body is characterized by a first thoracic segment (T1) bearing a black capsule longitudinally subdivised with a large body color spatch; and the presence of four dorsal spots on most of segments (Fig.2c). On the second and third thoracic segment, spots are transversally oriented: but from the fourth to the eigth (abdominal segment) spots are dorso-longitudinally oriented. The nineth segment has a single large black spot, and the tenth a pale anal schield (fig.2c). Larvae assessment from field to laboratory allowed to record size of the five larval instars (Length: L; breadth: d), as L1 (L= 5mm, d=0,5 mm), L2 (L=10mm, d=1mm), L3 (L=20-25mm, d=1,5mm), L4 (L=30-35mm, d=2mm), and L5 (L=40mm, d=3mm), respectively first, second, third, fourth and fifth instar larvae. Pupa has the region of the labial palpi extended forward as a crest (Fig.2d, e), as generally seen on related Spilomelinae species. The newly form chrysalid is brown yellowish (Fig.2d) and the mature one is brown dark (Fig. e). The adult is a clear-green moth (Fig.2f), with a black spot in their middle of the forewings, and wingspan is about 50 mm. As for all males of this genus bearing a hairy black pencil, the male of *P. baldersalis* is recognized by a black hairy stuff at it abdominal extremity (Fig.2g). Antennae are brown, two third length of the forewings. The edge of the forewings, the palpae, and the brush of anterior tibia are brown. Observation in laboratory of a former collected chrysalid of *P. baldersalis* allowed hatching of a wasp parasitoid belonging to genus *Latibulus* Gistel (Hymenoptera: Ichneumonidae) [15] (fig.2i).

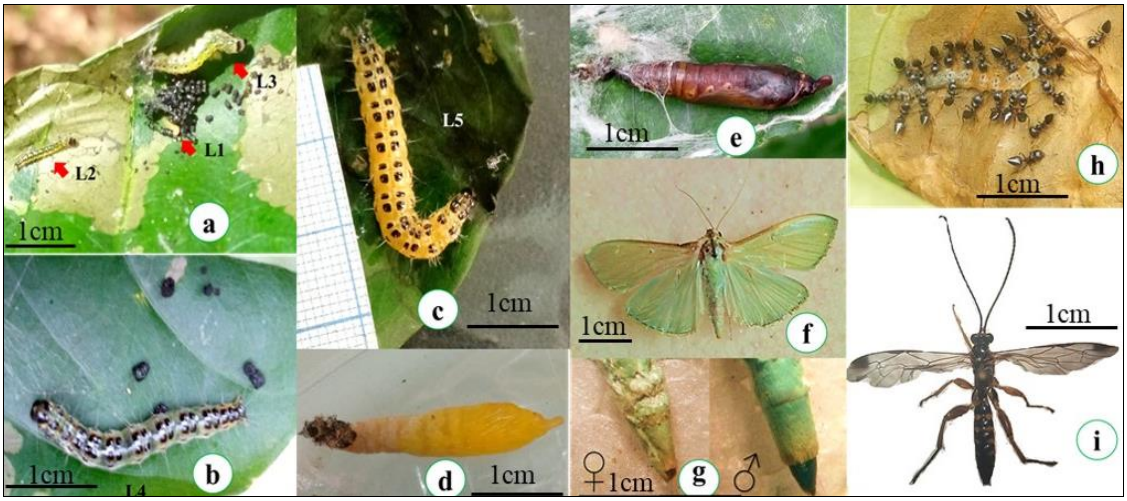


**Fig 2:** The Insect instars of *P. baldersalis* and relate predaceous.

## 4. Conclusion

The moth, *Parotis baldersalis* Walker (Lepdoptera: Crambidae) is the first time reported causing injury on leaves of *Tabernaemontana crassa* (Apocynaceae) in the Plateaux Bateke region, eastern Gabon. The insect species is well known by local population as edible caterpillar called *Onkútá*. The insect damage is only due to larval leaf consumption, turning to the foliage burning appearence, and dropping. *Voacanga africana* was observed to be an accesory feeding plant. The main stages were observed, and the adult hatching in laboratory allowed to the make scientific identification. These results provided a better comprehensive behavor and ecological role of this insect in Gabon, with occurrence restricted to spontaneous host plants. Further studies are to be focused on the insect nutritional value and life cycle traits with purpose of rearing and producing this insect as human ressource food and animal feed.

## 5. Acknowledgements

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