



Comparative Studies of Behavioural Variations of *Apis mellifera* L. Species in Nigeria

By Oyerinde, A. A., Dike, M. C., Bamaiyi, L. J. & Adamu, R. S.

University of Abuja, Nigeria

Abstract - Studies were conducted for three beekeeping seasons (between 2009 and 2011) on 400 colonized hives sited in the two major vegetation zones of Nigeria. Direct counting of the number of sting bables deposited on the beekeepers kit by scout bees defending her colony was done during the period of routing inspection and harvesting of crops from selected colonies while swarming and abscondment of established colonies after the first visit was noted and recorded for each farm. Behavioural variations of *mellifera* species from the forest and savannah vegetation zones of Nigeria revealed that majority (above 65%) of the honeybees were highly aggressive and none of the colonies in the country was stingless. The preponderance of the deposit of the sting bables by the scout bees in the nation was highly aggressive +++ > aggressive ++ > less aggressive + > stinglessness -. Comparison of behavioural variations of *Apis mellifera* colonies in Nigeria revealed that Abuja (31.3%), Adamawa (4.0%) and Osun (3.3%) States had the less aggressive species of honeybees while, both Kebbi (80.7%) and Ebonyi (79.7%) States recorded the highest percentages of sting bables deposition in the savannah and forest vegetation respectively.

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GJSFR-D Classification : FOR Code: 830502



COMPARATIVE STUDIES OF BEHAVIOURIAL VARIATIONS OF APIS MELLIFERA L. SPECIES IN NIGERIA

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Abstract - Studies were conducted for three beekeeping seasons (between 2009 and 2011) on 400 colonized hives sited in the two major vegetation zones of Nigeria. Direct counting of the number of sting labels deposited on the beekeepers kit by scout bees defending her colony was done during the period of routing inspection and harvesting of crops from selected colonies while swarming and abscondment of established colonies after the first visit was noted and recorded for each farm. Behavioural variations of *Apis mellifera* species from the forest and savannah vegetation zones of Nigeria revealed that majority (above 65%) of the honeybees were highly aggressive and none of the colonies in the country was stingless. The preponderance of the deposit of the sting labels by the scout bees in the nation was highly aggressive +++> aggressive ++ > less aggressive + > stinglessness -. Comparison of behavioural variations of *Apis mellifera* colonies in Nigeria revealed that Abuja (31.3%), Adamawa (4.0%) and Osun (3.3%) States had the less aggressive species of honeybees while, both Kebbi (80.7%) and Ebonyi (79.7%) States recorded the highest percentages of sting labels deposition in the savannah and forest vegetation respectively. The percentage of abscondment and swarming of established colonies recorded in the country was ebb but, honeybee colonies' abscondment ranged from 0.7% to 4.0% in Kwara and Osun States both in the savannah and forest vegetation zones of Nigeria respectively.

Keywords : *Apis mellifera*, Colonies, Aggressiveness, Swarming, Abscondment.

I. INTRODUCTION

Apiculture entails the management and maintenance of colonies of honeybees (Parker, 1981) that are kept for highly desirable products such as honey, comb/wax, pollen, propolis, bee venom and royal jelly (Ojeleye, 1999). Beekeeping was practiced in different ways in Africa in general and Nigeria in particular and in many cases the occupation was associated with some folklore, e.g. the Tiv people believe that beekeeping is a secret practice into which beginners must be initiated before they can practice (Olagunju, 2000). Like all the Agricultural sectors, beekeeping is a noble and economically rewarding vocation that can improve the socio-economic conditions of people in rural areas who do not own land to grow their own subsistence crops (Mahalefele, 1991).

Author α: Department of Crop Science, Faculty of Agriculture, University of Abuja, Nigeria.

Author σ: Department of Crop Protection, Faculty of Agriculture, Ahmadu Bello University, Nigeria.

A colony consists of three castes, infertile female workers, male drones and a queen (Johansson, 1980). The vast majority of adult honeybees in any colony are infertile female worker bees. The jobs of the worker bees are: tending and feeding young bees (larvae), making honey, making royal jelly and bee bread to feed larvae, producing wax, cooling the hive by fanning wings, gathering and storing pollen, nectar and water, guarding the hive, building, cleaning and repairing the comb and feeding and taking care of the queen and drones.

Several researchers and beekeepers had described the general distinguishing traits of the African honeybee subspecies, as rapid population growth, frequent swarming, minimal hoarding of honey, ability to survive on sparse supplies of pollen and nectar and highly defensive nature (Sugden, 2007). They abscond their hives in time when food-store is low, unlike the European colonies, which end dieing in the hives (Winston *et al.*, 1981).

The ability to increase honey production is rested upon several factors among which evaluation of the behavioural differences of races of *Apis mellifera* in Nigeria require top most attention. In Nigeria where a rich nectar flow is found, relatively small quantity of honey are produced and up to date no developmental programme has deemed it fit to conduct studies on the behavioural variations of the races of honeybees in Nigeria in terms of aggressiveness in order to further develop the gentle races that can encourage interested youth and other individuals aimed at engaging in healthy Apicultural practices in the country.

II. MATERIALS AND METHODS

a) Study Site

Studies were conducted for three beekeeping seasons on 400 colonized hives sited in the two major vegetation zones of Nigeria. 50 colonized hives were selected from established honeybee farms in Igbeti (Oyo State), Oshogbo (Osun State) and Ishiagwu (Ebonyi State) in the Forest Agro-ecological zone, as well as, Ilorin (Kwara State), Abuja (FCT), Katari (Kaduna State), Mayo Belwa (Adamawa State) and Zuru (Kebbi State) in the Savannah vegetation zone of the country.

Direct counting of the number of sting labels (Plate 1) deposited on the bee suite, hand gloves and hat by scout bees defending her colony was done during the period of routing inspection and harvesting of

crops from selected colonies over three beekeeping season i.e. between 2009 and 2011 while, swarming and

abscondment of established colonies after the first visit was noted and recorded for each farm.



Plate 1 : Showing Scout Bees Depositing Sting Babels on Hat and Bee suite

The behavioural characteristics was expressed on a range scale defined as: number of sting babel (NSB) i.e. no sting babel or stinglessness (-); 0-20 sting babels or less aggressive (+); 21-50 sting babels or aggressive (++); >50 sting babels or highly aggressive (+++); swarming behaviour (CS) i.e. no swarming (-); colony swarmed (+); abscondment behaviour (CA) i.e. no abscondment (-); colony absconded (+). The behavioural variation of the respective ecotype honeybees observed in the two vegetation zones was analyzed with inferential statistics tools of percentage and variance.

III. RESULTS

Behavioural variations of *Apis mellifera* species from the forest vegetation zone of Nigeria (Table 1) revealed that majority (above 65%) of the honeybees were highly aggressive and none of the colonies in this region was stingless. The preponderance of the deposit of the sting babels by the scout bees in the region was highly aggressive +++ > aggressive ++ > less aggressive + > stinglessness -. Also, the percentage of abscondment and swarming of established colonies in Ebonyi, Osun and Oyo States were relatively low i.e. 2.0, 4.0 and 2.7 respectively.

Hitherto, the behavioural variations of *Apis mellifera* species of the savannah vegetation zone of Nigeria (Table 2) were not different with the result obtained from honeybees of the forest vegetation origin. Majority of the States i.e. Adamawa, Kaduna, Kebbi and Kwara had above 60% honeybees colonies with highly aggressive behaviour but, honeybee colonies of apiaries sited in Abuja were relatively less aggressive compared to those from the various States. The deposition of sting babels by the scout bees of Abuja colonies spread over

the scales of aggressivity i.e. +++ (38%), ++ (30.7%) and + (31.3%).

Likewise as was experienced with the forest region colonies, none of the colonies in the savannah region was stingless. The preponderance of the deposit of the sting babels by the scout bees in this region followed suit with the pattern exhibited in the forest agro-ecological zone of the country. In addition, the percentage of abscondment and swarming of established colonies recorded in the savannah vegetation colonies were lower compared to their forest counterpart. Colonies abscondment and swarming in this region ranged between 0.7% in Kwara State to 2.0% in Abuja FCT, Adamawa and Kebbi States.

Comparison of behavioural variations of *Apis mellifera* colonies from the two main vegetation zones of Nigeria revealed that Abuja (31.3%), Adamawa (4.0%) and Osun (3.3%) States had the less aggressive species of honeybees while, both Kebbi (80.7%) and Ebonyi (79.7%) States recorded the highest percentages of sting babels deposition on bees suite (i.e. highly aggressive) in the savannah and forest vegetation respectively. This implied that colonies from the two States were highly ferocious and beekeepers in these States need proper kitting before inspecting their respective colonies.

In addition, comparison of colonies in terms of presence of stingless honeybee species showed that none of the colonies in the country exhibited this behaviour. The percentage of abscondment and swarming of established colonies recorded in the country was ebb but, honeybee colonies' abscondment ranged from 0.7% in Kwara State in the savannah vegetation zone to 4% in Osun State in the forest vegetation zone of Nigeria. This showed that

beekeepers in Kwara State had the best management practice of their honeybee's colonies.

IV. DISCUSSION

Majority of *A. mellifera* encountered in this study exhibiting high aggressiveness in terms of number of sting bachel deposited on beekeepers protective clothing by scout bees was an indication of the various ecotype *A. mellifera* being highly defensive as earlier reported on characteristics of Africanized honeybees by Sheppard *et al.*, (1999) and Sugden, (2007). In addition, the identification of few colonies that was less aggressive in Abuja, Adamawa and Osun States contradicted Sugden, (2007), earlier report that classified Africanized *A. mellifera* species as killer bees. Thus, the less aggressive species that occurred in Abuja, Adamawa and Osun States compared to the other States gave an indication that bees from these States can be adopted in queen rearing programme in order to develop bees that will be friendlier with beekeepers in the country. Also, the low abscondment and swarming rate recorded in this study portrayed effective management and adequate availability of food (pollen and nectar) for established honeybee's colony in the sampled State. This confirmed the concentration of honeybees on honey production when the environmental condition was favourable (Taylor, 1977; Otis *et al.*, 1981).

V. CONCLUSION

Based on our identification of some less aggressive colonies in this study, it is imperative to engage those less aggressive colonies in queen rearing programme, with the aim of producing nucleus bee colonies that can be adopted in modern beekeeping practice in Nigeria, in order to reduce exposure of beekeepers to unwanted bee sting by their respective colonies.

VI. ACKNOWLEDGEMENT

We appreciate financial assistance from Science and Technology Education Post Basic Project STEP B (Nigeria) and also Mr Ishiaku P. Musa of the Insect Museum, Department of Crop Protection, Ahmadu Bello University Nigeria for his technical support on the research work.

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Table 1 : Behavioural Variations of Ecotype *Apis mellifera* Colonies in Forest Vegetation Zone of Nigeria

State	No (%) Sting Babel NSB			No (%) Colony Swarmed CSS			No (%) Colony Absconded CAS		
	-	+	Variance	-	+	Variance	-	+	Variance
Ebonyi	0(0.0)	30(20.3)	0.442	147(98.0)	3(2.0)	0.020	147(98.0)	3(2.0)	0.020
Osun	0(0.0)	44(29.3)	0.802	144(96.0)	6(4.0)	0.039	144(96.0)	6(4.0)	0.039
Oyo	0(0.0)	32(21.3)	0.541	146(97.3)	4(2.7)	0.026	146(97.3)	4(2.7)	0.026

Number of sting babel **nsb** - no sting babel = stinlessness, + 0-20 sting babel= less aggressive, ++ 21-50 sting babel= aggressive, +++ >50 sting babel highly aggressive, - no swarming, + colony swarmed **css**, -no abscondment, + colony absconded **cas**

Table 2 : Behavioural Variations of Ecotype *Apis mellifera* Colonies in Savannah Vegetation Zone of Nigeria

State	No (%) Sting Babel NSB			No (%) Colony Swarmed CSS			No (%) Colony Absconded CAS		
	-	+	Variance	-	+	Variance	-	+	Variance
Abuja	0(0.0)	47(31.3)	0.804	147(98.0)	3(2.0)	0.013	147(98.0)	3(2.0)	0.013
Adamawa	0(0.0)	6(4.0)	0.531	147(98.0)	3(2.0)	0.020	147(98.0)	3(2.0)	0.020
Kaduna	0(0.0)	0(0.0)	0.362	148(98.7)	2(1.3)	0.026	148(98.7)	2(1.3)	0.026
Kebbi	0(0.0)	0(0.0)	0.442	147(98.0)	3(2.0)	0.020	147(98.0)	3(2.0)	0.020
Kwara	0(0.0)	0(0.0)	0.297	149(99.3)	1(0.7)	0.007	149(99.3)	1(0.7)	0.007

Number of sting babel **nsb** - no sting babel = stinlessness, + 0-20 sting babel= less aggressive, ++ 21-50 sting babel= aggressive, +++ >50 sting babel highly aggressive, - no swarming, + colony swarmed **css**, -no abscondment, + colony absconded **cas**