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Agrochemicals usage by farmers in central senatorial district of Gombe state, north eastern Nigeria

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ABSTRACT

This study was conducted in the central senatorial district of gombe state in north eastern Nigeria with objective of determining the usage of agrochemicals among the farmers in the study area, demography and the level of utilizations of agrochemicals are all part of this study's objectives in specific terms, however multi stage sampling technique was employed where by in the first stage three strategic agricultural towns (SAT) was randomly sampled from each of the local government in the study area, Akko : Kumo, Pindiga and Kembu while in Yamaltu deba : Deba, Kuri and Dadin kowa was selected The second stage involve a purposive selection of five villages from each of the SAT to make a total of 30 villages more so 25 different persons were randomly selected from 25 different household giving a total of 750 which was used as a sample size for this study. Focus discussion group was used to determine the level of utilization of agrochemicals in the area in whicha descriptive statistics is used to analyzed the data generated, however the result of this study reveals fertilizer as the commonly use agrochemical in the study area with 80% of the respondent indicated the use of it and ranked first which is followed by herbicide (67%) and the least agrochemical used is the nematicide (4.0%). The level of utilization of the agrochemicals in the study area shows that the frequently used agrochemical is the herbicide (mean value = 2.350)

and ranked first, pesticide (mean value =2.233), insecticide (mean value = 2.126). The demography of the respondents indicated that the respondents are active population within the age range of 18 – 60 years (90%) and majority of them are married (73%) and male by gender (87%) with good formal education (80%), their household is comparatively bigger with at least 7 - 9 members (47%). In conclusion the most commonly use agrochemical is the fertilizer and the most frequently used one is the herbicide while the least use agrochemical is the nematicide. Community leaders and all the stake holders in agriculture should encourage farmers to imbibe good farming practices to maintain soil fertility in the study area, Extension agents should educate farmers on the proper usage of agrochemicals to make sure that it is not used to detrimental level for both the soil and the farmers themselves. Community leaders in the area should advice farmers to used other materials to boost their soil fertility instead of depending on fertilizer alone as it's prolong usage may affect other soil parameters.

Keywords: Agrochemicals usage, Farmers, Gombe.

1. INTRODUCTION

Agricultural production in a modern world today relies heavily on the use of chemicals for many reasons, to achieve successful farming venture by the farmers, the use of these chemicals are viewed by many as an integral part of the success of crop production (Abubakar *et al*., 2015). However, most of the agrochemicals applied to agricultural lands may affect non-target organisms, pollute soil and water reservoir in the soil at varying degree of contamination (Tijjani, 2006). Most of these chemicals are potential up setters of soil ecosystem equilibrium as well as important microbial flora in the soil, with attendant consequences on the food chain and food web. Wide range of Agrochemicals are used by farmers at different level of crop cultivation to reduce loss due to biotic factors, in spite of their astonishing results, agrochemicals majority are non-biodegradable and with their prolong usage they tend to be accumulated to such a level that they will become injurious to soil ruderals, and this bioaccumulation can transcend into the food chain thereby creating hazardous effects on humans and ecosystem (Adeola, 2012). One of the most important occupational hazard in cur by the farmers in developing world such as Nigeria is exposure to Agrochemicals (Atray, 2008). In some circumstances such exposure can occur from accidental spills of chemicals, leakages or faulty spraying equipment's (Akingbohungbe, 2009). The exposure of farmers increase as a result of lacking technical know-how of using agrochemicals or intentional ignorance of safety guidelines and rules on the use of personal protective equipment's (Damalas and Ilias, 2011). There is need for policy intervention by all the stake holders in Agricultural production to provide an enabling environment for the usage of these chemicals by rural peasant farmers. Regulating policy may play an important role in checking the availability of such toxic and damaging chemicals and their utilization, farmers' access to better knowledge through extension officers for sustainable agricultural production should be strengthened. According to Maisamari (2001) in a study conducted in Kenya there is high risk associated with the usage of agrochemicals based on the sum total of the extent of usage, behavior of farmers towards the chemicals, ethical consideration etc.

Acquisition, distribution and usage of these chemicals are not always address by the authorities concern. Researchers on such index often carry out survey based on official data of importation and sales collated by the government agencies; however such official data do not reflect true situation of reality. Many agrochemicals despite being restricted in many countries and having been listed as dangerous by world health organization (WHO), Fegewonyomi (1995) stated that many of them are still in use in developing countries.

According to Andrew (2008) ecological damage is commonly associated with excessive usage of some agrochemicals whereby for examples deep percolation of heavily fertilized farms with nitrates and phosphate fertilizers leads to contamination of underground water making it unsafe for consumption by humans and their animals. The problem of eutrophication of nearby streams and rivers neighboring some farms is as a result of run off of water from farms that are heavily applied with fertilizers containing organophosphate or organosulphate compounds and their corresponding ligands. As observed over the years farmers are confronted with low yield due to wanton usage of agrochemicals and poor soil performance. This study is therefore aim at ascertaining the usage of agrochemicals in the rural areas of central senatorial district of Gombe state Nigeria. More specifically this study aim to determine the demography of the respondents in the study area as well as the level of usage of agrochemicals and the types of Agrochemicals use by the farmers in the study area.

2. MATERIALS AND METHODS

Thestudy were conducted in the central senatorial district of Gombe state which comprises two local government areas (Akko and Yamaltu Deba local government areas). The area of a study is strategically important to the state agriculturally and politically

because Akko local government is one of the largest local government in the state and the nation in general with bigger landmass and high population second to none in the whole state. The study area is a true guinea savannah with two alternating distinct seasons of rainfall and dry season. Table 1below shows the location, population and land size of the study area. A multi stage sampling procedure was employed to collect data whereby in the first stage three Strategic Agricultural Towns (SAT) are randomly selected from each local government, in Akko, the towns are: - Kumo, Pindiga and Kembu towns while in Yamaltu Deba, the towns are: - Deba, Kuri and Dadin Kowa towns respectively. The second stage involve a purposive selection of five villages from each of the SAT to make a total of 30 villages more so 25 different persons were randomly selected from 25 different household giving a total of 750 which was used as a sample size for this study. In order to ascertain the usage of Agrochemicals and the type of agrochemical used by the farmers in the study area focus group discussion (FDG) was carried out. Respondents were asked which methods they have adopted in using agrochemicals in some of their farming operations which was ranked based on frequency counts. Percentage, means and ranks was used to determine the demography of the respondents. To determine the level of agrochemical usage by the farmers five points likert type scale were used as follows: - Never = 0, Rarely = 1, Occasionally = 2, Monthly = 3, Weekly = 4. The mean score was used to rank the level of agrochemical usage by the farmers in the study area.

Table 1 Land size, population and location of the study area

Local Government	Population	Land size (Km^2)	Longitude	Latitude	Average Annual Rainfall (mm)
Akko	337,435	2,627	10°17′N	10°58′E	850 – 1000
Yamaltu Deba	255,726	1,981	10°13′N	11°23′E	950 – 1000

3. RESULT AND DISCUSSION

Table 2 reveals that the most commonly used agrochemical is fertilizer (rank = 1) followed by herbicide (rank = 2), Insecticide (rank = 3), Pesticide (rank = 4), Fungicide (rank = 5), Rodenticide (rank = 6), Molluscide (rank = 7), Nematicide (rank = 8), this finding buttress the fact that after fertilizer usage, the most commonly nuisance factor that disturb farmers in the study area is the problem of weed because most of the respondents about 500 of them out of 750 indicated the use of the agrochemical (herbicide) which is 67% and ranked second after fertilizer,of the total sample population and the others followed in their respective ranks but the least used Agrochemical is the nematicide, this shows that nematode problem in the study area is less hence its least rank.

Table 2 Common Agrochemical used by the farmers

Types of Agrochemicals use	Frequency*	Percentage	Rank**
Herbicide	500	67.0	2
Fertilizer	600	80.0	1
Pesticide	250	33.0	4
Insecticide	300	40.0	3
Rodenticide	50	6.70	6
Fungicide	150	20.0	5
Nematicide	30	4.0	8
Molluscide	40	5.3	7

*Note: *= multiple responses and **= rank 1 was considered to be the most common Agrochemical used by the farmers in the study area.*

Source: Field Survey, 2017.

From table 3 it has become crystal clear that majority of the farmers in the study area are active population within the age range of 18 to 30 years, this implies that the area has young people that are energetic and can involve more in production activities in the farm (Lupilya, 2007). however most of them are men (87%) which indicate patriarchy system and male dominance in decision making such as farming venture, which is a common feature of many Nigerian societies and no less African societies that resulted into most of households being led by men (Duze and Mohammed, 2006). However, most of the respondents are literate, only 20% do not have any form of formal education that is to say 80% of the respondents have formal education. Their monthly income shows that 73% of the people in that axis have a monthly income within the range of 10 to 30,000 naira and index that shows relative abundance of wealth in the area, however, there is still a need of economic empowerment because from the interview conducted, it show a high rate of poverty in the area, this may not be unconnected with the fact that farming activities with bring most of the

fortune in the area is a seasonal activity only perform during the rainy season. Their household indicated that the majority have a big family with high number of members whereby the least is having one to three members which is 7% meaning that almost 97% has big household which by extension mean abundant cheap labor for agricultural production.

Table 3 Demography of the Respondents

Socioeconomic Characteristics	Categories (n =750)	Frequency	Percentage
Age	18- 30 years	400	53.0
	31- 60 years	280	37.0
	61- 90 years	70	9.0
Gender	Male	650	87.0
	Female	100	13.0
Marital Status	Married	550	73.0
	Divorcee	150	20.0
	Single	50	7.0
Educational Level	No formal education	150	20.0
	Primary education	250	33.0
	Secondary education	200	27.0
	Tertiary education	150	20.0
Monthly income (in Naira)	10,000 – 30,000	550	73.0
	30,001 – 50,000	200	27.0
	50,001 – 70,000	0	0.0
Household size	1-3 persons	50	7.0
	4-6 persons	250	33.0
	7-9 persons	350	47.0
	10- many	100	13.0

Source: Field Survey, 2017

Table four reveal the fact about the level of using the agrochemicals in the study area whereby the most commonly used agrochemical is the herbicide with mean value of 2.350 followed by pesticide (2.233) and followed by insecticide (2.126) this follows up to the Agrochemical with least value which is nematicide (0.253). Impliedly this results show that the area of study has a problem of weed, pest and insect which if can be controlled properly, may be by using integrated pest and disease management practices, the agricultural production of the area may improve drastically. However the extent offertilizer utilization in the area is ranked fourth with mean value of 2.026, this indicated that the area has advantage of good fertile soil which does not require supplementation by synthetic fertilizer. Furthermore the least ranked 8th of nematicide (mean = 0.253) shows that the area has no or little nematodes infestation hence its least rank

Table 4 Distribution of Respondents by the Level of Agrochemicals Usage

Agrochemical	Never	Rarely	Occasionally	Monthly	Weekly	Mean	Rank
Herbicide	5(0.7)	150(20.0)	250(33.3)	270(36.0)	75(10.0)	2.350	1
Fertilizer	5*(0.7)**	95(12.7)	550(73.3)	75(10.0)	25(3.3)	2.026	4^{+}
Pesticide	25(3.3)	175(23.3)	250(33.3)	200(26.7)	100(13.3)	2.233	2
Insecticide	35(4.7)	250(33.3)	150(20.0)	215(28.7)	100(13.3)	2.126	3
Rodenticide	550(73.3)	50(6.7)	125(16.7)	10(1.3)	15(2.0)	0.520	6
Fungicide	450(60.0)	150(20)	50(6.7)	75(10.0)	25(3.3)	0.760	5
Nematicide	650(87.0)	50(6.7)	25(3.0)	10(1.3)	15(2.0)	0.253	8
Molluscide	600(80.0)	100(13.3)	35(4.7)	5(0.7)	10(1.3)	0.300	7

*Note: * and **= frequency and percentage; + = Rank, 1 is considered to be most commonly used Agrochemical while 8 was the least common agrochemical in use in the study Area.*

Source: Field Survey, 2017.

4. CONCLUSION AND RECOMMENDATIONS

The findings of this study show that the most commonly used agrochemical in the study area is the fertilizer followed by pesticide but the level of usage of the agrochemicals show that herbicide is the most frequently used agrochemical which is followed by pesticide and insecticide and the most least used agrochemical as well as in terms of level of usage is nematicide.

Based on the above foregoing following recommendations are projected

1. Community leaders, government agencies as well as other stakeholders should encourage farmers to imbibe good farming practices such as organic farming to maintained the good nature and fertility of the soil in the area
2. Extension agents should educate farmers on the proper usage of agrochemicals to make sure that it is not used to detrimental level for both the soil and the farmers themselves.
3. Community leaders in the area should advice farmers to used other materials to boost their soil fertility instead of depending on fertilizer alone as it's prolong usage may affect other soil parameters.

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Conflict of Interest:
The authors declare that there are no conflicts of interests.

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Data and materials availability:
All data associated with this study are present in the paper.

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