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Assessment of Colony Absconds and It's Effect on the Production of Honey in Ondo State, Nigeria

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Abstract: *The study was carried out to assess colony absconds and how it affects production of honey in Ondo State, Nigeria.A multistage sampling technique was used to collect the data from 90 beekeepers in six Local Government Areas across the three ecological zones in the State. Data collected were analyzed using descriptive statistics and correlation analysis. The results indicated that majority (90%) of the respondents owned less than 120 hives for honeybee rearing, while 93.43% produced below 300litres of honey per cropping season. The result further revealed that the main perceived causes of colony absconds were Pest/parasite invasion, Nutritional problem from non-availability of nectar, Fire/smoke disturbance, Incessant disturbance/ poor apiary maintenance, and Unfavorable weather condition with responses of 94.44%, 72.22%, 68.89%, 58.89% and 55.56% respectively. The results of correlation analysis showed that all the identified causes of colony abscond had negative and significant relationship with honeybee production in the area. It is therefore recommended that government should enlighten the beekeepers on the possible steps to take in preventing colony absconds as identified in this study.*

Key Words: *Colony, Absconds, Production, Honey and Honeybee.*

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I. Introduction

The honeybee (*Apis mellifera)* exists as a distinct race occupying habitats dissimilar to the temperate climates of North America and Europe. Temperate and tropical subspecies exhibit numerous behavioural differences, many of which are associated with the duration and predictability of forage abundance in the contrasting environments (Ruttner, 1988). Temperate races experience a brief predictable foraging season during which large food stores must be amassed for winter survival. In contrast, African subspecies do not experience a winter and may forage virtually all year round (McNally and Schneider, 1992). However, food availability in tropical Africa is often temporarily and spatially unpredictable owing to unpredictable rain patterns. As a result, African races frequently respond to unfavorable periods by undergoing seasonal absconding or migration which involves a colony absconding a nest site, presumably to move into an area of greater resource abundance (Fletcher, 1991).

Migration is unique to tropical honeybee races and may result in movement of 15-100% of all colonies during certain times of the year. However, colonies occupying the same area and experiencing the same weather condition and potentially the same foraging environment can vary greatly in their migration behavior (Schneider, 1990). Migration may therefore, depend upon some assessment of both environmental and intra-colony conditions. Little is known about the factors regulating seasonal absconding hence, migration remains one of the least understood aspects of honeybee biology (Otis, 1991).

There are two types of absconding, namely, seasonal absconding or migration and chronic disturbance. Migration or seasonal absconding involves the movement of a whole colony due to resources depletion; declining nest and site (hive) quality. Disturbance absconding are caused by acute disturbance that may be natural, e.g fire outbreak, flooding, or anthropogenic, e.g human interventions. Seasonal absconding involves a period of time prior to moving, when foraging, honey and brood levels are reduced. No such preparation occurs before disturbance absconding (Visscher and seeley, 1982).

With tropical species, environmental conditions are more favorable for survival year-round, which means that unlike temperate honeybees, tropical honeybees are able to move the whole colony throughout the year in response to change or disturbance, and to follow the honey flow both of which increase fitness and survival of the colony (Otis *et al.*, 1981). In contrast, temperate honeybees had to evolve in conditions that are favorable only during a short period of time with long periods of food shortage and freezing temperatures

leading to hoarding of large honey stores and staying put in thermally stable nests in order to survive the unfavorable conditions of winter (Ruttner, 1988; Seelay, 1983).Seasonal absconding is strongly related to resource depletion and adverse environmental conditions. Apis cerena do not store large amounts of honey, hence they do not have sufficient stores to last through a long period of unfavorable conditions. As a result, they move to find better conditions elsewhere, so they have been seen to move, for example, during periods of high temperatures, after abatement of prolonged heavy rains, and during the dry season. Apis cerana preparing for migration (seasonal absconding) are characterized by decreasing numbers of pollen-carrying workers, greatly reduced brood feeding and rearing, reduced predator and parasite defense. In addition, honey and pollen stores, eggs, open and closed brood decrease dramatically lead to large changes in colony demography prior to absconding. Temperate Apis millefera, especially wild colonies, may abscond in response to the same reasons as tropical honeybees due to depleting resources and starvation, predation, disturbance, adverse environmental conditions and diseases/parasitism (Koeniger and Koeniger, 1980).

1.1 Statement of Problem

When a colony absconds, the entire colony leaves the hive including all the workers and the queen. The bees usually take everything with them, including the stored honey and leave only the empty combs behind. This consequently,led to loss of income and sometimes negative profit on the part of the beekeepers. Hence, the need to study the various parameters that could influence colony absconds and the corresponding management strategies that would reduce this absconding menace becomes a necessity.

1.2 Aims and Objectives

The major objective of this study is to examine the factors influencing the absconding in colonies of honeybees in Ondo State.

The specific objectives are to:

i. describe the socio-economic characteristics of beekeeping farmers in the study area;
ii. identify main causes of abscond in honey bee colony in the area;
iii. examine relationship between causes of colonyabsconds and honey production in the area;and
iv. proffer possible ways of eradicating the problem of absconding in colonies of honeybees in the study area.

II. Research Methodology

2.1 Study Area

This study was carried out in Ondo State, Nigeria. Ondo State is situated within the tropical region of Nigeria and it covers land area of about 14,600km^2 with a fairly large population of 3.4million (NPC, 2006). The geographical coordinates lie between latitude 5°45'N to 8°15'N and longitude 4°45'E to 60°0 0'E. Tropical climate of the State has two distinct seasons: rainy season that starts from April and ends in October, and dry season that last between November and March. It has a temperature range of 21°C-29°C with a relatively high humidity. It has a tropical wet and dry climate with mean annual rainfall of about 1500mm and 2000mm in the derived Savannah and humid forest zones respectively. The major occupation of the people in the State is Agriculture which promotes Apiculture activities, and offers about 75% of employment to the people of the State. The Agricultural landscape is characterized by tree crops such as oil palm, mango, cocoa, rubber, cola nut and also cash crops such as yam, cassava, cowpea and maize. The State is endowed with forest tree products like Teak, Mahogany, Messenia, Obeche, Iroko, Aborea, Cidar and some white woods. There are also animal products such as rat, snake, squirrel and bees.

Fig 1: Map of Ondo State (study area) showing the three ecological zones (pink, yellow and blue) and their local government areas.

2.2 Data Source and Sampling Techniques

Data used for the study were collected from primary and secondary sources.Secondary data were collected from past journals, conference proceedings and textbooks. Primary data were collected through direct personal interview andwell-structured questionnaire to obtain pertinent information on socio-economic characteristics of beekeepers and the perceived causes and effect of colony absconds on their beekeepingbusiness.Multistage sampling was used to administer 90 copies questionnaire to practicing beekeepers in the study area. The three (3) senatorial districts in the State were considered for the study to accommodate the spread of beekeepers in the State. Two (2) Local Government Areas were selected from each of the senatorial district using purposive sampling technique based on ecological zones where honey productions were prominent. From each of the local government area selected, three (3) communities wererandomlyselected given a total of eighteen (18) communities. In each of the eighteen (18) communities, five (5) beekeepers were selected using simple random sampling technique making a total of ninety (90) respondents. The Local Government Areas selected were Odigbo, Ile-Oluji/Okeigbo, Ondo West, Akure South, Owo and Ose.

2.3 Method of Data Analysis

Data collected were analyzed with the aid of descriptive statistics and correlation analysis. Descriptive statistics involved the use of mean, percentages and frequency distribution to analyze age, educational level, beekeeping experience, size of apiary (number of hives) and perceived causes of colony absconds. Correlation analysis was performed to examining the relationship between honeybee production and perceived causes of colony abscond in the area.

The model is stated as:

Pearson Product Moment Correlation Coefficient

$$r = \frac{\sum XY - \sum X \sum Y \,/\, n}{\sqrt{\sum X^2 - \left(\sum X\right)^2 \,/\, n \sum Y^2 - \left(\sum Y\right)^2 \,/\, n}}$$

Where Y is the dependent variable (honeybee production), X is the independent variables (socio-economic characteristics and causes of colony absconds) and n is the number of observations.

III. Results And Discussion

3.1 Socio-economic Characteristics

Results in Table 1 showed that 94.44% of the respondents were male while only 5.56% were female. About 78.89% were married with only 21.11% being single. These showed that apiculture business was mainly dominated by male gender and married people in the study area.This could be due to the fear that women have

for bee stings. The result of the majority being married indicated that apiculture business was dominated by responsible and matured people who could take decisions jointly with their spouses on their beekeeping business. The result also indicated that 67.78% were above 50years of age while 96.67% had either secondary or tertiary education. The high literacy level of majority of the respondents would have implications on adoption of improved honey production techniques and consequently on their productivity because adoption of technology had been shown to have positive correlation with education attainment.The result further revealed that 80% had above 10years experience on the job while 90% produce honey for commercial purpose. These also indicated that majority of the respondents had the required knowledge of the job in terms of prospects and challenges. It also implied that majority of the respondents took up the business as a means of earning a living. However, the result revealed that about 90% of the respondents had below 100 hives in their apiaries. This implied that beekeeping practice was still on a small scale level in the area.

Table 1: Distribution by socio economic characteristics of the respondents.

Sex	**Frequency**	**Percentage (%)**
Male	85	94.4
Female	5	5.6
Total	90	100.0
Marital status	**Frequency**	**Percentage (%)**
Single	2	2.2
Married	88	97.8
Total	90	100.0
Age	**Frequency**	**Percentage (%)**
20 - 30	3	3.3
31 - 40	8	8.9
41 - 50	28	31.1
51 - 60	27	30.0
Above 60	24	26.7
Total	90	100.0
Education	**Frequency**	**Percentage (%)**
Primary Education	3	3.3
Secondary Education	30	33.33
Tertiary Education	57	63.3
Total	90	100.0
No of years	**Frequency**	**Percentage (%)**
5 years	28	31.0
10 years	27	30.0
15 years	28	31.0
16years and above	27	30.0
Total	90	100.0
Purpose of honey production	**Frequency**	**Percentage (%)**
Commercial	81	90.0
Consumption	9	10.0
Total	90	100.0
No. of hives owned	**Frequency**	**Percentage (%)**
1 – 20	20	22.2
21 – 40	61	67.8
41 – 60	5	5.6
61 – 80	1	1.1
101 – 120	3	3.3
Total	90	100.0
Yield (litres)	**Frequency**	**Percentage**
≤ 50	70	77.8
51 – 100	18	20.0
101 – 150	2	2.2
151 – 200	1	1.1
201 – 250	1	1.1
251 – 300	9	10.0
> 300	6	6.7
Total	90	100.0

Source: Computed from Field Survey, 2017

3.2 Perceived Causes of Absconds in Honeybee Colony

Results in Table 2 revealed that 94.44% of the respondents submitted that invasion of hives by pests/parasites such as solder ants, wax moths, squirrels, rats, lizards, snakes and human beings were major reasons for the absconds of honeybee colonies. This, according to the results could be regarded as the most common and prominent cause of colonyabsconds since every living organism, animal in particular would always move away from every danger or threat to their life. About 72.22% of the respondents also attributed the

colony absconds to nutritional problem from non – availability of nectars in the area. This position was shared by Reddy Rami *et al.*(2012). The respondents explained that this problem often made the bees to travel severalkilometers in search for available nectars which could led to the bees migrating to a closer environment to their source of food Fire /smoke disturbances were attributed by about 68.89% of the respondents to be responsible for the abscond in honeybee colonies in the area. This could also be as a result of the fact that when bees see an upcoming fire or smoke approaching their hive, they quickly take all their personal belongings which is usually their food (honey) and move (migrate) to escape death and settle elsewhere. About 61.11% argued that honeybee colonies could absconds as a result of incessant disturbance or poor apiary maintenance. Since, honeybees lived a well-organized and sophisticated life; it is therefore evident that any activity that tends to affect such organized life usually led to their migration to another peaceful area where they could continue their original or planned life.The result further indicated that 58.89% of the respondents attributed colony absconds to unfavourable weather condition. This however, agreed with Reddy*et al.* (2012) and Isha and Tripathi(2016). Improper harvesting pattern/method had been adjudged by 55.56% of the respondents as the cause of absconds in honeybee colonies in the area. This group argued that many colonies had been observed to migrate away from the hives after harvest. This could be as a result of the remover of all the honeycombs from the hive bars or over smoking of the hive.Other reasons attributed for absconds in honeybee colonies in the area were use of insecticides and herbicides and lack of space for the colony to expand or prepare more combs. These two reasons were submitted by 40% and 33.33% of the respondents respectively. The result further indicated that about 76.66% of the respondents produced between 50 and 250 litres of honey per copping season while only 16.67% produced above 250 litres per season. This implied that beekeeping business was predominantly on a small scale level in the area.

Table 2: Distribution 0f Respondents According to Perceived Causes of Absconds in Honeybee Colony

Causes of colony absconding	Frequency	Percentage %
Pest/parasite invasion	8	59.44
Nutritional problem from non-availability of nectars.	6	57.22
Fire/smoke disturbance	6	26.68
Unfavorable weather condition	5	35.58
Incessant disturbance/ poor apiary maintenance	5	56.11
Use of insecticides and herbicides in the area	3	64.00
Lack of space for the colony to prepare combs.	3	03.33
Improper harvesting pattern/method	5	05.56

Source: field survey, 2017. Note: Multiple choice answers allowed.

3.3 Relationship between Causes of Colony Absconds and Honey Production

The relationship between causes of colony absconds and honeybee production was examined using correlation analysis. Results from the study revealed that the socio-economic factors had positive relationship with honeybee production. This implies that age of the beekeepers, educational status and beekeeping experience had upward relationship with honeybee production with coefficients of 0.22 (P> 0.05), 0.79 (P< 0.05) and 0.76 (P< 0.05) respectively. The coefficients of all the causes of colony abscond showed negative and statistically significant association with the honeybee production. This implies that increase in any of the causes will decrease honeybee production in the area.

Table 3: Distribution of Respondents According to Relationship between Causes of Colony Absconds and Honey Production.

Variable	r-coefficient	Sig.	Decision
Age	0.2291	0.191	NS
Education	0.791	0.041	S
Experience	0.761	0.061	S
Improper harvesting pattern	-0.82	0.012	S
Pest/parasite invasion	-0.98	0.045	S
Nutritional problem	-0.42	0.011	S
Fire/smoke disturbance	-0.51	0.049	S
Unfavourable weather condition	-0.62	0.000	S
Incessant disturbance/poor apiary maintenance	-0.81	0.000	S

S= significance; NS = not significance

Source: Computed from field survey, 2017.

3.4 Steps Taken to Prevent Absconds in Honeybee Colony

Results in Table 4 showed that 81.11% of the respondents adopted the use of improvised hives that could prevent abscond in honeybee colony. Examples include reduction in the size of the entering points that would be big enough for bees to enter but too small for rodents and other bigger animals to enter. It also involved the use of milk tin filled with waste engine oil to support the hive stands. This would help to prevent insects such as solder ants from climbing through the stands to the hive. About 78.89 % had also adopted a strategy of not removing all combs during harvesting as well as avoiding over smoking of the hives. These were done to allow the colony to have some food to live upon and also to prevent the tendencies of the colony to migrate in search of food and more comfortable and habitable environment. The result further revealed that 72.22% of the respondents ensured proper routine inspection / maintenance of the apiary as a strategy towards preventing honeybee colony absconds. About 55.56% submitted that they avoided the use of chemicals such as insecticides, pesticides and herbicides in order to prevent abscond in honeybee colony in the apiary. Planting of flowering plants/crops that could supply nectar to the bees at the apiary was also a strategy adopted by about 46.67% of the respondents to prevent absconds in honeybee colony in the area. However, about 18.89% of the respondents said that they had not taken any feasible step towards preventing the problem of colony absconds. This group argued that they only visited their apiary some months after baiting to harvest their honey.

Table 4 Distribution of Respondents According to Steps Taken at Preventing Honeybee Colony Absconds.

Steps taken at prevent colony absconding.	Frequency	Percentage%
Use of improvised hives that could prevent rodents and pests entrance	73	81.1
Avoid the use of chemicals in the apiary	50	55.6
Planting of flowering plants/cropsto supply nectar	42	46.7
proper routine inspection/ maintenance of the apiary	65	72.2
Avoid total removal of honeycombs and over smoking of hives during harvesting	71	78.9
No feasible steps taken	17	18.89

Source: Computed from field survey, 2017. Note:Multiple choice answers allowed.

IV. Conclusion And Recommendation

4.1 Conclusion

Colony absconds had been a major problem confronting beekeepers which had led to total loss or reduction in production of honey and other honeybee products. It could be concluded from the results of this study that pests'/parasites invasion, nutritional problem from non–availability of nectars, fire/smoke disturbance, unfavourable weather condition,incessant disturbance/poor apiary maintenance and improper harvesting pattern or methods were the most prominent and significant causes of honeybees' colony absconds in the area.

4.2 Recommendations

Based on the result of this study, improvised hives designed only to allow bees entrance but prevent rodents and other pests from entering into the hives should be used by beekeepers in the area. Beekeepers are also advised to avoid over smoking and total removal of honeycombs from the hives during harvesting. Proper routine inspection/maintenance of the apiary, avoiding the use of chemicals and planting of flowering plants/crops to supply nectars in the apiary should be ensured by the beekeepers in the area. Young and agile school leavers between the age of 20 and 40 years who are within the active labour force age should be encouraged by government at all levels to go into commercial beekeeping in the area. This could be achieved through enlightenment campaign on the prospects of the business and to also provide credits in form of loans to any such youth in the business.

References

[1]. Fletcher, D. J. C., (1991). Interdependence of Genetics and Ecology in A Solution to the African Bee Problem. In:The "African" Honeybee (M. Spivak, D. J. C. Fletcher, And M. D. Breed, Eds.), Westview Press, Boulder, Colorado, Pp. 77–94.

[2]. Isha Siathia and Tripathi, N. K (2016): Impact of Climate Change on Honeybee Populations and Diseases. *Published by Research Trend, Website:Www.Biobulletin. Com*, 2(1): 40-42

[3]. Koeniger, N., and G. Koeniger, (1980).Observations and Experiments on Migration and Dance Communication of Apis Dorsata in Sri Lanka.J. Apic. Res. 19:21–34.

[4]. Mcnally, L. C., And S. S. Schneider, (1992). Seasonal Patterns of Growth, Development and Movement in Colonies of the African Honeybee, Apis Mellifera Scutellata, In Africa.Ins. Soc. 39:167–179.

[5]. Otis, G. W., (1991). Population Biology of the Africanized Honeybee. In the "African" Honeybee (M. Spivak, D. J. C. Fletcher and M. D. Breed, Eds.), Westview Press, Boulder, Colorado, Pp. 213–234.

[6]. Otis, G. W., M. L. Winston and O. R. Taylor, (1981). Engorgement and Dispersal of Africanized Honeybee Swarms.J. Apic. Res. 20:3–12.

[7]. Reddy Rami, P.V, Rajan Varun. V and Abraham Verghese (2012b). Foraging Activity of Honeybees (Apis Cerana) In Relation to Weather Parameters. Presented in iv National Symposium on Plant Protection in Horticultural Crops Bangalore, 24-27 April, 2012.

[8]. Ruttner, F., (1988). Biogeographyand Taxonomy of Honeybees. Springer-Verlag, New York, New York, USA.

[9]. Schneider, S. S., (1989). Spatial Foraging Patterns of theAfrican HoneybeeApis Mellifera Scutellata.J. Insect. Behav. 2:505–521.
[10]. Schneider, S. S., (1990a). Nest Characteristics and Recruitment Behavior of Absconding Colonies of the African Honeybee (Apis Mellifera Scutellata) In Africa. Insect. Behavior 3:225–240.
[11]. Schneider, S. S., (1990b). Queen Behaviour and Worker-Queen Interactions in Absconding and Swarming Colonies of the African Honeybee, Apis Mellifera Scutellata (Hymenoptera: Apidae).J. Kansas Entomol. Soc. 63:179–186.
[12]. Schneider, S., and R. Blyther, (1988). The Habitat and Nesting Biology of the African Honeybee (Apis Mellifera Scutellata) in the Okavango River Delta, Botswana, Africa. Ins. Soc. 35:167–181.
[13]. Schneider, S. S., and L. C. Mcnally, (1992). Seasonal Patterns of Foraging Activity in Colonies of the African Honeybee (Apis Mellifera Scutellata) in Africa. Ins. Soc. 39:181–193.
[14]. Seeley, T. D., (1983). Division of Labor Between Scouts and Recruits in Honeybee Foraging Behaviour. Ecol. Biol. 12:253–259.
[15]. Seeley, T. D., (1985). Honeybee Ecology. Princeton University Press, Princeton, New Jersey, USA.
[16]. Visscher, P. K., and T. D. Seeley, (1982). Foraging Strategy of Honeybee Colonies in A Temperature Deciduous Forest. Ecology 63:1790–1801.

J.O, Ijigbade. "Assessment of Colony Absconds and Its Effect on The Production of Honey in Ondo State, Nigeria." IOSR Journal of Agriculture and Veterinary Science (IOSR-JAVS) 12.1 (2019): PP- 08-14.