International Journal of Entomology Research
ISSN: 2455-4758; Impact Factor: RJIF 5.24
Received: 16-01-2019; Accepted: 19-02-2019
www.entomologyjournals.com
Volume 4; Issue 2; March 2019; Page No. 32-35

The impact of some agricultural practices on population status of honey bee, *Apis mellifera* L. in Katsina State, Nigeria

Abdullahi Magaji Dauda[1*], Abbati Nasiru[2], Mohammed Suleiman[3]
[1-3] Department of Biology, Umaru Musa YAR'ADUA University, Katsina, Katsina State, Nigeria

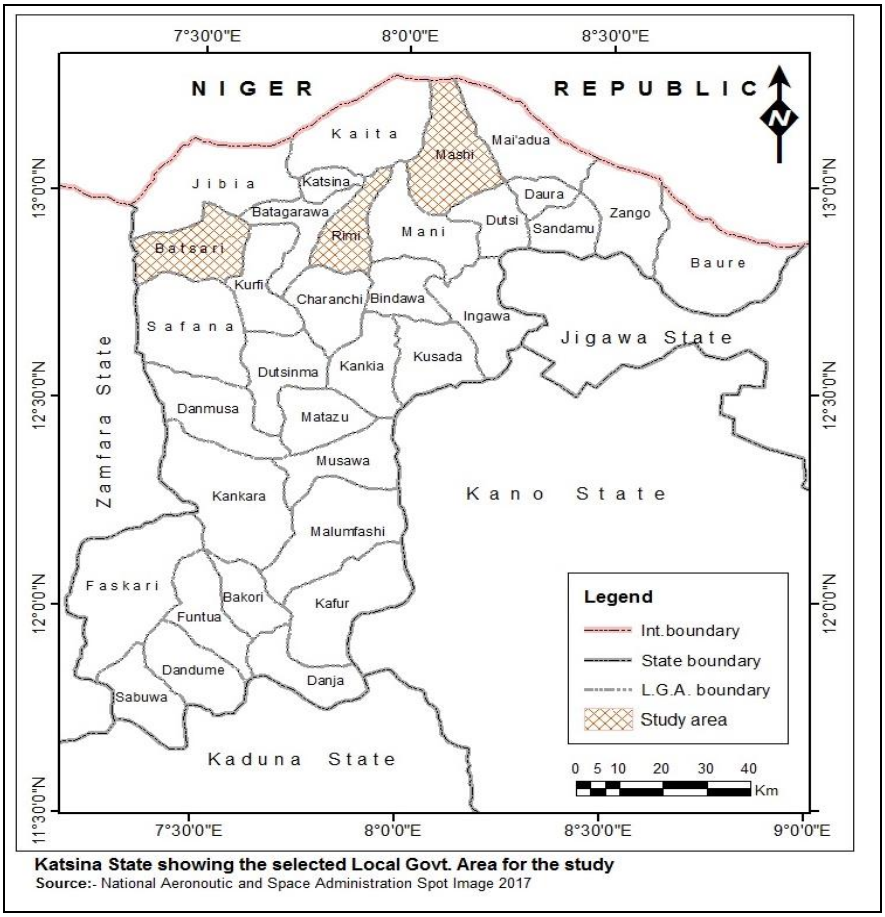
Abstract
A study was conducted between March and September, 2017 in order to find the impact of agricultural practices on population status of honey bees in Katsina State. Survey questionnaire were used to collect data from traditional beekeepers, honey sellers, farmers and settlers. The survey was conducted in three selected local government areas (LGAs), namely Rimi, Batsari and Mashi, due to their popularity in beekeeping activities. A descriptive statistical methods and chi-square (χ^2) were used to present and analyze the data obtained. Beekeepers in the study area were 100% males, 56.44% of them were at the age range of 61-80 years and 54.46% attained primary education and having a reasonable number of hives. Populations of honey bees were moderately decreased due to improper use of pesticides/herbicides (44.50%), deforestation (28.70%), water contamination (15.90%) and bush burning (10.90%). Therefore, application of pesticides and herbicides during the flowering period should be avoided**.** Chemical pesticides should also be substituted with biopesticides so as to minimize the toxicity of chemicals to pollinators.

Keywords: bush burning, deforestation, honey bee, pesticides, population

1. Introduction
Honey bees are social insects which rely exclusively on flowering plants and act as a pollen vector by transporting pollen from one flower to the next. This mutualistic relationship is responsible for over 200 billion dollar worth of food products and the reproductive success of more than 85% of flowering plants [1]. They are a crucial part of ecosystems, pollinating one-third of food consumed by humans, increase biodiversity of plants species, maintain genetic diversity within plants populations, increase fruit yields and hence support flora and fauna in every level of the food chain [2]. Even though bees are distributed globally, Africa is their original home and the common one in Nigeria is *Apis mellifera* L. [1]. Honey bees are the sole producers of honey which is estimated that, 100g of honey provides nutrients equivalent to 6liters of milk or 170g of beef [1].
Beekeeping has been traditionally practiced for long in almost all the local government areas of the State. However, there has been an increase in the use of agricultural chemicals, deforestation and bush burning to provide food and shelter needs of the increased human population. These activities could result in polluting water bodies and nectar, habitat lost or fragmentation and loss of native flora which may in turn affect population status of honey bees in the State. It has been observed that honey bees, are bio-resources which requires human protection as well as conservation. Without insect pollination, about one third of the crops we eat would have to be pollinated by other means, or they would produce significantly less food. Undoubtedly, fruits, vegetables and some crops used as fodder in meat and dairy production would be badly affected by a decline in insect pollinators [3].
Beekeeping can be used as a means of poverty alleviation, hunger reduction and job creation especially in the rural areas where there is high level of unemployment and the people are mostly engaged in subsistence farming for food production. Forest provides excellent resources for bees and beekeeping and hence, conservation of forest is imperative for sustainable beekeeping [4]. Increase in the population of bees could promote pollination which may boost food production.
Unfortunately, fragmentation of natural and semi-natural habitats, destructive practices that limit bee nesting ability and the spraying of herbicides and pesticides, make industrial agriculture one of the major threats to pollinator communities globally [3]. Residues of systemic insecticides can be present at 'trace' levels in the plant pollen and nectar which could be toxic to honey bees feeding on them [5].

2. Materials and Methods
2.1Study area
The study was conducted in Katsina State (latitudes 11°08′N and 13°22′N and longitudes 6°52′E and 9°20′E), bounded by Niger Republic to the North, Jigawa and Kano State to the East, Kaduna State to the South and Zamfara State to the West (Figure 1). The State has 34 Local Government Areas (LGAs) and for the purpose of this research, three LGAs were selected due to their popularity in beekeeping activities, namely; Mashi, Rimi and Batsari.

2.2 Data collection
The research was conducted from March to September 2017. Data were obtained using a designed questionnaire, distributed to traditional beekeepers, farmers and honey sellers. The questionnaire consisted of eleven questions, covering; socio-demographic information and those related to agricultural practices and their possible impact on the population of honey bees. A total 101 questionnaires were distributed and filled-in across the selected LGAs.



Katsina State showing the selected Local Govt. Area for the study
Source:- National Aeronautic and Space Administration Spot Image 2017

Fig 1: Map of Katsina showing the selected LGA's for the study

2.3 Data analysis
A descriptive statistical method using frequencies, percentages and bar graph was used to present the data obtained while chi-square was also used to determine relationship between agricultural practices and population status of honey bees in the study area.

3. Results
3.1 Demography of the respondents
Table 1 shows that all beekeepers in the study area were males with the majority (56.44%) at the age of 61-80, while those from the age group of 21-40 were least (9.90%) involved in beekeeping. The Table further shows that only 5.94% of the respondents obtained tertiary education, 24.75% secondary education and 54.46% attained primary education. Individuals involved in beekeeping for 21-30 years had the highest percentage (43.56%), while the least (2.97%) comprised of those with above 40 years in the practice. The results also show that up to 42.57% of the respondents owned 41-60 hives and only 8.91% had more than 80 hives (Table 1).

3.2 Population status of honey bees
Majority of the respondents (90.10%) believed that the honey bee populations were decreased, while 9.90% believed in an increase in the populations (Table 2). Some of them (44.55%) observed that the decrease was due to death, some (39.60%) by migration and others (15.84%) had the opinion that the population decrease was as a result of both of the factors (Table 2).
The result further revealed that 64.4% of the respondents expressed the population changes as moderate, 19.80% as high, 14.90% and 0.90% as slightly as extremely decreased, respectively (Figure 2). The possible causes of honey bee population decrease were recorded in the following order: improper use of pesticides/herbicides > deforestation > water contamination > bush burning (Table 2).

Table 1: Demographic data of the respondents

Variables		Frequency	Percentage
Sex	Male	101	100.0
	Female	0	0.0
Age	≤ 40	10	9.90
	41-60	22	21.78
	61-80	57	56.44
	> 80	12	11.88
Educational qualification	Informal	15	14.85
	Primary	55	54.46
	Secondary	25	24.75
	Tertiary	6	5.94

Beekeeping period (years)	≤ 10	17	16.83
	11-20	26	25.74
	21-30	44	43.56
	31-40	11	10.89
	> 40	3	2.97
Number of hives owned	≤ 40	32	31.68
	41-60	43	42.57
	61-80	17	16.83
	> 80	9	8.91

Table 2: Condition of honey bee population in three LGAs of Katsina State and their possible causes

Variables		Frequency	Percentage
Population status of honey bees	Decreased	91	90.10
	Increased	10	9.90
How the decrease occurred	By death	45	44.55
	By migration	40	39.60
	By both death and migration	16	15.84

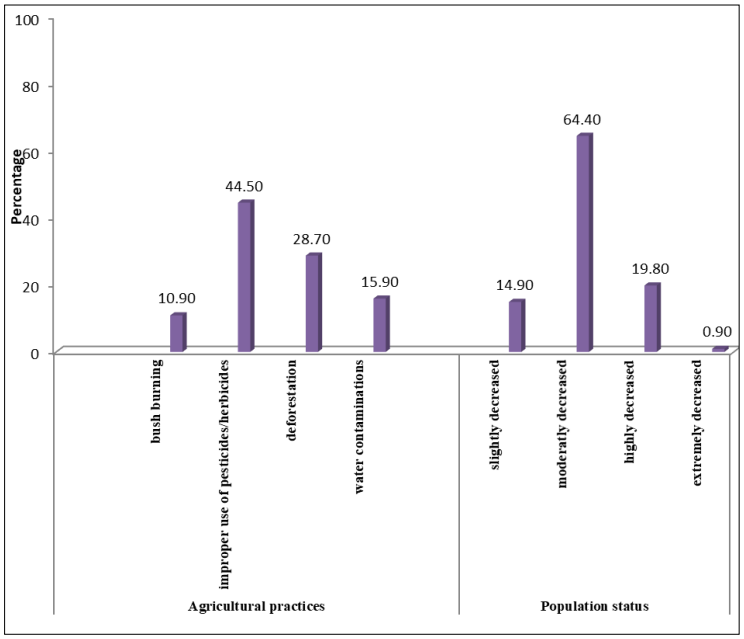


Fig 2: Agricultural practices and population status of honey bee in three LGAs of Katsina State, Nigeria

4. Discussion

Findings of the study revealed that all respondents in the study area were males (100%), which is closely similar to the findings of [6] who reported that 95% of beekeepers in Yobe State were males. The involvement of most of the respondents with the age of 60-80 in beekeeping in the study area is contrary to the findings of [7] who reported that 81% of beekeepers in Malumfashi LGA were between the age of 31 and 50 years. This indicates that youth in the study area showed negligence in beekeeping which may result in the demise of the practice after the death of the old ages.

The decrease in bees populations observed in this study concurs with the findings of [3] who reported that populations of bees and other pollinators seem to be declining globally particularly in North America and Europe. This decrease might be caused by improper use of chemicals (pesticides and herbicides), deforestation, water contamination and bush burning. Similarly [3], observed that insecticides in particular, pose the most direct risk to pollinators. It is becoming increasingly evident that some insecticides at concentrations applied routinely in the current chemical-intensive agricultural system, exert clear negative effects on pollinators [8]. Other human activities such as bush burning, water contamination and deforestation were observed to cause decline in honey bee population the three LGAs of Katsina State. The finding is consistent with the previous reports that establishment of monocultures, overgrazing and land clearing affect the population of bee species and their abundance [9]. An overzealous application of scientific techniques and indiscriminate use of chemicals may lead to contamination of water resources [10]. These activities may possibly kill or repel foraging bees especially when undertaken during the flowering period and hence reducing their populations.

5. Conclusion

It could be concluded from the findings of this study that beekeepers in the study area were all males and elderly. Majority attained primary education and having a reasonable number of hives. Populations of honey bees were moderately decreased in the selected three LGAs of Katsina and therefore, farmers should be cognizant to what they are applying to their crops and the stage of the crop at which they apply pesticides and herbicides so as to minimize the toxicity of these chemicals to honey bees.

6. References

1. Oluwaseun TO. Economics of honey production in

Ijebu Division of Ogun State. Unpublished M.Sc. Thesis, Olabisi Onabanjo University, Ogun State, Nigeria, 2009.
2. Batra SWT. Bees and pollination in our changing environment. Apidologie. 1995; 26(5):361-370.
3. Tirado R, Simon G, Johnston P. Bees in decline: A review of factors that put pollinators and agriculture in Europe at risk. Greenpeace Research Laboratories Technical Report (Review)/ 2013; 1:1-48.
4. Mustafa MO, Adeoye OT, Abdulalzeez FI, Akinyemi OD. Mitigating effects of climate change and deforestation on bees with respect to their ecology and biology. Journal of Environment and Ecology, 2015; 6(2):1-12.
5. Blacquiere T, Smagghe G, Van Gestel CA, Mommaerts V. Neonicotinoids in bees: A review on concentrations, side-effects and risk assessment. *Ecotoxicology*. 2012; 21(4):973-992.
6. Tijani BA, Ala AL, Maikasuwa MA, Ganawa N. Economic analysis of beekeeping in Chibok Local Government Area of Borno State, Nigeria. Nigerian Journal of Basic and Applied Sciences, 2011, 19(2).
7. Khumari JD. From bee hunters to beekeepers" Malumfashi Local Government Area, Katsina State, Nigeria. Agro-satellite journal. 2015; 10(2):59-67
8. Aneni T. Green growth and improving preparedness to adapt to pollinator decline in Nigeria – Communicating results for policy and action. Environmental Skeptics and Critics. 2017; 6(2):23.
9. Alemberhe K, Gabremeskel K. A review on: The Role of honey bee pollination in improving crop productivity and Seed quality in the Northern Ethiopia. Journal of food science and quality management. 2016; 47:7-13
10. Nnamonu LA. Onekutu A. Green pesticides in Nigeria: an overview. J Biol Agric Healthcare. 2015; 5(9):48-62.