

Original Research Paper

## Beekeeping features in the Cameroon Adamawa grasslands

Meutchieye F. <sup>1\*</sup> Ngamadjeu D.D<sup>1</sup> Tchoumboue J. <sup>1</sup>

<sup>1</sup>Department of Animal Production, FASA, University of Dschang, Cameroon

**\*Corresponding Author:** F. Meutchieye, Faculty of Agronomy and Agricultural Sciences /University of Dschang, Dschang, Cameroon; **Email:** [fmeutchieye@gmail.com](mailto:fmeutchieye@gmail.com) [fmeutchieye@univ-dschang.org](mailto:fmeutchieye@univ-dschang.org)

**Article history:** Received: July 20th- 2018: Revised: July 29th- 2018: Accepted: August 5th- 2018

### Abstract:

Socioeconomic and technical factors influencing beekeeping were assessed in Mayo Banyo Division, Cameroon (Adamawa Highlands agroecological zone) from April and July 2015. A total of 113 befarmers were surveyed using semi structural questionnaire, interviews and direct observations. Bees and beehive products were also described using classical features. Results showed that beekeepers were exclusively men, with 100% of respondents. They are between 30-50 years and married for more than 80% and all Muslim in Mayo Banyo. Less than 87% respondents have attended formal school. Nevertheless majority of them have been keeping bees for at least 15 years with main production objective being market and also own consumption. Bee species encountered in colonies is *Apis mellifera adansonii*, the African common bee, generally yellowish (in more than 89% colonies). The production system is predominantly extensive, fixed hives being the main used, with number varying from 1 to 800 in the survey. Hives are placed on trees, at 1m at least above the soil. Bee wax is used as the main swarm attractant. Major beehives' products are: honey (5 to 20 litres/hive) which is harvested yearly once in Mayo Banyo, wax, and rarely propolis and pollen. The main constraints identified are lack of training, colony absconding and pathologies, made up of predators and particularly hives' moth. Beekeeping in Mayo Banyo division has socioeconomic and environmental potentials for communities' livelihoods, though serious actions for improvement are required.

**Keywords:** *Apis mellifera*, livelihoods, beekeeping, honey, Cameroon

### Introduction

Beekeeping has been considered as crucial for income generation alternative opportunity for rural populations. Its poverty alleviation potentials have been demonstrated in several cases in Cameroon (Tsafack, 2011). Cameroon national beekeeping and honey production, ranked first in Central Africa region is fast growing in Adamawa, West, North West and East regions. Productivity constraints have been highlighted in literature, pointing out gaps to be addressed accordingly for situation improvement (Founadoudou, 2007; Matso *et al.*, 2011; Fotso *et al.*, 2014; Meutchieye *et al.*, 2018). Though Adamawa region is recognized for its leading role in national honey production and trade, little reliable information is available concerning the Mayo Banyo plateaux (Founadoudou, 2007; Mbogning *et al.*, 2011) which is suspected to be an important place in honey industry for now and the future, given its natural vegetation. This research was carried out from May to September 2015, with the objective to evaluate the socio-economic characteristics of beekeeping in Mayo Banyo (Cameroon Adamawa region).

### Materials and methods

Mayo Banyo division is located in Adamawa region, expanding from 6 to 8° Northern and between 10 to 16° Eastern. The area is dominated by humid woody savannah and high plateaux, between 900 to 1300m above sea level (Founadoudou, 2007). In order to investigate on socioeconomic and technical characteristics of beekeepers, using the Open Data Kit procedure, a total of 113 beekeepers living in Mayo Banyo Division were sampled in the following communities: Banyo (Banyo centre, Mouroum, Allate, Toukouwa, Taran-

siri, Taran-Katarko, Mbouwbou, Mafowrou, for a total of 52 beekeepers), Wawa (Gandowa-wawa, Gandowa-Foulbe, Woumyari-Wawa, Bacewa, Taramyabam-Wawa, Tarambadjam, Tagnan, Boundji for a total of 27 beekeepers) and Laman (Yaouroun, Labaré, Yamaossaoum, youngary, Gaoula, Kassawa) for a total of 34 beekeepers.

## Results and Discussion

The findings indicated that (Tab.1): beekeeping in exclusively a male activity (100%), aged from 30 to 50, Muslim (88%) and married (88%), with a household of 5 to 10 persons. Majority (96%) of beekeepers never attended formal education. Only 13% of the interviewed beefarmers considered beekeeping as the main income activity, while enterprise objectives (95.6%) were: sales, first in combination with auto-consumption. The production system is extensive, with low quality beehives (Fig.1), mostly fix hive with mobile frame, built with available materials and conical in form (95%), with life span of 2 to 5 years.

**Table 1:** Distribution of beefarmers (%) according to beehives number, types and forms per communities

Parameters and characteristics	Communities			
	Banyo (52)	Wawa (27)	Laman (34)	Total (113)
<b>Number of beehives</b>				
[1-11[	0.0(0)	11.1(3)	2.9 (1)	3.5(4)
[11-31[	25.0(13)	18.05(5)	20.6 (7)	22.1(25)
[31-51[	21.2(11)	11.1(3)	17.7 (6)	17.8(20)
[51-100[	26.9(14)	22.2(6)	14.7(5)	22.1(25)
≥100	19.2(10)	0.0(0)	14.7(5)	8.8(15)
Non defined	7.7(4)	37.0(10)	29.4(10)	21.2(24)
<b>Types of beehives</b>				
Fix hives	82.7 (43)	92.6(25)	97.1 (33)	89.4 (101)
Mobile bar hives	1.9 (1)	0.0(0)	0.0(0)	0.9 (1)
Both types	14.2 (8)	7.4(2)	2.9 (1)	9.7(11)
<b>Forms of beehives*</b>				
Cylindrical	51.9(27)	37.0(10)	41.2(14)	45.1(51)
Parallelepipedic	3.8(2)	0.0(0)	0.0(0)	1.8(2)
Kenyan Top Bar	15.4(8)	7.4(2)	2.9(1)	9.7(11)
Cubical	3.8(2)	0.0(0)	0.0(0)	1.8(2)
Conical	90.4(47)	96.3(26)	100.0(34)	94.7(107)

( ) : number of occurrence ; \* the same beefarmer could give more than one form



Figure 1: Beehives types used in Mayo Banyo Division

The bees' colonies were made up of African honey bee, *Apis mellifera adansonii* usually yellowish in colour (91%). Beehives in Mayo Banyo highlands tend to be less "traditional" with higher proportion of mobile bars and Kenyan Top Bar hives (Njia, 1999; Abongu, 2001; Niba & Ingram, 2008; Mbogning *et al.*, 2011).

As illustrated at table 1, the hives were mostly installed between October and January (100%), mostly on trees (23%), at a height of 1-6m (96%) because of theft and wild bush fire.

The number hives per individual farmer varied from 1 to 800 (Tab. 2). Majority of farmers had more than 30 beehives, and around 20% having more than 100 installed in neighboring savannas of their communities. The number of hives per farmer is influenced by abundance of flowering savanna plants (Founadoudou, 2007; Mbogning *et al.*, 2011; Tchoumboue *et al.*, 2001). The relative abundance of bee colonies in the region is very useful for fruits production. Almost all hives were of fix bar type, and a majority being either cylindrical or conical. Abongu (2001) and Baimenda (2010) observed different trends in the North West region, where in relatively educated communities farmers adopted in higher proportion the mobile frames hives.

The interval between installation and harvesting was ranged from 6 to 12 months (Tab.2). The bait used was wax (91%). Technical and individual equipment were as follows: body protection (41%) and smoker (19%). Harvesting was carried out once a year (97%), at night (69%), February and June being the main period of harvest. Intervals between installation and harvesting, as well as harvesting schedules are similar to observations made by Abongu (2001), Niba & Ingram (2008) and Tchoumboue *et al.*, (2010) in western highlands. But in highly dense cultivated areas, the installation period tended to be at the beginning of dry season (December mid January) according to Njia (1999).

**Table 2:** Various time intervals in Mayo Banyo division honey bees' exploitation

Parameters	Communities			
	Banyo (52)	Wawa (27)	Laman (34)	Total (113)
<b>Installation-Colonizing interval (yrs)</b>				
<1	38.5(20)	37.6(10)	20.6(7)	32.7(37)
>1-3	21.2(11)	22.2(6)	38.2(13)	26.6(30)
Do not know	40.4(21)	40.7(11)	40.2(14)	40.7(46)
<b>Total number of hives</b>				
Observed	2292	2847	1900	7042
Colonized	1657	1993	1302	4952
Colonizing rate (%)	72.3	70.0	68.5	70.3
<b>Colonizing-Harvesting interval (months)</b>				
6≤12	57.7 (30)	74.1 (20)	44.1 (15)	57.5 (65)
≥12	3.8 (2)	0.0 (0)	14.8 (5)	6.2 (7)
Do not Know	38.5 (20)	25.9 (7)	41.1 (14)	36.3 (41)
<b>Installation-harvesting interval (months)</b>				
6≤12	19.2 (10)	29.9 (8)	32.3 (11)	25.7 (29)
≥12	1.9 (1)	14.8 (4)	5.9 (2)	6.2 (7)
Do not know	78.9 (41)	55.6 (15)	61.8 (21)	68.1 (77)

( ) : number of occurrence

The hive products were (Tab. 3): honey (100%), wax (88%), propolis (5%) and pollen (2%). The average honey production varied from 5 to 20 litres per hive. Honey color varied from brown to dark brown.

**Table 3:** Major beehives products exploited in Mayo Banyo

Beehive products	Communities			
	Banyo (52)	Wawa (27)	Laman (34)	Total (113)
Honey	100.0 (52)	100.0 (27)	100.0 (34)	100.0 (113)
Wax	94.2 (49)	85.2 (23)	82.4 (28)	88.5 (100)
Propolis	9.6 (5)	0.0 (0)	2.9 (1)	5.3 (6)
Pollen	3.8 (2)	0.0 (0)	0.0 (0)	1.8 (2)

() : number of occurrence ; the same respondent could choose several products

Almost everywhere in Cameroon, the same trends were observed concerning beehives products preferences (Njia, 1999; Abongu, 2001; Baimenda, 2010; Fotso *et al.*, 2014). Beekeepers in Mayo Banyo mainly produce honey and less other highly demanded beefarming products (Founadoudou, 2007; Fotso *et al.*, 2014; Meutchieye *et al.*, 2018). These trends could be explained by technical factors (Meutchieye *et al.*, 2018). Honey color is considered as a “landmark” (Mbogning *et al.*, 2011). It is known that only Oku honey is purely white-creamy (Niba & Ingram, 2008; Meutchieye *et al.*, 2018), and other honey quality is not easy to honey because of smooth invasion and intrusion of foreign plant species and varieties in Cameroon without proper control (PANAPRESS, 2005; Moity-Maizy and Sautier, 2006).

As it is shown in Tab.4, large majority of beefarmers operating in Mayo Banyo had received no formal training. This information is from households and contacts with experienced beefarmers. Almost all the beefarmers depend on their own savings to start beekeeping and there is no tendency of forming beefarmers' group in the region.

**Table 4:** Distribution of beefarmers (%) according to training experience, funding sources and membership to honeybee associations and per community

Paramaters	Communities			
	Banyo (52)	Wawa (27)	Laman (34)	Total (113)
<b>Training in beefarming</b>				
Yes	19.2(10)	7.4(2)	8.8(3)	13.3(15)
No	80.8(42)	92.6(25)	91.2(31)	86.7 (98)
<b>Funding Sources</b>				
Own savings	96.2(50)	96.3(26)	100.0(34)	97.3 (110)
Own savings and loans	3.8(2)	3.7(1)	0.0(0)	2.7(3)
<b>Membership to an association</b>				
Yes	11.5(6)	0.0(0)	0.0 (0)	5.3(6)
No	88.5(46)	100.0 (27)	100.0(34)	94.5(107)

() : number of occurrence

Beefarming training has been the avenue developed by NGOs and other small relief services in rural communities of Cameroon western highlands since the nineties (Njia, 1999; Abongu, 2001; Niba & Ingram, 2008; Baimenda, 2010). Other regions have been neglected because of remoteness or lack of incentives. Like in other parts of the country, beefarming is considered as household enterprise and less subjected to funding schemes. Only some Microfinance Institutions in North West region with the collaboration of NGOs have recently started providing loans to farmers, and these induced groups or cooperatives formation to harness processing, packaging and better sales margins (Moity-Maizy et Sautier, 2006; Niba & Ingram, 2008; Meutchieye *et al.*, 2018). Many other elements factor the performance of honeybee farming in the study.

It was demonstrated that the beekeeping performances were significantly influenced by communities and experience (Tab. 5). Experience has been found to be the most relevant influential factor. The ministry of Livestock under which falls beekeeping has been very slow to develop and implement honeybee farming pragmatic policies (MINEPIA, 2011).

**Table 5:** Correlation between few variables in Mayo Banyo communities

Variable	Communities	Age	Experience	Training
Age	Banyo	1	0.0380**	0.016
	Wawa		0.0480**	0.060
	Laman		0.0350**	0.247
Experience	Banyo	1		-0.270
	Wawa			-0.256
	Laman			-0.256

\*\* significant  $P < 0.01$

Management was a real challenge in the study area concerning all critical steps. The absconding and poor hives handling could be explanatory to 30% empty hives recorded during the survey as already reported by several comparable analyzes (Founadoudou, 2007; Matso *et al.*, 2011; Fotso *et al.*, 2014; Meutchieye *et al.*, 2018). Among constraints, pests' invasion was very common and treatments nonexistent.

Beehives' damaging pests have been observed in poorly managed colonies (Fig. 2).



**Figure 2:** Bees' comb heavily infested by *Galleria mellonella*

Njia (1999) and Fotso *et al.*, (2014) also recorded serious beehives pests, mostly insects and in higher proportion the deadly hive moth. Despite these challenges, the income generated by honey per hive varied from CFA francs 11 500 to 11 600 and 13 825 to 13 900 per annum for shaft conical and top bar hives respectively. Matso *et al.*, (2011) recorded close findings in their research in the North West region. This made honeybee farming a sustainable income generating activity in Adamawa region. There are areas to be amended for better benefits, both for communities and the entire surroundings. The impact of beekeeping on horticulture has been not yet assessed in the region.

## Conclusion

Beekeeping activities are very popular in Mayo Banyo division. Technical transition is not yet clear, placing the honeybee exploitation between "hunting" and modern apiculture. The challenges identified were financial, poor management skills, pathologies and storage, which affect beehives products quality. Trade is not well structured and could be of interest for better marketing while the impact of honeybee in local vegetation dynamics could be also assessed in future investigations.

## Acknowledgement

This study benefited from various field guides, particularly the Mayo Banyo traditional heads and the MINEPIA local staff to facilitate contacts with farmers.

### Author's Contributions

**Meutchieye** designed and monitored the whole study; **Ngammadjeu** led the data collection and primary data analysis; **Tchoumboue** contributed to further analyses and paper write-up.

### Ethics

Authors declare that there are ethical issues that may arise after the publication of this manuscript.

### References

- Abongu, L. 2001.** Gender and Beekeeping in the North-West province of Cameroon Case of localities under INADES Formation Backup actions in Belo, Fundong, Kedjom Ketinguh and Mbengwi. Unpublished Agricultural Engineer thesis, University of Dschang, Cameroon.
- Baimenda EB 2010.** Socio-Economic Analysis of Beekeeping in Oku Sub-Division in Bui Division of the North West region, Cameroon. Unpublished. Agricultural Engineer thesis, University of Dschang, Cameroon.
- Fotso KPR. Meutchieye F. Andriamanalina SI. Youbissi A. Tchoumboué J. Pinta JY. Zango P 2014.** Caractéristiques socio-économiques et techniques de l'apiculture dans les Départements de Bamboutos, Mifi et Menoua (Région de l'Ouest-Cameroun). *Livestock Research for Rural Development* **26** (12) 2014. <http://www.lrrd.org/lrrd26/12/fots26221.htm>
- Founadoudou E 2007.** Caractéristiques socio-économiques et techniques de l'Apiculture de la zone Soudano-Guinéenne de l'Adamaoua (Cameroun). Unpublished Cameroon. Agricultural Engineer thesis, University of Dschang, Cameroon.
- Mbogning E. Tchoumboue J. Damesse F. Sanou SM. Antonella C 2011** Caractéristiques physico-chimiques des miels de la zone Soudano-guinéenne de l'Ouest et de l'Adamaoua Cameroun. *Tropicultura* **29** (3) :168-175. ISSN 0771-3312 eISSN 2295-8010
- MINEPIA. 2011.** Document de Stratégie du Sous Secteur de l'Elevage, des pêches et des industries animales, Division des Etudes, des Statistiques et de la Coopération. 125p.
- Meutchieye F. Sanglier M. Gildemacher B 2018.** Honey bee keeping in mountainous environment: socio economic features and prospects for ecosystem resilience in Oku region - Cameroon. *ÉMERGENCE SUD, Revue Universitaire des Sociétés Africaines Renaissance* **1** (1) :167- 191. ISBN 978-1-937030-81-0.
- Moity-Maizy P. Sautier D 2006.** Produits d'origine en Afrique de l'Ouest et du Centre : potentiels et controverses des démarches de certification. III Congreso Internacional de la Red SIAL « *Sistemas Agroalimentares Locales* », Alimentación y territorios « ALTER 2006 ». Baeza (Jaén), España. [sy.al.agropolis.fr/ALTER06/pdf/actes/c14.pdf](http://sy.al.agropolis.fr/ALTER06/pdf/actes/c14.pdf)
- Niba, J. Ingram V. 2008.** Market Access for Cameroon Honey: Challenges and Opportunities for Cameroon Honey to Access European Markets, WS 2: Vertical integration: farming systems in food chain, 8th European IFSA Symposium, 6 -10 July 2008, Clermont-Ferrand (France).
- Njia MN 1999.** Caractéristiques socio-économiques et techniques de l'Apiculture dans les Hauts Plateaux de l'Ouest Cameroun. Unpublished Agricultural Engineer thesis, University of Dschang, Cameroon.
- PANAPRESS 2005.** Cameroun, des semences OGM distribuées dans le Nord. on Afric.com :<http://www.afrik.com/article9172.html> Accessed on the 12/12 /2017
- Tchoumboué J. Tchouamo IR. Pinta JY. Njia MN 2001** Caractéristiques socio-économiques et techniques de l'apiculture dans les hauts plateaux de l'Ouest du Cameroun. *Tropicultura* **19** (3) : 141-146. ISSN 0771-3312 eISSN 2295-8010
- Matso AST. Achu GM. Kamajou F. Ingram V. Boboh MV 2011.** Etude comparative de la rentabilité de deux types d'apiculture au nord ouest Cameroun. *Tropicultura* **29** (1):3-7. ISSN: 0771-3312.