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Survey on Traditional Beekeeping and Honey Production in Biu and Its Environs, North – Eastern Nigeria

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Abstract: For years in olden times, man depended on gathering and hunting for foods and the favourable climate, but recently, the coming of many scientific, technological and engineering, innovations and the clarion call for change and sustainable development, man had improved and modified plants varieties and animal breeds for food security and it consequences. For these reasons, this study was conducted on the survey on traditional honey bee (*Apis millifera*) keeping and honey production in Biu and its environs. Compound structured closed and opened ended questionnaires and verbal interview were used for data and information ecosystem collection. One hundred and fifty (150) questionnaires were distributed randomly to beekeepers within the communities of Bubalwada, Garwashina and Kirmbula villages in Biu, north – eastern Nigeria, retrieved, statistically analysed and were recorded. It revealed vital information on the demography of the Apiculturists and the traditional honey beekeeping, honey production; male's youths (83%), married persons (57%), those with formal educational status (68%), business persons (31%), attended secondary level of education (35%), number of house hold size (16 persons and above), have experience in beekeeping (9 years and above), were mostly involved in Apicultural practicing. The study also revealed that most of the Apiculturists in the study area use grass hives for the traditional method (27%), honey bee wax as attractant for new colonies formation (51%), wild honey harvesting (63%) and traditional methods of honey production (68%), rude method of honey processing (61%) and theft of the honey being produced was the most serious problems they encountered were (37%). The majority of the Beekeepers in Biu and its environs sale their honey at retails price (41%) and sales were done in the rural market (47%) inclusively. Youths are urging to engage and participate in this sector of farming, it adds more beauty to the agro – ecosystem - ecology and economic values systems.

Keywords: Attractant, *Apis millifera*, Beekeeping, Environs, Hive, Honey, Traditional Method

1. Introduction

The acquisitions of knowledge and experience in Agricultural farming sectors are always important in all respects and disciplines, it become necessary, imperative and impressive. This is because knowledge is the central key factor in this world, especially when been acquired, quantum and speedily, for the purpose of good living in respect of

biodiversity; bio-security and food security. This necessitates the acquisition the knowledge of honey beekeeping or bee farming or Apiculture is a sector of agriculture field of economic activities. The traditional beekeeping activities have been known to take place in extensively in the northern states and some part of southern and western states of Nigeria, mostly using honey bees of African origin (*Apis millifera*) in traditional man made hives and this been practiced by men being the majority and fewer women involved in this kind of farming (Animal Husbandry), it provides essential food, nutritional and medicinal values, help in health care delivery and provides employment for the local people. Most of the traditional beekeeping was that the hives were seasonally placed on the trees and some women place it on the ground whereby at the end they harvest a lot of litres of honey and some kilograms of beeswax. Beekeeping is an old art that has been practiced by different generation in many parts of the world using local available materials such as pots, gourds, straws, bark and log hives, wicker baskets or skeps some of which are hung on trees. Nowadays, most of the agricultural developments and products in terms of nutritional and medicinal values, particularly in developed countries, turn out from inorganic to organic agriculture, and in developing African countries like Nigeria, Organo-culture are in practiced in olden days and up to present days where by agricultural foods are produce within the farms by using organic manures as fertilizers.

For thousands of year, man has depended on honey bee colonies to get honey and beeswax which are two major products [2, 11]. Honey is an important unrefined food and the only unmanufactured sweet available in commercial quantities. Honey is an important item and is been produced naturally by honey bees. Production and management of honey has been deliberately included as part of the animal husbandry because of the important roles it plays in the society at large, and for many years, man has plundered honey bee colonies to get honey bee larvae and beeswax. Honey being the only food item that can never spoil, has the pH of 3.2 to 4.5 which is not favorable medium for diseases causing bacteria and fungi is used for food and for medicinal values curing many diseases [12, 14, 15, 18]. Bee farming (Apiculture) is a new field of economic activity that has come to stay. Honey beekeeping or farming is a sector of agriculture field of economic activity which becomes a ready alternative and bee farming has presented itself as a viable and profitable business, although, not yet practiced on a large scale. Nonetheless, it provides essential food and nutritional and medicinal values, help in health care and provides employment for rural dwellers [19, 20, 21]. Many rural people make a living from honey bees, and most beekeepers are hobbyists who have only a few hives and simply enjoy working with these fascinating insects [8, 10, 14, 18].

Honey bees are social insect and classified as to the order of Hymenoptera (membranous wings), super family of Apoidae (bees) and subfamily of Apinae. Honey bees represent the highest form of social development among the invertebrate animals due to the social life of the honey bees; they live in colony throughout the year. A colony of honey bees consists of queen or the mother bee, a fertile laying – eggs female bee and from 10, 000 up to 20,000 workers bees which are infertile females bees [7, 17]. Queen being a fully fertile specialized for producing eggs, when she dies or lost, workers select a few young workers larvae and feed them with a special diet and develop in to queens. The drone (king) which are the male's bees, are always present in the reproductive season but may be kicked out by the workers bees which are re-fertile female during food scarcity. The difference between the workers and the queens is that only one queen per colony. The Queen also affects the colony by producing chemicals substance called "Pheromones" that regulate the behaviours of other bees drone (the male bees). A colony may have 0 to 500 drones during the spring and summer. Drones fly from their hives and mate in the air with the queen from other colonies [1, 4, 15].

Honey bees e.g., *Apis millifera*, are one of the most well known, popular, olden and economic beneficial insects because of their honey and beeswax productions [14, 15, 18]. Honey being the nectar or plant sap ingested by honey bees, has as many tastes and colours, as the flavor and colour of plant from which it is derived [3, 6, 13, 23]. Honey bees colonization is a process of getting honey bees attracted into the hive. The marked needed for the process to occur are a standard bee hive and attractant. The attractant that are commonly used are honey wax, pineapple juice, raffia wine, original palm wine, locust bees, cocoa bean juice, mango juice, etc [8, 10, 12, 14]. The aims and objectives of this study are to determine the traditional methods of Beekeeping and the traditional methods of honey production practiced by the Beekeepers in the study area.

2. Materials and Methods

2.1. Study Area and Location

Biu is a town and a local government area (LGA) in southern Borno state and is located in the north-eastern geographical zone of Nigeria. The town is the administrative centre of the LGA, once being the capital of Biu kingdom and the capital of Biu emirate. The climatic condition of the region is semi-arid, it lies on the Biu plateau at an average of 626 metres above sea level with a longitude of 12.1950 E ($12° 11^{I} 42^{II}$ E) and latitude of 10.611 N ($10° 36^{I} 39^{II}$ N), with a population of 176,072 people [5], with an area density of 282 persons / M^2. The annual rainfall of the area is over 280 mm – 800 mm per annum, and with the temperature of about 36°C – 40°C. The inhabitants of Biu region are mainly bura, tera, Marghi, mina and Fulani people, with large number of rural communities in addition to Biu which include; balbaya, buratai, charengi, etc. Biu LGA is mostly located in the northern Guinea-Savannah agro-ecological zone, with a portion in the north-east, the Kamba area lying in the dryer Sudan-Savannah. The economy is mixed agriculture, based on herding cattle, goats, sheep, horses and donkeys, and farming sorghum, millet, maize, cowpea and cotton.

Agricultural practice consists of mainly small scale farmers using traditional methods.

2.2. Material Used

Compound structured, closed and opened ended questionnaires and verbal interview were used for the purpose of information and data collection on the traditional methods of honey Bee-farming and honey production. One hundred and fifty (150) questionnaires were distributed to Apiculturarists (bee-farmers) within the said communities in the studied area.

2.3. Method Used

The method used in this survey research study, the source of data collection were through primary and secondary sources. The primary source was through questionnaire distribution to the respondents who were the beekeepers. The secondary source was obtained through the internet, text books, Journals and information media. One hundred and fifty (150) questionnaires were distributed to Apiculturarists (bee-farmers) within the said communities in the study area; Bubalwada, Garwashina and Kirmbula villages in Biu and its environs respectively. All the questionnaires distributed to the respondents were retrieved and the data obtained were recorded.

2.4. Data Analysis

The data obtained from this research study were subjected to statistical tools of analysis using percentage, mean for the measurement of central tendency, and standard deviations for measurement of dispersion and or discrepancy within the variables being obtained and its' significance, as described by Stroud and Booth, (2001).

3. Results

The results obtained from this study revealed that, data and some vital information were ascertained and collected on the traditional methods of honey Bee-farming and honey production in Biu and its environs. The results were presented in percentage, total, mean and standard deviations of the answers given by the respondents involved as presented in the tables below as follows:

Table 1 showed the distribution of the respondents according to gender class whereby out of the total of 150 and their mean of 75 of the respondents interviewed, the males had the highest in terms of population with 125 (83.3%), the females had 25 (16.7%) respectively.

Table 2 showed the distribution of the respondents according to age - group of which out of the total of 150 and their mean of 30 of the respondents involved in the interview were that, for the age – group from 15 – 24 had 11 respondents with 7.3%, 25 – 34 had 26 (17.3%), 35 – 44 had 37 (24.7%), 45 - 54 had 46 (30.7%) and lastly those within the age – group from 55 and above had 30 with 20% only.

Table 3 showed the distribution of the respondents according to marital status, out of the total of 150 and their mean of 50 of the respondents involved and interviewed were that, those found to be single were 47 with 31.33%, the married ones had 86 (57.33%) and the widow had 17 respondents with 11.33% respectively.

Table 4 showed the educational status background of the respondents, out of the total of 150 and their mean of 75 of the respondents involved were that, those with informal educational status were 48 (32%) and those that said to have formal educational status were 102 with 68% respectively.

Table 5 showed the skill acquired (informal education) by the respondents out of the total of 48 and their mean of 12 of the respondents that were involved; those that said were in business had 15 (31.25%), crafts had 12 (25%), Technical artisan had 8 (16.67%) and Horticultural Farming had 13 with 27.01% exactly.

Table 6 showed the educational background (formal education) of the respondents and out of the total of 102 and the mean of 25.5 of the respondents that were involved; those that said they attended Arabic school were 21 had 20.6%, Primary school had 34 (33.3%), secondary school had 36 (35.3%) and tertiary school were 11 with 10.8% respectively.

Table 7 showed the number of house hold size of the respondents out of the total of 150 and their mean of 50 of the respondents involved; those that said have less than 5 had 8 with 5.33%, 6 – 8 had 41 (27.33%), and those have 9 and above had 102 with 67.36% exactly.

Table 8 showed the experience of the respondents in beekeeping and production of honeys, out of the total of 150 and their mean of 37.5 of the respondents involved; those that have the experience of less than 5 years were 12 with 8%, 6-10 years had 23 (15.33%), 11–15 years had 47 (31.33%) and 16 years and above had 68 with 45.33% respectively.

Table 9 showed the various traditional methods of beekeeping practice by the respondents, out of the total of 150 and their mean of 30 of the respondents involved; those that said they used barrel hives in beekeeping were 15 with 10%, clay pot hives had 38 with 25.33%, log hives had 34 (22.67%), grass hives had 41 (27.33%) and guard had 22 with 14.67% respectively.

Table 10 showed the type of attractants used for the new colonies formation by the respondents, out of the total of 150 and their mean of 25 of the respondents involved; those that said they used honey bee wax as an attractant were 76 with 50.67%, locust beans juice had 13 (8.67%), mongo juice had 29 (19.33%), palm date juice 20 (13.33%), pineapple juice had 12 (8%) and those used raffia wine as attractant were none respectively.

Table 11 showed the methods used by the respondents in harvesting honey, out of the total of 150 and their mean of 37.5 of the respondents involved; those that said they used Wild honey harvesting method were 94 with 62.67%, smoke method had 22 (14.66%), Breakage of container had 18 (12%) and top – stalk method were 16 with 10.67% exactly.

Table 12 showed the methods used by the respondents in honey productions, out of the total of 150 and their mean of 50 of the respondents involved; those that said they used traditional method were 102 with 68%, modern method had 35 (23.33%), and both methods were 13 with 8.67% respectively

Table 13 showed the methods used by the respondents in processing honey, out of the total of 150 and their mean of 50 of the respondents involved; those that said they used rude method in processing honey were 91 with 60.67%, refine method had 45 (30%), and those that used both the rude and the refine methods were 14 in number with 9.33% respectively.

Table 14 showed the problems of beekeeping and honey production, out of the total of 150 and their mean of 37.5 of the respondents involved; those that said the problem that encountered was illiteracy had 34 with 22.67%, diseases had 22 (14.67%), lack of fund were 39 with 26%, theft had 55 with 36.67% respectively.

Table 15 showed the pattern of sales of honey by the respondents involved, out of the total of 150 and their mean of 37.5 of the respondents involved; those that said they used the pattern of retail sales were 61 with 40.67%, while whole sales had 54 with 36% and those uses both pattern of sales were 35 in number with 23.33% only.

Table 16 showed the marketing pattern of sales of honey by the respondents involved, out of the total of 150 and their mean of 50 of the respondents involved; those that said they sale their honey and its products at the rural market were 71 with 47.33%, urban market had 58 with 38.67%, and those that sales at the both rural and urban markets were 21 in number with the percentage of 14% respectively.

Table 1. *Distribution of Respondents According to Gender.*

Gender Group	Number of Respondents	Gender Percentage (%)
Male	125	83.3
Female	25	16.7
Total (mean ± St Dev.)	150 (75 ±70.7)	100 (50 ± 47.1)

Keys: % = Percentage, ± = Equals or Minus, St Dev. = Standard Deviation.

Table 2. *Distribution of Respondents According to Age – Group.*

Age – Group	Number of Respondents	Percentage (%)
15 – 24	11	7.3
25 – 34	26	17.3
35 – 44	37	24.7
45 – 54	46	30.7
55 – Above	30	20.0
Total (mean ± St Dev.)	150 (30 ± 13.1)	100 (20 ± 8.7)

Keys: % = Percentage, ± = Equals or Minus, St Dev. = Standard Deviation.

Table 3. *Distribution of the Respondents According to Marital Status.*

Status	Number of Respondents	Percentage (%)
Single	47	31.33
Married	86	57.33
Widow	17	11.33
Total (mean ± St Dev.)	150 (50 ± 34.6)	100 (33.3 ± 13.6)

Keys: % = Percentage, ± = Equals or Minus, St Dev. = Standard Deviation.

Table 4. *Educational Status Background of the Respondents.*

Status	Number of Respondents	Percentage (%)
Informal Education	48	32
Formal Education	102	68
Total (mean ± St Dev.)	150 (75 ± 38.2)	100 (50 ± 25.5)

Keys: % = Percentage, ± = Equals or Minus, St Dev. = Standard Deviation.

Table 5. *Skill Acquisition of the Respondents.*

Skills Background	Number of Respondents	Percentage (%)
Business	15	31.25
Crafts	12	25.0
Technical works	8	16.67
Horticultural Farming	13	27.1
Total (mean ± St Dev.)	48 (12 ± 2.9)	100 (25 ± 6.1)

Keys: % = Percentage, ± = Equals or Minus, St Dev. = Standard Deviation.

Table 6. *Educational Background of the Respondents.*

Educational Level	Number of Respondents	Percentage (%)
Arabic	21	20.6
Primary	34	33.3
Secondary	36	35.3
Tertiary	11	10.8
Total (mean ± St Dev.)	102 (25.5 ± 11.7)	100 (50 ± 11.5)

Keys: % = Percentage, ± = Equals or Minus, St Dev. = Standard Deviation.

Table 7. *Number of House Hold Size of the Respondents.*

House Hold Size	Number of Respondents	Percentage (%)
< 5	8	5.33
6 – 8	41	27.33
9 – Above	102	67.36
Total (mean ± St Dev.)	150 (50 ± 47.2)	100 (33.33 ± 31.4)

Keys: % = Percentage, ± = Equals or Minus, St Dev. = Standard Deviation.

Table 8. *Experience of the Respondents in Beekeeping and Production of Honeys.*

Experience (Years – Group)	Number of Respondents	Percentage (%)
> 5	12	8.0
6 – 10	23	15.33
11 – 15	47	31.33
16 – Above	68	45.33
Total (mean ± St Dev.)	150 (37.5 ± 25)	100 (25 ± 16.7)

Keys: % = Percentage, ± = Equals or Minus, St Dev. = Standard Deviation.

Table 9. *Various Traditional Methods of Beekeeping Practice by the Respondents.*

Methods in Practice	Number of Respondents	Percentage (%)
Barrel Hive	15	10.0
Clay Pot Hive	38	25.33
Log Hive	34	22.67
Grass Hive	41	27.33
Guard Hive	22	14.67
Total (mean ± St Dev.)	150 (30 ± 11.1)	100 (20 ± 7.4)

Keys: % = Percentage, ± = Equals or Minus, St Dev. = Standard Deviation.

Table 10. *Type of Attractants used for the New Colonies Formation by the Respondents.*

Attractants used	Number of Respondents	Percentage (%)
Honey bee wax	76	50.67
Locust bean juice	13	8.67
Mango juice	29	19.33
Palm date juice	20	13.33
Pineapple juice	12	8.0
Raffia wine	0	0
Total (mean ± St Dev.)	150 (25 ± 26.8)	100 (16.67 ± 17.8)

Keys: % = Percentage, ± = Equals or Minus, St Dev. = Standard Deviation.

Table 11. *Methods used by the Respondents in Harvesting Honey.*

Methods used	Number of Respondents	Percentage (%)
Wild honey harvesting	94	62.67
Smoke	22	14.66
Breakage of container	18	12.0
Top – stalk	16	10.67
Total (mean ± St Dev.)	150 (38 ± 38)	100 (25 ± 25)

Keys: % = Percentage, ± = Equals or Minus, St Dev. = Standard Deviation.

Table 12. *Methods used by the Respondents in Honey Productions.*

Methods used	Number of Respondents	Percentage (%)
Traditional	102	68.0
Modern	35	23.33
Both methods	13	8.67
Total (mean ± St Dev.)	150 (50 ± 46)	100 (33.33 ± 31)

Keys: % = Percentage, ± = Equals or Minus, St Dev. = Standard Deviation.

Table 13. *Methods used by the Respondents in Processing Honey.*

Methods used	Number of Respondents	Percentage (%)
Rude method	91	60.67
Refine method	45	30.0
Both methods	14	9.33
Total (mean ± St Dev.)	150 (50 ± 38.7)	100 (33.33 ± 25.8)

Keys: % = Percentage, ± = Equals or Minus, St Dev. = Standard Deviation.

Table 14. *Problems of Beekeeping and Honey Production.*

Type of Problems	Number of Respondents	Percentage (%)
Illiteracy	34	22.67
Diseases	22	14.67
Lack of fund	39	26.0
Theft	55	36.67
Total (mean ± St Dev.)	150 (37.5 ± 13.7)	100 (25 ± 9.1)

Keys: % = Percentage, ± = Equals or Minus, St Dev. = Standard Deviation.

Table 15. *Pattern of Sales of Honey by the Respondents Involved.*

Sales pattern	Number of Respondents	Percentage (%)
Retail sales	61	40.67
Whole sales	54	36.0
Both sales	35	23.33
Total (mean ± St Dev.)	150 (50 ± 13.5)	100 (33.33 ± 9)

Keys: % = Percentage, ± = Equals or Minus, St Dev. = Standard Deviation.

Table 16. *Marketing Pattern of Sales of Honey by the Respondents Involved.*

Marketing Pattern	Number of Respondents	Percentage (%)
Rural market	71	47.33
Urban	58	38.67
Both markets	21	14.0
Total (mean ± St Dev.)	150 (50 ± 25.9)	100 (33.33 ± 17.3)

Keys: % = Percentage, ± = Equals or Minus, St Dev. = Standard Deviation.

4. Discussion

The acquisitions of knowledge of and experience in Agricultural farming sectors are always important in all respects and disciplines, it become necessary, imperative and impressive. This is because, knowledge is the central key factor in this world, especially when been acquired, quantum and speedily, for the purpose of good living in respect of biodiversity; bio-security and food security. This necessitates the acquisition the knowledge of honey beekeeping or bee farming or Apiculture is a sector of agriculture field of economic activities. For thousands of years, in the olden times man depended on gathering and hunting for foods and the favourable climate, but recently with the coming of many scientific, technological and engineering, innovations and called for sustainable development, man had improved and modified plants varieties and animal breeds all for his food security and it consequences. According to Gwana and Umaru, (2016) who stated that, recently changes in climate have caused some impacts on human systems and nature, across all bodies; such as the ecosystem – ecology (abiotic and biotic), viz. vegetations and waters.

These negative changes causes problems to agriculture and security, national development, economic and financial illiteracy, agricultural skills acquisitions and entrepreneurships, administration and management system and lack of creating awareness and inspiring activities, especially in the fields of biodiversity and agro-ecological activities such as apiculture, deforestation, desertification, environmental waters which includes fisheries, irrigations, cultivation, etc. These are the challenge needs to be ascertained and addressed.

Amongst the agricultural sectors, bee-farming or beekeeping is known as Apiculture from the Latin word *Apis* which means bees. Apiculture is the maintenance of bees in colonies commonly in hives made by human beings and the location where bees are kept is called Apiary or bee- yard. A bee-keeper or Apiarist keep bees in order to collect their honey and other products that the hive produces which including bee wax, propolies pollen and royal daily, and to pollinate crops or to produce bees for sale to other bee-keepers [7, 9, 14].

Apiculture in the other hand being a sector of agriculture which is been practiced in Nigeria, both the traditional and the modern methods are in used. Honey beekeeping or bee farming or Apiculture is a sector of agriculture fields of animal husbandry and economic activities. The traditional beekeeping activities have been known to take place extensively in the northern states and some part of southern states of Nigeria, mostly using honey bees of African origin (*Apis millifera*) in traditional man made hives and this been practiced by men been the majority and fewer women involved this kind of farming (Animal Husbandry), it provides essential food, nutritional and medicinal values, help in health care delivery and provides employment for the local people. This initiated some research studies on beekeeping for honey and its by-products, for food, nutrition and medicinal values needs.

The research study on the traditional methods of honey Bee-farming and honey production in Biu and its environs would not have been different with the above statement made of which was conducted; the study revealed that, out of 150 respondents interviewed, the demographic data obtained was that majority of the apiculturists in the studied area, 125 (83%) males were, while 25 (17%) were females. The age –

group distribution of the apiculturists, who responded, ranged from 15 – 24 years were 11 in numbers with 7% to 45 - 54 years were 46 in numbers had 31%, and those are within the age-group from 25 – 34 years were 26 (17%), 35 – 44 years were 37 with 25% and finally from 55 years and above were 30 in numbers with a percentage of 20 and this gave a total mean age-group of 30 of respondents involved. This revealed vital information on the apiculturists in the said studied area that male's youths are mostly involved in apiculture (bee farming).

With regard to the respondents marital status, ranged from 17 – 86 or from 11% to 57%, i.e. those said that were single were 47 in numbers and had 31%, married were 86 with 57% and widow were 17 in numbers had the percentage of 11%, with the mean total of 50 respondents that were involved. The education status of the respondents was also considered; those that said had informal education were 48 in numbers with 32%, and those that said they had formal education were 102 in numbers and also had the percentage of 68% with a mean total of 75. These results revealed that married persons and those said that had formal educational status are the majority in apicultural practicing in Biu area.

In addition, out of 48 respondents that said to had acquired skills (informal education), in business were the highest number of respondents of 15 with 31%, followed by horticultural farming were 13 (27%), then crafts skill were 12 in numbers (25%), the least was those said they acquired technical works skill were 8 with 17%, and with a mean total of 12. That out of 102 respondents that said to have formal education (i.e. educational background), the answers given by the respondents was ranged from 11 to 36 responds (from tertiary level which is highest to secondary level which is lowest in term of the responds given). That is, those who said they had attended secondary school were 36 in numbers with 35%, followed by primary school were 34 in numbers with 33%, then Arabic school were 21 (21%), and the least was those attended tertiary education were 11 (11%), with a mean total of 25.5 respectively. Deduced from these results obtained it revealed that, majority of the apiculturists in Biu town and its environs are business persons and most of them attended secondary level of education.

In another development, the responds given by the respondents their own numbers of house hold sizes was that, those that said they have less than 5 peoples were 8 with 5%, 6 – 8 peoples were 41 (27%), and 9 peoples and above were 102 with 67%. The highest was those that said they have 9 and above house hold size, followed by 6 – 8 house hold size and the least was those said they have less than 5. The mean total of the respondents interviewed on this matter was 50. On the experience of the respondents in beekeeping and production of honey, the responds ranged from 12 (have less than 5 years) – 68 (16 years and above), those said that they have less 5 years were 12 with 8%, 6 – 10 years were 23 (15%), 11 – 15 years were 47 (31%) and finally those have 16 years and above were 68 (45%) respectively, their mean total number is 37.5. Thus, the results revealed that, the majority of the beekeepers in the studied area have numbers of house hold size of 16 Persons and above, while most of the beekeepers have experience of 9 years and above in bee farming.

Information on the traditional beekeeping and honey production were also conducted and ascertained in the studied area; the responds on various traditional methods of beekeeping practice by the respondents are that, it ranged from 15 – 41, i.e. the least was those who used barrel hives were 15 in numbers with 10% and the highest was those who said the used grass hives were 41in numbers with 27%, clay pot hives were 38 (25%), then followed by log hive of which were 34 (23%), and those who used guard hives were 22 in numbers with 15%, and their mean total was 30 respondents. In responds to the attractants in used for the new colonies formation by the respondents, are that, it ranged from 0 – 76, that is to say, the least was those who used raffia wine were 0 in number with 0% and the highest was those who said the used honey bee wax as attractant were 76 in numbers with 51%. Those that used locust bee juices as attractant were 13 (9%), mango juices as attractant were 29 in numbers with 19%, and then those that used palm date juices as attractant were 20 in numbers with 13%, and finally are those used pineapple juices as attractant were 12 in number with a percentage of 8% and their mean total was 25 respondents. These results obtained revealed that, the majority of the beekeepers in the studied area are those respondents who used grass hives for the traditional method of beekeeping and those that used honey bee wax as attractant for new colonies formation.

In other issues concerning the traditional beekeepers in Biu area, are the methods used in harvesting honey when due with the ranged from 16 – 94 (11% – 63%) responses. Some respondents said that they used wild honey harvesting techniques and were 94 in numbers (63%) which was the highest, followed by those used smoke for harvesting honey were 22 with 15%, then followed by those used the method of breakage of container, finally those used top-stalk method were 16 in number with 11% which was the least, and mean total of the respondents was 37.5. The methods of honey production was also considered in this study, and the responses of the beekeepers are that, those used traditional method were 102 with 68% which was the highest, modern method were 35 (23%) and those sais that they sued both methods were 13 in numbers with 9%, and their mean total was 50. These revealed that majority of the beekeepers in Biu area used wild honey harvesting method and traditional method of honey production.

The respondents' responses to the method used in processing honey and problems encountered with beekeeping, those that said they used rude method were 91 (61%) which was the highest, refine method were 45 with 30%, and both methods used were 14 in numbers with 9%, and their mean total of the respondents was 50. The problems of beekeeping the responses was that, those said illiteracy was the problems were 34 (23%), diseases were 22 in numbers with 15% which was the least among the problems, lack of fund were 39 in numbers with 26%, and theft were 55 in number with 37% which was the highest, and the mean

total of the respondents was 37.5. It revealed that the majority of beekeepers used rude method of honey processing and theft of their honey was the problems they encountered.

In addition to the pattern of sales of honey and marketing pattern, the respondents' responses on these matters that; those said the pattern of sales of honey was retail sales were 61 (41%) which was the highest, whole sale were 54 (36%), both sales were 35 in numbers with 23% which was the least amongst the pattern of sale of honey, and the mean total of the respondents was 50. On the marketing pattern of the sales of honey, those respondents that said they sale their honey in rural market were 71 in numbers with 47% which was the highest, urban market were 58 (37%), and those said they sales at both the rural and the urban markets were 21 in numbers with 14%, and the mean total of the respondents involved was 50. Thus, it revealed that the majority of the beekeepers sale their honey at retails price pattern of sales and also the sales was done in the rural markets.

Man has depended on honey bee colonies to get honey and beeswax which are two major products [2]. Honey is an important unrefined food and the only unmanufactured sweet available in commercial quantities. Honey is an important item and is been produced naturally by honey bees. Production and management of honey has been deliberately included as part of the animal husbandry because of the importance roles it plays in the society at large, and for many years, man has plundered honey bee colonies to get honey bee larvae and beeswax. According to Okonta, (2014), Dallet, (2007) and IBRA, (1992) who stated that honey being the only food item that can never spoil, has the pH of 3.2 to 4.5 which is not favorable medium for diseases causing bacteria and fungi is used for food and for medicinal values curing many diseases.

Most of the traditional beekeeping was that the hives were seasonally placed on the trees and some women place it on the ground whereby at the end they harvest a lot of litres of honey and some kilograms of beeswax. Beekeeping is an old art that has been practiced by different generation in many parts of the world using local available materials such as pots, gourds, straws, bark and log hives, wicker baskets or skeps some of which are hung on trees. Nowadays, most of the agricultural developments and products in terms of nutritional and medicinal values, particularly in developed countries, turn out from inorganic to organic agriculture, and in developing African countries like Nigeria, Organo-culture are in practiced in olden days and up to presence days where by agricultural foods are produce within the farms by using organic manures as fertilizers.

The production of honey through beekeeping (Apiculture) as economic activity in the developing African countries like Nigeria is been sidelined, most especially in the rural and semi-urban communities of Nigerians. This may be due to the discovery of crude oil in some parts of Nigeria in the late years and this adversely affected the agricultural sub- sectors of the socio-economic of Nigeria, especially the Apiculture amongst others. The once booming agriculture in all respects in Nigeria, especially in late 1940s and up to early 1970s became a shadow to an extent of itself. Some aspects of agriculture and its prospects in Nigeria that is been neglected or an aspect that awareness has not been properly created is in the field of Apiculture or bee farming. Therefore, it becomes necessary to promote and encourage the art, science and technology, and of the skills knowledge in Bee-farming to enhance the production of quality honey and its by-products through socio-economic values change, economic growth and gross domestic products (GDP) in or of Nigeria and the entire world at large. These creates and increases more friendly and productive honey bees flies which encourages and makes the environments friendly and biodiversity of the pollinating insects for the plants nectar and fruits. Although, various sects of governments in Nigeria have attempted to called and to revitalized the agriculture sub-sectors but not fully succeeded wholly in turning the fortune of agriculture as a whole for socio-economic growth. Just recently, with the current Government of Nigeria, a call for change programmed was lunched and advocated, creating awareness and inspiring activity and encourage the societies, more especially to depend on the agricultural sectors for production of food security and consume what its produced. Today, many parts of Nigeria answered the call and are involved in the deliberate process of Bee farming or Apiculture and other agric-sectors, this ancient profession is still young in the agriculture system, been gradually growing and extend to parts of the country, especially when it is been viewed against the background of the usefulness of the honey in terms of nutritional and medicinal values, been a very valuable by-product of bee farming and the management.

5. Conclusions

For thousands of year, in the olden times man depended on gathering and hunting for foods and the favourable climate, but recently with the coming of many scientific, technological and engineering, innovations and called for sustainable development, man had improved and modified plants varieties and animal breeds all for food security and it consequences. These negative changes causes problems to agriculture and security, national development, economic and financial illiteracy, agricultural skills acquisitions and entrepreneurships, administration and management system and lack of creating awareness and inspiring activities, especially in the fields of biodiversity and agro-ecological activities such as apiculture, etc, these great negative challenges in agriculture –ecological systems need to be address and monitor in other to check out of these menaces.

The study on the traditional honey bee (*Apis millifera* – African honey bee specie) keeping and honey production in Biu and its environs, north - eastern Nigeria, was found significant by providing useful data and information on the Apiculture and of the Apiculturists in the said communities within the studied area. The study revealed vital information on the demography of the apiculturists and the traditional beekeeping honey production in the said studied area; that male's youths are mostly involved in apiculture (bee farming).

These results revealed that married persons and those with formal educational status are the majority in apicultural practicing, majority of the apiculturists in Biu town and its environs are business persons and most of them attended secondary level of education, have numbers of house hold size of 16 Persons and above, while most of the beekeepers have experience of 9 years and above in bee farming. The results also revealed that, the majority of the beekeepers used grass hives for the traditional method of beekeeping used honey bee wax as attractant for new colonies formation, majority of the beekeepers in Biu and its environs area used wild honey harvesting method and traditional method of honey production, also used rude method of honey processing and theft (stealing) of their honey was the problems they encountered. Thus, it revealed that the majority of the beekeepers sale their honey at retails price pattern of sales and also the sales was done in the rural markets inclusively. Also youths are urging to participate in this sector of bee farming (Apiculture) and it's adding beauty to the ecosystem – ecology, especially the biotic diversity ecosystem, i.e. biodiversity and its ecosystems. It's maintain the intact and contribute to the ecosystem – ecology, both economically and environmental friendly.

Recommendations

Based on the findings of this research study; it is recommended that the authority concerned should invest more fund and encourage our farmers generally on bees farming, this is because, have the potentials of producing food, nutritional and medicinal values became necessary in our surrounding environs, especially the African specie *Apis millifera*, which is rapidly growing, disease - resistant bees. It is also recommended traditional beekeepers should be educated on the modern beekeeping and management technology honey production and processing. One of the problems of beekeepers is theft of their products; the authority concerned should look in to this matter for protection of this farming system where available and feasible, this is, in order to have enough access and available to the honey production for tremendous harvest of the honey and its by-products, for provision of quick and safe supply of its nutritional values and health benefits' as well as the Gross Domestic Products (GDP) and income at large.

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