

## LOCAL KNOWLEDGE AND PEASANT ADAPTATION TO BEEKEEPING IN THE CHIEFDOM OF PANDURU IN THE PROVINCE OF ITURI, DRC

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### SUMMARY

Beekeeping is a science that allows humans to breed bees. This practice has existed since prehistoric times, and today it is practicing all over the world. This activity offers a good way to generate additional income for households from natural resources without damaging them. Man does not only derive honey, but also and above all much more from other products namely: wax, pollen, propolis (the vegetable resin that bees use as a mortar), royal jelly (the secretion that the larvae and the queen of the colony are fed) and venom are all

examples of products that humans derive from the bee. The evaluation by the population survey of the Chiefdom of PANDURU illustrates that this population has local knowledge and adapts to beekeeping activity from local materials or 67.30%. While 46.16% remain in the traditional exploitation with rudimentary local materials against 19.23% who migrate to the modernization of beekeeping. However, it should be noted that most of the beekeepers of PANDURU or 85.71% of the respondents have serious difficulties in the modern operation of beekeeping. These results reflect the low level of adaptation of the population to modern

technology of bee exploitation in beekeeping in the PANDURU Chiefdom in Mahagi Territory, Democratic Republic of Congo.

**KEYWORDS:** *Knowledge, local, adaptation, peasant, beekeeping, Panduru.*

## 1. INTRODUCTION

The breeding of bees nowadays as in most parts of the world, is carried out through the European bee *Apis mellifera*, although in large regions of (sub)tropical Asia, the most common species is the *Apis cerana*, quite similar by the way. Even if the composition of a bee colony is basically the same all over the world, bee management must be adapted to the species and breed, climate and vegetation.

In developing countries, particularly in sub-Saharan Africa, agriculture and related activities are the main sector contributing significantly to the diet and economic life of rural households (Voahirana, 2013). Although they continue to be carried out using rudimentary techniques and production is relatively low, IFAD (2011) cited by Kistali (2013), argues that they play a very fundamental role in these countries. More than 80% of rural populations derive their livelihood from it.

Thus, in the face of poverty and food insecurity dominating rural Africa, the agricultural sector represents an essential development tool. Its strengthening must be considered a priority strategy to eradicate these scourges and ensure the improvement of the precarious living conditions of rural populations. It should involve all related activities, including fish farming. Lazard (2005) and HishaMunda et al. (2011) argue that fish farming has the potential to offer the poor several opportunities to improve their well-being and quality of life

Beekeeping is a branch of agriculture that consists of the breeding of honey bees to exploit the products of the hive, mainly honey but also wax, royal jelly, pollen and propolis, even bee venom. The beekeeper must provide the apiary with shelter, care, and care for its environment (NASSOUROU et al.2018,).

Practiced on all continents, this activity differs according to the varieties of bees, the climate and the level of economic development. It is an activity where ancestral methods such as harvesting honey by pressing combs still meet today, but also modern methods such as extraction by centrifugal force, artificial insemination, or the study of the path of bees equipped with radar micro reflectors (JANIN P., A. ROY, 2016).

The role of bees in generating sustainable livelihoods is little known and appreciated even though they are a fantastic source of it globally. Indeed, they are essential for the environment because they pollinate flowering plants including crops and therefore increase seed and fruit yields (BRANDEAR, 2010 a) which was illustrated in June 2022, the beneficial fact of honey bees for coffee pollination has increased by 50% (BRADDEAR, year c).

Beekeeping can be practiced for many different reasons such as: hobby, by passion for bees or by environmental motivations, as a food supplement or as an economic activity, as a main or secondary or third rank. (MAYAZINE, 2018). Perceived as a hobby or a secondary activity, beekeeping can often be true and represent for some populations an activity that among all the existing options guarantees livelihoods for the rural population. Beekeeping and related commercial activities tend to be minimized both at the policy and planning level of decision-makers (FOURASPIE, 1965b).

The passion for the beekeeper arises in particular from the meeting of a beekeeper, the visit of the apiary, a friend or a relative, the taste or appetite of his own honey at the table, the gift to a friend of a jar of honey from his apiary, the ever-increasing demand for good quality hive products due to the fact that the beekeeper is the village doctor (BETAYENE, 2008).

As an income-generating activity, beekeeping contributes to the development of the local economy and the fight against rural exodus, especially of young people, and offers an alternative to populations living near protected areas and thus contributes to the protection of it. (BENOIT, 2018). It is in this perspective that we thought it would be interesting to evaluate local knowledge and peasant adaptation to beekeeping in the Panduru chiefdom in order to encourage peasants to practice beekeeping, which seems to be neglected, as well as demonstrating that it is a source of income at a lower cost of production by using local materials for socio-economic life (IDRISSOU *et al.* 2019).

## **2. EQUIPMENT AND METHOD**

### **2. 1. Middle**

The Chiefdom of PANDURU is one of the decentralized administrative entities of Ituri Province, in Mahagi Territory, bordering Uganda. The present study was carried out on the extent of the territory of Mahagi in the northeastern province of Ituri of the DRC in the chiefdom of Panduru has ecologically very favorable to beekeeping. The soil of Mahagi is

humus-rich clay sand and fertile with a sandy clay mixture in the valleys. INERA NIOKA Climate Service, 1985.

Mahagi enjoys a climate of type A in the Koppen classification it is the humid tropical climate characterized by the alternation of the dry and rainy season with the divided average temperature of the coldest month above 18 degrees Celsius and where the annual rainfall height at the same time is greater than twice. This temperature increases by 14 degrees Celsius (UGWOKI, 2014). The vegetation of the territory is dominated by savannah in several plant groups, we find: setaria, sphacelata imperata eyhindrica, cymbogon afronardus, penisedum sp and some shrubs and small bushes (ANONYMOUS, 2011).

## 2.2. Hardware

Agriculture currently based on monoculture does not ensure a broad spectrum in the diversity of food for bees. In the same vein, modern agriculture uses pesticides, such as neonicotinoids that have a major impact on our precious bees. It is worth recalling here the negative impact due to air pollution, diseases and the reduction of their natural flowering meadow habitat. This indicates the scientific interest in the face of the worrying decline in bee populations. During these investigations, we used a number of biotic and abiotic material, including a survey questionnaire previously designed for this purpose, respondents, etc.

The hive used must be adapted to the chosen beekeeping method. There is a great diversity of hives, ranging from relatively simple hives from cheaper local materials. Through beekeeping worldwide, the three types of hives most often used are:

- Hives with fixed spokes.
- Mobile ray hives with upper strips.
- Mobile ray hives with frames.



Photo: Frame covered with bees, extracted from a hive by a beekeeper.

### 2.3. METHODOLOGY

In beekeeping, low-acquisition techniques involving the use of local bee breeds and local knowledge and materials are the key to success for individual beekeepers or for the economic interest of households. Through this study, the use of the descriptive approach proved imperative, in order to establish the state of play of beekeeping in the chiefdom of Panduru in Mahagi Territory, Ituri Province, at the same time question and evaluate local knowledge in beekeeping.

On the basis of a previously drawn up questionnaire, a survey was conducted on a sample of 52 peasant beekeepers chosen randomly without distinction of sex or age. Some variables were selected for this evaluation, namely: local knowledge of beekeeping, adaptation or experience in beekeeping practice, types of hives used, duration of harvest, quantity of honey harvested by type of hive, price of honey in the environment, origin of buyers, objective of beekeeping and difficulties related to this beekeeping activity. The data thus collected were compiled in the Excel spreadsheet for statistical analysis and interpretation on the basis of frequency.

### 3. PRESENTATION OF RESULTS

In the chiefdom of PANDURU in Mahagi Territory, Ituri Province, the practice of beekeeping is well introduced in rural areas. However, its implementation is likely to be hampered by the difficulty of having hives made by carpenters who can make hives from local materials.

#### 3.1. Knowledge of beekeeping

**Table 1: Distribution of respondents according to knowledge of beekeeping.**

Knowledge of beekeeping	Actual	%
Yes	35	67,3
No	17	32,7
Total	52	100

This table shows that 67.3% of our respondents have knowledge about beekeeping against 32.7% who have none.

Figure 1: knowledge curve of beekeeping by Panduru respondents

#### 3.2. Experience in beekeeping practice

Table 2. Distribution of respondents according to their experience in beekeeping practice

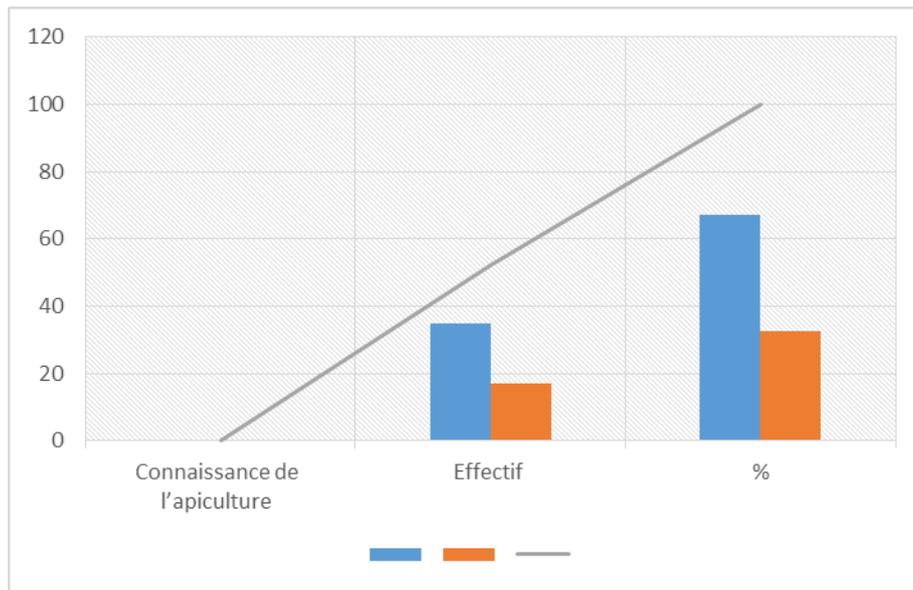


Figure 1: Knowledge Curve of Beekeeping By Panduru Respondents.

### 3.2. Experience in beekeeping practice

Table 2: Distribution of respondents according to their experience in beekeeping practice.

Experience in beekeeping	Actual	%
<1 an	0	0
1 an	8	22,86
>1 an	2	5,71
>2ans	25	71,43
Total	35	100

The table above that 22.86% of respondents have been beekeeping for 1 year; 5.71% for more than one year and 71.43% have more than two years in this practice.

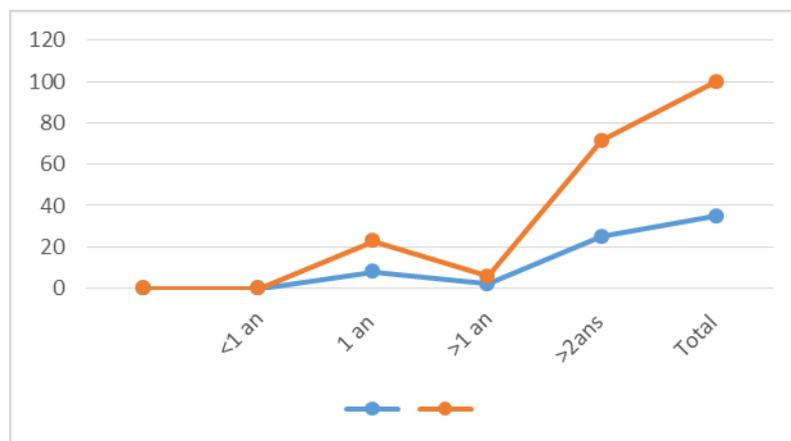


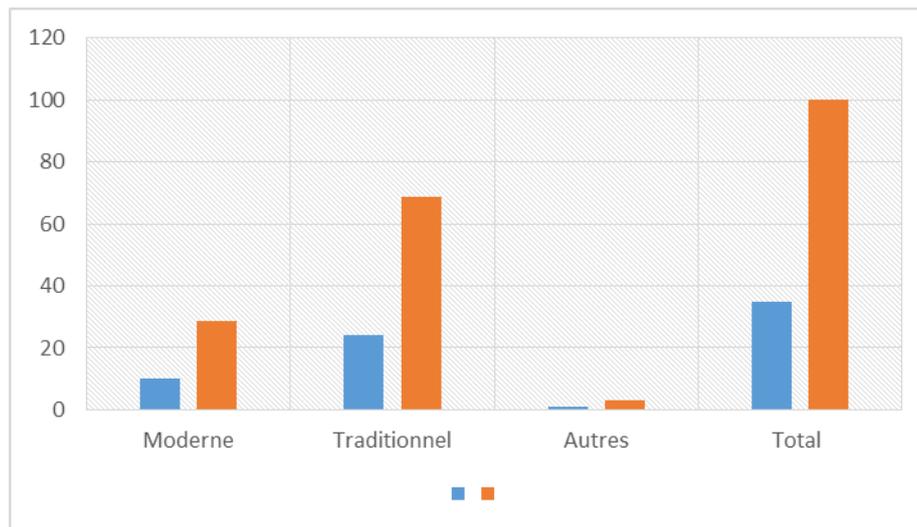
Figure 2: Experience in beekeeping among respondents.

### 3.3. Types of hives used

**Table 3: Distribution of beekeepers according to the types of hives used.**

Types of hives used	Actual	%
Moderne	10	28,57
Traditionnel	24	68,57
Autres	1	2,86
Total	35	100

Table 3 shows that 28.57% of beekeepers use hives of the modern type, 68.57% use hives of the traditional type and only 2.86% use other types of hives



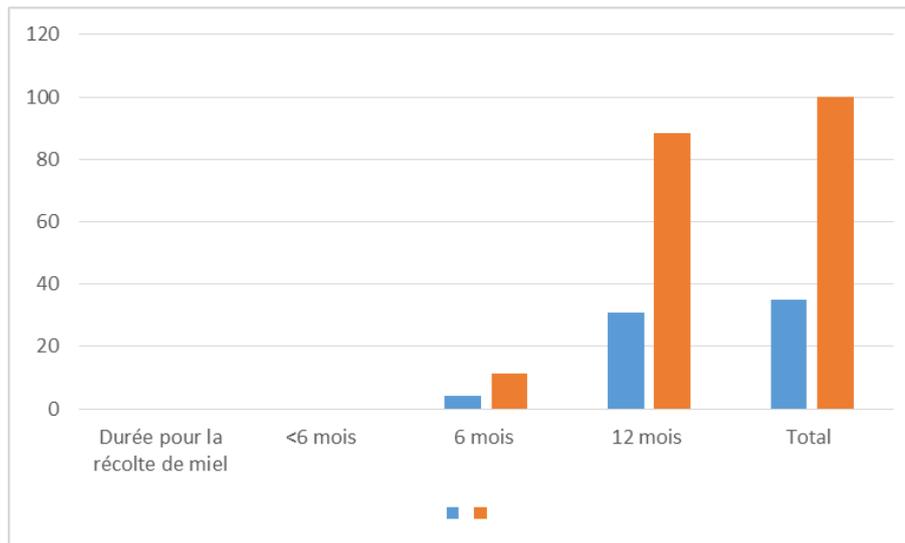
**Fig. 3: Type of hives used by Panduru beekeepers.**

### 3.4. Time to harvest honey

**Table 4: Distribution of beekeepers by duration for honey harvesting.**

Time for Honey Harvesting	Actual	%
<6 mois	0	0
6 mois	4	11,43
12 mois	31	88,57
Total	35	100

The table above states that no beekeeper harvests honey from his rich man before 6 months, 11.43% of respondents harvest it at 6 months, and 88.57% harvest it at 12 months.



**Figure 4: Harvest duration graph.**

### 3.5. Quantity of honey harvested by type of hive/harvest

**Table 5: Distribution of respondents by quantity of honey harvested/type of hive/harvest.**

Type of hive	Average amount of honey harvested/harvested
Modern	18.16 liters
Traditional	9.42 liters
Other	4.7 liters

Modern type hives produce an average of 18.16 liters of honey per harvest, double the traditional type hives with an average of 9.42 liters per harvest.

### 3.6. The selling price of honey in the environment

**Table 6: From the selling price of honey in the environment.**

Question	Number of respondents	%	Average price/ litre	
			In FC	In USD
At what price do you currently sell 1 liter of honey in the middle?	31	59,6	4.614	2,24
	2	3,84	3.500 1.69	
	2	3,84	Have not yet harvested this year.	
	17	32,69	Do not know the selling price.	
Total	52	100	-	

This table reveals that the price of a liter of honey in the middle for 59.6% of respondents is 2.24 US \$ on average or 4614 Congolese Franc, 3.84 beekeepers sell in the neighboring country in Uganda and did not want to provide us with the secret of their price and 3.84% have not yet harvested this year, while 32.69% are not informed of the selling price in the middle.

### 3.7. Origin of honey buyers

**Table 7: Distribution of respondents according to the origin of honey buyers.**

Origin of honey buyers	Actual	%
Local buyers	31	88,56
Exporters (Ugandan and Kenyan)	2	5,72
Not known	2	5,72
Total	35	100

This table reveals that 88.56% of beekeepers surveyed sell their honey on local markets and in retail, 5.72% sell it to Ugandan and Kenyan exporters and 5.72% do not control the origin of buyers.

### 3.8. Objectives of beekeeping

In relation to the objectives of beekeeping, all respondents practice it not only for domestic self-consumption but also as an income-generating activity and as a therapeutic product widely used in traditional medicine.

### 3.9. Difficulties encountered in the practice of beekeeping

**Table 9: Distribution of respondents according to difficulties encountered in beekeeping.**

Difficulties encountered in beekeeping	Actual	%
Lack of adequate equipment, lack of supervision and proper procurement	30	85,71
Scarcity of space for beekeeping	2	5,72
Accidents caused by bees	3	8,57
Total	35	100

Most beekeepers (85.71%) find it difficult to find it difficult to find it the lack of appropriate equipment, the lack of supervision and no market; 5.72% raise the scarcity of space for beekeeping and 8.57% fear accidents caused by bees.

### 3.10. Comparison of the size of hives used worldwide and in Panduru

**Table 10: Sizes and dimensions for breeding several breeds of honey bees (*Apis mellifera* and *Apis cerana*).**

Bee breed	Deviation of Rays (mm)	Diameter of The cell (mm)	Diameter of The queen grid (mm)
<i>Apis mellifera</i>			
European	35	5,3	4,2
East Africa ( <i>Apis mellifera scutellata</i> )	32	4,8	4,4

<i>Apis cerana</i>			
Nepal	30	3,5	
India:	35	4,8	4,1
-Cashmere	31	4,9	4,0
- High Himalayas	31	4,7	3,8
- Lower Himalayas	32	4,5	3,5
- Central India	32	4,3	-
- South India	30	4,7	-
-Philippines			
Viet Nam:	31	4,7	-
-North	26	4,3	-
-South			

#### 4. DISCUSSION OF RESULTS

The objective of this study was to assess local knowledge and peasant adaptation to beekeeping in chiefdom of the Panduru, Ituri province, DRC. From this study, some results proved that the population surveyed has local knowledge and adapts to beekeeping activities, 67.30% of which about 48.07% have been practicing it for more than two years already.

With a view to modernizing this beekeeping activity, 46.16% remain in the traditional farm with rudimentary local materials against 19.23% who migrate to the modern farm of the Kenyan type. Compared to the length of time to harvest honey, 59.61% report harvesting after 12 months against 7.69% who harvest after 6 months. From our study, it should be remembered that POSHO NDOLA (2014) specifies that the honey harvest takes place between 1 to 2 years with the possibility of 18.16 liters on average for modern hives against 9.42 liters on average for traditional hives. In addition, OWONO et al. reiterate that the annual yield of honey is 8 liters for natural hives while modern hives produce 10 liters when operating a bee colony.

The price of a liter of honey was revealed at US\$2.24 for 59.6% of our respondents, while 1 liter of honey is sold at US\$5.17 in food supplies in the commune of Mahagi about 58 km from the chiefdom of Panduru our investigation site; in GOMA in North Kivu a liter of honey cost 12 to 14 US \$ in 2018 (MAGAZINE, n°34 September 2018). AWONO, A and MANIRAKIZA, D (2009) add that the minimum price for the 2007 marketing year was US\$2, the average selling price of non-imported local honey was estimated at US\$4.6.

As for buyers, 59.61% of our respondents sell locally in the middle market and retail while 3.8% sell in Uganda and Kenya. MAGAZINE, n°34,2018 reveals that in North Kivu beekeepers will sell their honey at low prices to a person able to pay cash provided they take

away almost all the production, rather than selling on credit to the cooperative. For 67.31% of our respondents, beekeeping is a source of money and contributes to their diet and also cures certain diseases (Therapy).

This is also the case for the farmers' association of beekeepers of MUMOSHO in South Kivu for whom honey is above all therapeutic before being a food (KATWANYI, K.; BALAGIZI, K and BAKENGA, M.,2013). Regarding the difficulties of beekeeping, 55.76% of our respondents do not have appropriate equipment and lack technical supervision; 1.92% lack space for installation and 5.77% are afraid of the dangers of bees. KATWANYI et al. (2014) adds that in MUMOSHO in South Kivu, beekeeping is experiencing major constraints related to predators and spaces allocated to the installation of hives and access to markets for hive products and a relatively low level of technical supervision of beekeepers.

## CONCLUSION

The fact is that beekeeping is known by 67.30% of respondents as evidenced by our result. Income from beekeeping remains as capital for the household despite the lack of awareness of the importance of beekeeping and its place in related activities such as agriculture.

Not all parasites can reproduce. It depends on the following factors:

- The species of bees used: a species is less vulnerable when its brood develops quickly and when it washes well;
- The seasons: the availability of adequate brood cells and the size of the colony influence the reproductive capacity of the parasite;
- The environment: a higher than appropriate temperature prevents parasites from reproducing.

Worker bees infected with parasites are less able to feed the brood. However, with the difficulties in different forms that this sector is experiencing, actions in synergy bringing together national and international non-governmental organizations, state structures and civil society to accompany and encourage the practice of beekeeping in the environment taking into account ecological potential.

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