Poor Beehive Colonisation: Another Emerging Obstacle to Beekeeping in Nigeria?

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Abstract: A two-year survey was conducted in the Northeast geo-political zone of Nigeria to assess the rate of beehive colonisation in apiaries using improved and traditional methods of beekeeping. Snow-ball and purposive sampling methods were applied to select 185 traditional and three low-technology (Kenya Top-Bar Beehives: KTBH) apiarists, respectively, from the study area. A four-item open-ended questionnaire was used to collect data from the respondents in 2015 and 2016 cropping seasons. Findings show that majority of the apiarists used local attractants in bee baiting with cow dung accounting for 47.4% and 26.9% as the larger proportions in 2015 and 2016, respectively. While cumulatively beehive colonisation accounted for only 22.5% against 77.5% empty beehives in the first year, the second year recorded 62.5% and 37.5% colonised and unoccupied beehives, respectively. It's therefore, concluded that there was a remarkably low rate of beehive colonisation in the study area. In this regards, research-based institutions should intensify efforts towards providing effective training on colony division for local farmers, financial assistance to beekeeping beginners and beekeeping-based curricula by institutions of learning to capture youths as future apiculturists for sustainability.

Keywords: Beekeeping, Beehives, Colonisation, KTBH, Traditional, Nigeria

1. Introduction

Beekeeping, or Apiculture, as also referred to in the literature, is basically characterised by four major events which include appropriate construction of the beehive which is the main determinant of the method used in the farming system, colonisation of the beehive by bees using appropriate attractants, employment of good management practices of the beehive, and lastly, the use of appropriate methods of the beehive crops harvesting/extraction for storage before marketing. Any failure experienced along this chain of activities will definitely render the bee farming exercise a futile venture.

Apiarists in recent times have reported several problems along this chain of activities (Ja'afar-Furo, 2007; Ja'afar-Furo et al., 2009a; Ja'afar-Furo et al., 2009b) with the most worrisome being the inability of most beekeepers to get their beehives colonised completely, as also experienced in an experiment by Okwee-Ocai et al. (2010). With all the best management practices, effective attractants and the improved apicultural equipment at the disposal of an apiarist, if beehives remain empty, the entire processes

become worthless or rather halted. But in any case, bees must get into the hives and properly managed by skilled individuals before substantial amount of beehive crops would be realised. This is a very clear indication of the significance of beehives colonisation, a process which is rarely given concern among apiarists, yet very crucial in beekeeping.

This investigation stemmed from findings experienced from two 20-KTBH apiaries located about 20km apart in Adamawa State, and a three-KTBH apiary situated in Kaltungo, Gombe State, Nigeria. The poor beehives occupation rates within two cropping seasons necessitated the expansion of the scope of the study to cover two states with similarities in geographical terrain that strongly favour bee farming in order to validate the results.

2. Materials and Method

2.1 The Study Area

The study was conducted in Adamawa and Gombe States that are part of the six states that formed the Northeastern Nigeria. The states are located on 9°20′N 12°30′E and 10°15′N 11°10′E , respectively. Collectively, the area of study covers a land area of 55,685 square kilometers and population of 5, 521, 980 (NPC, 2006), with farming as the major occupation of the people. Other subsidiary economic activities of the inhabitants include petty trading, tanning, pottery and weaving, among others.

2.2 Sampling Procedure and Data Collection

The two 20-Kenya Top-bar Beehives (KTBH), three-KTBH and Adamawa State University (ADSU) apiaries were purposely selected as the only improved method of established beekeeping available in the area at that point in time. Other traditionally-based apiaries were identified using a snow-ball method of sampling. The occurrences in the KTBH-apiaries necessitated the expansion of the investigation to cover apiaries that were used as farming system for livelihoods. The study was strictly based on baiting with popular attractants in the area in order to determine the natural occupation rates, as this was the system used by the majority of traditional apiarists.

In the ADSU 15-KTBH, three-KTBH and two 20-KTBH apiaries, data were collected through a cost-route method which was supplemented with close observation and monitoring. Also, the apiary attendants served as good informants. However, a four-item open-ended questionnaire was constructed to source for data from the remaining apiaries across the states. Specifically, information on four most experienced constraints on apiary management from beehives constructions, baiting, extraction and storage/marketing were sought. Items used in the study include KTBHs, beehive stands, smokers, bee suits, hand gloves, bee veils, rain boots and beehive tools/knives. Traditional beehives identified were tree-trunk/log, woven straw and clay/pot. Attractants of choice were melted beeswax, honeycombs, cow dung, rotten rodents, local brew bran, locust bean cake and Binta Sudan/scents.

2.3 Method of Data Analysis

Descriptive statistics that include mainly frequency distribution, mean and percentage score were applied in realising the objectives of the study. As this was a preliminary survey, it would pave way for a more detailed and comprehensive investigation.

3. Results and Discussion

This part of the investigation captures the findings and attempts to tabulate, and discuss these results taking into account the implications on the beekeeping industry in general, and Nigeria in particular. However, the role beekeeping plays on the livelihoods of the inhabitants would not be left out so that the investigation will have maximum impact on the society.

Table 1: Distribution of attractants based on the type of beehives applied-on in the study area (n: 1123)

Year	Type of Attractant	Type of Beehives Applied			Total Freq. (%)
		Improved	*Traditional*		
2015	Melted beeswax	KTBH 59(5.3)	-	-	59(5.3)
	Honeycombs	KTBH 59(5.3)	-	-	59(5.3)
	Cow dung	-	Tree-trunk	532(47.4)	532(47.4)
	Binta Sudan®/Scents	KTBH 59(5.3)	Tree-trunk	319(28.4)	378(33.7)
	Rotten rodents	-	Woven straw	107(9.5)	107(9.5)
	Locust bean cake	-	Clay/pot	74(6.6)	74(6.6)
	Brew bran	-	Woven straw	32(2.8)	32(2.8)
2016	Melted beeswax	KTBH 59(5.3)	Tree-trunk	132(11.8)	191(17.1)
	Honeycombs	KTBH 59(5.3)	Tree-trunk	98(8.7)	157(14.0)
	Cow dung	-	Tree-trunk	302(26.9)	302(26.9)
	Binta Sudan®/Scents	KTBH 59(5.3)	Tree-trunk	290(25.8)	349(31.1)
	Rotten rodents	-	Woven straw	75(6.7)	75(6.7)
	Locust bean cake	-	Clay/pot	106(9.4)	106(9.4)
	Brew bran	-	Tree-trunk	20(1.8)	20(1.8)

Note: Multiple responses were recorded,
Values in parentheses are percentage of total beehives.
Source: Computed from field data (2015 and 2016)

The results in Table 1 show the bee attractants applied in the study area by the apiarists using both improved and traditional methods. Although Ja'afar-Furo et al. (2009a) documented a total of nine (9) bee attractants in Adamawa State, Nigeria, this field work which was extended to Gombe, a neighbouring State, reported seven (7) attractants. These are melted beeswax, honeycomb, cow dung, binta Sudan, rotten rodents, locust bean cake and local brew bran. Of these attractants, cow dung was found to be most (47.4%) utilised in the year 2015. This was followed by Binta Sudan scent in both 2015 and 2016 with 33.7% and 31.1%, respectively. However, cow dung accounted for 26.9%, as the second most applied attractant in the year 2016. Melted beeswax and honeycomb trailed with 17.7% and 14.0%, in the third and fourth positions, respectively

Going by the above findings, it could be concluded that cow dung has been the prominent attractants in both the first and second years, signifying its relevance among the traditional beekeepers using tree trunk/log beehives. Similarly, Binta Sudan scent seemed to be the attractant of choice among the traditional apiarists also. On the other hand, both the melted beeswax and honeycombs were more applicable among users of improved beehives (KTBHs). The implication of the results is that majority of the beekeepers in the area of study still heavily rely on traditional methods of baiting which is basically unhygienic, and huge gap existed between what ought to be in terms of improved practice and what was obtainable at the period of the survey.

Table 2: Distribution of traditional beehives according to type, location and rate of colonisation in the study area (n: 1064)

Year	State	Types of Beehives	Rate of Colonisation		Total number of beehives
			Colonised	Empty	
2015	Adamawa	Tree-trunk/Log	208(19.5)	301(28.3)	509(47.8)
		Clay/Pot	32(3.0)	69(6.5)	101(9.5)
		Woven straw	32(3.0)	23(2.2)	55(5.2)
	Gombe	Tree-trunk/Log	199(18.7)	100(9.4)	299(28.1)
		Clay/Pot	20(1.9)	28(2.6)	48(4.5)
		Woven straw	32(3.0)	20(1.9)	52(4.9)
2016	Adamawa	Tree-trunk/Log	245(23.0)	264(24.8)	509(47.8)
		Clay/Pot	49(4.6)	52(4.9)	101(9.5)
		Woven straw	41(3.9)	14(1.3)	55(5.2)
	Gombe	Tree-trunk/Log	252(23.7)	47(4.4)	299(28.1)
		Clay/Pot	26(2.4)	22(2.1)	48(4.5)
		Woven straw	25(2.3)	27(2.5)	52(4.9)

Note: Values in parentheses are percentage of total beehives.
Source: Computed from field data (2015 and 2016).

As the investigation focused on the rate of colonisation of two major types of beekeeping (traditional and improved methods), Table 2 captures the distribution of traditional beehives according to type, location and the occupation rate in the two states. In the year 2015 in Adamawa State, a larger proportion (28.3%) of the tree-trunk/log beehives were left empty with only 19.5% colonised by bees naturally. Similarly, there were more (6.5%) unoccupied beehives among clay/pot users than colonised (3.0%). However, in the same year in Gombe State, the rate of colonisation of the tree-trunk/log beehives surpassed (18.7%) that of empty (9.4%) beehives, indicating a slight improvement.

The result clearly shows that there were more unoccupied (empty) traditional beehives among the apiarists in the area under study. The implication of the result is that there would eventually be less beehive crops (honey and beeswax: major products in the area) harvested by the beekeepers, and by extension low income generation which would reflect negatively on the livelihoods of the farmers economically.

Table 3: Rate of beehives (KTBH) colonisation in the TV of Adamawa State University, Mubi, Nigeria in 2015 and 2016 seasons (n: 15)

Year	Type of beehives	Number of beehives colonised	Number of beehives not colonised	Total number of beehives
2015	KTBH	3 (15.00)	12 (75.00)	15 (100)
2016	KTBH	6 (40.00)	09 (60.00)	15 (100)

Note: Values in parentheses are percentage of total beehives.
Source: Computed from field data (2015 and 2016).

In the Technology Village (TV) of Adamawa State University, Mubi, Nigeria, designated as a center for skills acquisition solely established by the Sasakawa Africa Fund for Extension Education (SAFE) for improved beekeeping, there were 15 KTBHs meant for training students, staff and university community members. As reflected in Table 3, in the first year 2015, a mere 15.0% KTBHs were colonised with about 75.0% left empty. Similarly, the second year 2016 produced slightly improved result with 40.0% beehives colonised by bees, and 60.0% were left unoccupied. The latter result perhaps could be attributed to better management practices employed in the apiary, as similar finding was earlier reported by Okwee-Acai et al. (2010) that improved apiary management practices had significant influence on increasing the rate of colonisation of KTBHs. Giving these findings in Table 3, it can be concluded that the rate of beehives colonisation under natural conditions using the most conventional attractants was still poor.

Table 4: Rate of beehives (KTBH) colonisation in Boggare and Sabon-gari apiaries in Yola-South LGA, Adamawa State (n: 40)

Year	Type of Beehives	Boggare Apiary		Sabon-gari Apiary		Total number of beehives
		Colonised	*Empty*	*Colonised*	*Empty*	
2015	KTBH	06(15.00)	14(35.00)	03(07.50)	17(42.50)	40(100)
2016	KTBH	19(47.50)	01(02.50)	06(15.00)	14(35.00)	40(100)

Note: Values in parentheses are percentage of total beehives.
Source: Computed from field data (2015 and 2016).

Pooling all the results for the periods under consideration, the findings in Table 4 shows that only a total of 22.5% beehives were colonised by bees in 2015 against 77.5% empty beehives. On the other hand, colonised beehives recorded 62.5% against 37.5% not occupied by bees in the year 2016, indicating a remarkable improvement. As these apiaries were two entities, it further goes to confirm Okwee-Acai et al. (2010) claim that enhanced bee farm management practices would significantly improve beehives occupation rates and by implication the beehive crops yield in an area.

The baiting of these two apiaries was done in early October through early January for the two consecutive years. This range of time was regarded as the bees swarming period when plants and specifically trees flower in the area. The bee flora in the apiaries' environment were solely composed of all-through flowering mango orchard for one, and eucalyptus, neem and mango trees, among others, for

the second, which were considered good bee plants. Pure honey and beeswax were used as attractants for a period of three months continuously.

Table 5: Rate of beehives (KTBH) colonisation in Kaltungo, Kaltungo LGA, Gombe State ***(n: 03).***

Year	Type of Beehives	Colonised	Empty	Total number of beehives
2015	KTBH	01 (33.3)	02 (66.7)	03 (100)
2016	KTBH	02 (66.7)	01 (33.3)	03 (100)

Note: Values in parentheses are percentage of the total beehives.
Source: Computed from field data (2015 and 2016).

While the other three KTBH apiaries were under watch for data collection, another three-KTBH apiary meant for demonstration purposes was monitored for natural colonisation in Gombe State, Nigeria. The result is shown in Table 5. Of the total beehives in the apiary in 2015, 66.7% was accounted for by unoccupied KTBHs, with 33.3% remaining colonised. However, in the year 2016, a significant increase in the rate of colonisation of beehives was recorded, with 66.7% and 33.3% for colonised and empty beehives, respectively. This is a trend observed in all the KTBH apiaries.

Having evaluated the success rates obtained from these investigations, the best option was to seek the advice of the professionals both from the academia and experienced practicing beekeepers. The aspects of queen rearing, supplementary feedings and appropriate beehive management were greatly explored. While the idea of colony division was dropped because almost all the colonised beehives were not strong in terms of population at that point in time, the aspect of supplementary feeding of the occupied beehives was irrelevant due to the adequacy of very good bee flora in the vicinities of all the apiaries mentioned. However, after a broad analysis of the situation at hand, the best option was to adopt colony division which ultimately centered on appropriate queen rearing. For the apiaries practicing improved methods using the KTBHs, the technique has already been adopted in multiplying the required colonies. But what about the remaining large number of the traditional apiaries from where the beehive crops (mainly honey and beeswax) for both local and national consumption are mainly obtained? Could this phenomenon be associated with a drop in the population of honeybees due to global warming as being speculated in the literature? What about huge indiscrete application of insecticides and herbicides by teeming small-scale and commercial farmers? Are there new bating methods that have not been explored? Or could this be linked to the factors cited by Dukku (2016) that would be considered for conservation of local population of indigenous honeybees? What about the huge gap created by the neglect in appropriate policy making as raised by Ja'afar-Furo (2016)? As poor beehive colonisation is being massively recorded now among apiaries in Nigeria, could it be an emerging obstacle to beekeeping industry in the country? These and many more probing questions are what professionals/stakeholders from the world of apiculture need to provide practicable answers for.

4. Conclusion and Policy Implication

Drawing from the findings of this survey, it could be stated that there has been a dwindling aspect of beehive colonisation among both traditional and low-technology apiaries in the North-eastern parts of Nigeria, and by extension the entire country. Also, there have been very minimal efforts on the part of

local beekeepers to adopt improved apiary management practices in the area surveyed, perhaps as a result of absence of adequate extension services on the subject matter. This would definitely have significant negative effects on the overall total beehive crops yield in the country.

Based on the aforesaid, the beekeeping research agencies in Nigeria like Center for Beekeeping Research and Development (CEBRAD) in conjunction with State Ministries of Agriculture and Departments of Natural Resources of Local Government Areas nationwide should design collaborative packages in training farmers on improved methods of beekeeping with particular emphasis on queen rearing/colony multiplication techniques. Similarly, institutions of learning should be encouraged to incorporate beekeeping courses in their curricula toward targeting the youths as enlighten future farmers. Meanwhile, the government and well-meaning donor agencies could be implored to render financial assistance in terms of soft loans, research grants etc. to individuals and organisations that would like to venture into the apicultural business.

References

Dukku, U. H. (2016). Conservation of local populations of honeybee for sustainable beekeeping in Africa. *Advance in Agriculture and Biology*, 5 (1), 20-23. DOI:10.15192/PSCP.AAB.2016.5.1.2023

Ja'afar-Furo, M. R. (2007). Appraising the Perception of Farming Communities towards Adoption of Apiculture as a Viable Source of Income in Adamawa State, Nigeria. *Apiacta*, 42,1-15

Ja'afar-Furo, M. R. (2016). Dynamics of Poverty, Deforestation and Beekeeping in Northern Nigeria: Concern for Policymakers - Part II. *European Journal of Physical and Agricultural Sciences.* 4(1), 33-45

Ja'afar-Furo, M. R., Mshelia, S. I., & Haruna, U. (2009b). Resource-Use Efficiency and Environmental Constraints in Beekeeping in Adamawa State, Nigeria. *Agriculture, Business and Technology Journal*, 7, 98-106

Ja'afar-Furo, M. R., Tanko, H. S., & Abonemdam, A. I. (2009a). A Study of the Effects of Honey Theft and Bush Burning on Apiaries in Adamawa State, Nigeria. *Apiacta*, 44, 1-13

National Population Commission, NPC (2006). Report of the National Census of the Federal Republic of Nigeria, Abuja.

Okwee-Acai, J., Anyanzo, T. A., Aroba, J., Vuchiri, J. K., Onzivua, T., & Okullo, P. (2010). Effects of Apiary Management on Colonisation and Colony Performance of African Honey Bee (*Apis Mellifera*) in the North-Western Agro-Ecological Zone of Uganda. *Livestock Research for Rural Development*, 22(5), 1-9. Retrieved on March 19, 2017, from http://www.lrrd.org/lrrd22/5/okwe22086.htm