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The use of herbicide among maize farmers in Ido Local Government Area of Oyo State, Nigeria

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A B S T R A C T

This study assessed maize farmers' use of herbicide in Ido Local Government area of Oyo state. Primary data were collected from 80 farmers with the aid of structured interview schedule using multi-stage sampling procedure. Data collected were analyzed using descriptive and inferential statistics. The results revealed that majority of the maize farmers were males (66.3%), married (95.0%) and (60.0 %) have no formal education. The study shows that majority (88.8%) of the farmers use herbicides for farming. The chi-square results showed that age (p=0.009), secondary occupation (p=0.029) and farm size (p=0.000) were the selected socio-economic characteristics that associated with the use of herbicides in the study area. This study concluded that maize farmers made use of herbicide and lead to an increased maize yield in the study area. This study, therefore, recommends herbicides should be made available to maize farmers at the appropriate time to improve their production. Government should provide more support to farmers by subsidizing the cost of those herbicides in the study area.

Key words: Assessment, herbicide, maize, occupation

INTRODUCTION

Agriculture is the cultivation of land and breeding of animals and plants to provide food, fibre, medicinal plants and other products to sustain and enhance life. (International Labour Organization, 2013*).* These include the cultivation of soil, growing and harvesting of crops, breeding and raising of livestock dairying and forestry. The history of agriculture dated back thousands of years ago; people gathered wild grains at least 105,000 years ago (FAOSTAT, 2018). The importance of agriculture can never be over-emphasized, especially since we are not strangers to how life was before and during colonial era when we depended solely on production of food crops and cash crops. The national report on agricultural performance survey of the 2015 wet season indicated that about 99.3% of farmers' populations in Nigeria are engaged in food crop production cultivated mainly for household consumption (NAERLS and FMARD, 2015).

Therefore, the primary demand for cereals in Nigeria is for food where they are principal food crops, including maize, sorghum, millet and rice. In terms of area cultivated and volume of production, maize comes first, followed by sorghum, cassava, millet, cowpea, yam, rice and groundnut (DTMA, 2014). It is a major stable food for over 80% of Nigeria's population and has the highest potential in Nigeria among the cereal crops, it is produced in all agro-ecological zones of the country. Maize (*Zea mays*), is one of the oldest and widely cultivated cereals in the world. It provides food for man and livestock. Maize, which is also commonly known as corn, is one of the most popular food crops in Africa. Nigeria is the 10th largest producer of maize in the world, and the largest maize producer in Africa, followed by South Africa (DTMA, 2014), while Kaduna State remains the largest producer in Nigeria (NAERLS and FMARD, 2015).

Maize is an important source of carbohydrates, protein, iron, vitamin B, and minerals. It is also used as animal feed and as raw material for brewing beer and for producing starch (IITA, 2008). Herbicide as a pesticide also commonly known as weed killers are chemical substances used to control unwanted plants (EPA, 2011). One of the major factors of enhanced production in the sector is the use of agrochemicals which can be positively or negatively effective . Agrochemicals are chemical products used in agriculture which could be pesticides which include insecticides, herbicides, fungicides, rodenticides, molluscicides and nematicides. Pesticides are substances that are meant to control pests, including weeds (US Environmental Protection Agency, 2018*).* The term pesticide includes all of the following: herbicide, insecticides (which may include insect growth regulators, and termiticide,) nematicide, molluscicide, piscicide, avicide, rodenticide, bactericide, insect repellent, animal repellent, antimicrobial, fungicide and disinfectant (antimicrobial). The most common of these are herbicides which account for approximately 80% of all pesticide use *(*Food Print. GRACE Communications, 2018).

The weed interference is a major maize production constraint in southwestern Nigeria. Most farmers in tropical rainforest areas depend on rain for farming and weed aggressiveness is associated with rain-fed agriculture. It's an aggressive shrub which grows densely and forms large communities. It eliminates plants by growing rapidly forming canopy cover over them; cutting off the light to them and is capable of causing considerable yield losses in cultivated crops (Ademuluyi *et al.,* 2013). Agrochemicals are the result of modern technology that

depends on pesticides and fertilizers. They are looked upon as a vehicle for improved crop technology and are considered as a powerful weapon or magic bullet in developing countries in order to enhance agriculture productivity and improve farm work efficiency, though it is a costly input. The findings of this study will be of immense importance to the farmers, agricultural institutes, and government for various reasons. Agriculture has been seen as the background of any successful economy, yet the level of its productivity is low in Nigeria. The issue of herbicide use in Oyo State has received less attention, and little or no studies have been carried out on the different types of herbicide used by maize farmers therefore this creates an important research gap which needs to be looked into. It is against this background that this study focused on herbicide use among maize farmers and its effects.

The general objective of the study is to analyze the usage of herbicide among maize farmers in Ido local government area of Oyo State. The specific objectives are to; describe the socio-economic characteristics of maize farmers, identify the type of herbicide used by the maize farmers, examine the relationship between herbicide use and socio-economic characteristics of maize farmers, and describe the constraint of each herbicide used by the maize farmers in the study area.

Hypothesis of Study

H_0: The type of herbicide used by the respondents is independent of their socio-economic characteristics.

MATERIALS AND METHODS

Study Area

This study was conducted in Ido Local Government Area of Oyo state with its headquarter in the town of Ido. It is located between longitude 2^o30 W, 50^o15 E and latitude 6^o45 N and 9^o45 S. It has area of 986 km^2 and a population of 103,261 at the 2006 census. Ido local Government was among the five in Ibadan district before it was cancelled in 1956. Other four Local Governments that were in existence at the time were Mapo, Akinyele, Ona-ara and Olode-Olojumon. Mapo was the headquarters for all the Local Governments by then, which was called Ibadan City Council (ICC). The council formerly has six wards, which had been increased to ten for easy exercise of franchise. Among the major towns within the local Government Area are Ijokodo, Ido, Omi-Adio, Apata, Apete, Akufo, and Bakatari as well as 612 villages which include Ogunwede, Dada, Olowofela, Apoyin, Oderemi, Odetola, Erinwusi, Tade, Alagbaa, Iku-senla among others.

There are extensive fertile soils, which are suitable for agriculture; the basic occupation of the people is farming. There are large hectares of grassland which are suitable for animal rearing, vast forest reserves and rivers. People in the area grow varieties of cash crops such as cocoa, kola nut, palm oil, timber and food crops such as maize and rice. The area is also suitable for a wide range of edible fruits.

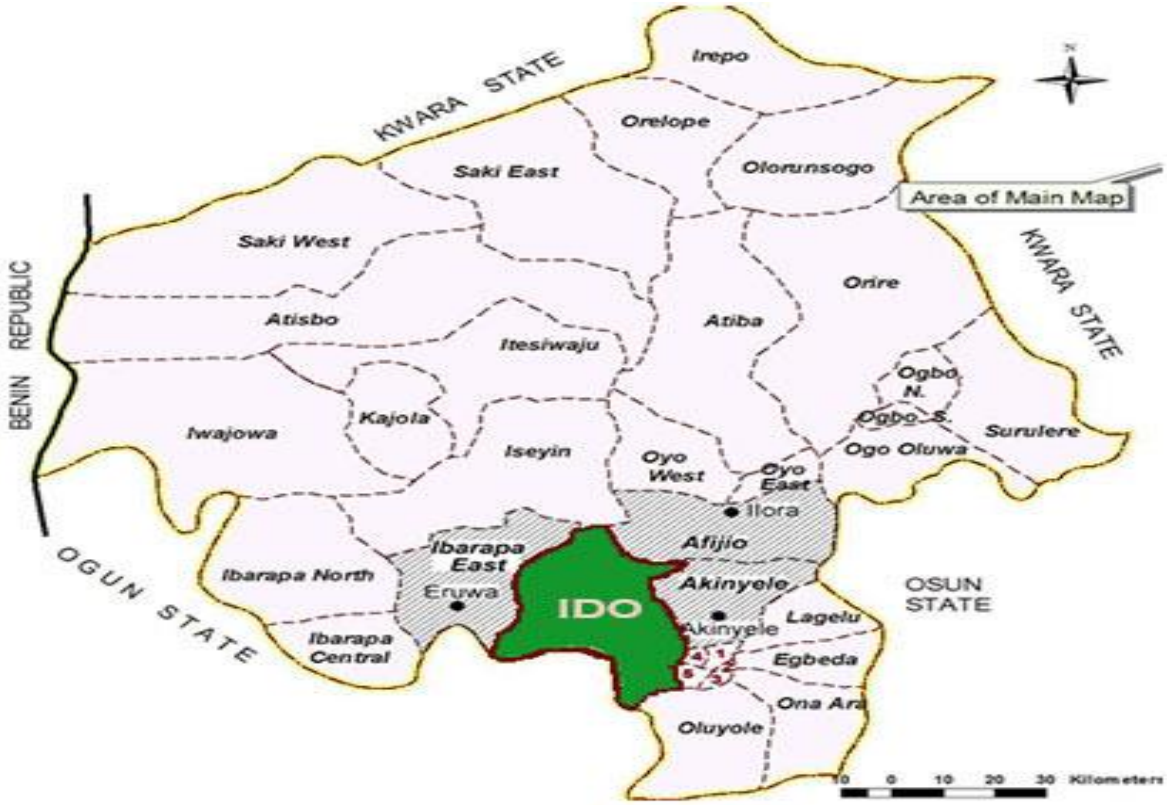


Figure 1 Map of Oyo state showing Ido Local Government Area.

Population of the Study

The study population consists of maize farmers in Ido Local Government Area in Oyo State.

Sampling Procedure and Sample

A multi-stage random sampling technique was used for this study. The first stage involved Purposive selection of Ido local government due to the predominance of maize farmers in the area. The second stage involved random selection of 4 villages from the selected local government. The final stage involved the random selection of 20 maize farmers from each village to arrive at a sample size of 80 respondents for this study.

Methods of Data Collection

Data were collected with the aid of well-structured questionnaire. The target respondents were the maize farmers in the study area, to complement the information gathered using questionnaires, structured personal interviews was used to elicit adequate information about the objectives of the study from key informants.

Data Analysis

The data for this study were analysed using descriptive statistics while the stated hypothesis was tested using chi-square analysis to examine the relationship between socio-economic characteristics and herbicide

use in the study area at significant values based on the decision rule.

Test of hypothesis

H_0: The type of herbicide used by the respondents is independent on their socio-economic characteristics.

The Table 3 presents a chi-square test of independent between the herbicide type and demographic characteristics of the respondents

Chi-square =

$$X^2 = \sum_{i=1}^{r}\sum_{j=}^{c} \frac{(o_{ij} - e_{ij})^2}{e_{ij}} \sim x^2_{(r-1)(c-1),\alpha}$$

Where o_{ij} is the observe value in cell ij

e_{ij} is the expected value in cell ij

α is the level of significance

Decision rule: reject $\mathbf{H_0}$ if p-value is less than α= 0.05

RESULTS AND DISCUSSION

Socio-economic characteristics of maize famers

The result for age shows that (3.8%) of the respondents fall within the age range of 20-30 years, while 38.8% of the respondents fall within the age range of 31-40 years, and 40.0% of the respondents fall within the age range of 41-50 years and the remaining 17.5% are from age group 51 years and above. The mean age was 42 years, this implies that the maize farmers are in their active production age in the study area. It is considered as economically active age according to Odefedehen (2017). Table 1 indicates that 66.3% of the total respondents were male, while 33.8% of the respondents were female. The results imply that there were more male farmers than females; gender tends to influence the use of herbicides. This agrees with Raufu *et al*. (2015), who opined that farming is mostly dominated by men. The results revealed that 20% of the respondents were with no formal education and the majority 60% had primary education while 16.3% had acquired secondary education and only 3.8% had acquired tertiary education. The implication of this is that those with formal education can read and write and this could assist them in their level of exposure, enlightenment and the use of modern farming techniques. This is as a result of technical and scientific knowledge needed to be successful in agriculture. The results of farm size showed that majority 71.2% owns a farm size of 0.1-1.0 hectare, while the remaining 22.5% and 6.3% owns 1.1-2.0 hectares and 2.1-3.0 hectares respectively. This could be as a result of accessibility to funds and lands. The average farm size was 0.9 hectares. the results also showeds that the average farming experience was 14 years. This implies that most of maize farmers have more than one decade of experience in maize farming. This result is consistent with Ajieh (2013) who discovered that the average farming experience was 14 years. The results of household size showed that the average household size was 8 persons. This result contradicts the findings of Fasina and Odefedehen (2014) who discovered that the average household in Ondo State was 5 persons.

Table 1: Socio-economic characteristics of maize farmers

Socio-economic variables	Frequency	Percentages (%)	mean
Age(years)			
20-30	3	3.8	
31-40	31	38.8	
41-50	32	40.0	42.0
51-60	14	17.5	
Gender			
Male	53	66.3	
Female	27	33.8	
Marital status			
Single	2	2.5	
Married	76	95.0	
Widowed	2	2.5	
Household size			
1-5	28	35.0	
6-10	30	37.5	8.0
11-15	22	27.5	
Educational status			
no formal education	16	20.0	
primary education	48	60.0	
secondary education	13	16.3	
tertiary education	3	3.8	
Primary Occupation			
Farming	58	72.5	
Trading	16	20.0	
Artisan	5	6.3	
Civil servant	1	1.3	
Farm Size(Ha)			
0.1-1.0	57	71.2	0.9
1.1-2.0	18	22.5	
2.1-3.0	5	6.3	
Year of Experience			
1-5	3	3.8	
6-10	26	32.5	14.0
11-15	18	22.5	
16-20	22	27.5	
21-25	11	13.7	
Total	**80**	**100**	

Source: Field Survey, 2019

Table 2: Types of herbicides used and perception by maize farmers

Variables	Frequency	Percentages (%)
Type of Herbicide used		
2,4-D	5	6.25
PARAQUAT	16	20.0
BUTYLATE	6	7.5
ATRAZINE	17	21.25
BLADEX	10	12.5
GLYPHOSATE	26	32.5
Controls weevil		
Agree	24	30.0
Strongly Agree	54	70.0
Give good quality		
Agree	30	37.5
Strongly Agree	50	62.5
Increase yield		
Agree	36	45.9
Strongly Agree	44	55.0
Causes Food poisoning		
Strongly Disagree	17	21.25
Disagree	28	35.0
Agree	31	31.0
Strongly Agree	4	4.88
Crop Injury		
Strongly Disagree	10	12.5
Disagree	21	26.25
Agree	35	43.75
Strongly Agree	14	17.5
Has residue effects on soil		
Strongly Disagree	17	21.25
Disagree	18	22.5
Agree	37	46.25
Strongly Agree	8	10.0
Affect Farmers' health		
Strongly Disagree	15	18.75
Disagree	10	12.5
Agree	47	58.75
Strongly Agree	8	10.0
Total	**80**	**100**

Source: Field Survey, 2019.

Types of herbicides used by the respondents

Table 2 presents the distribution of the respondents based on the types, and perceptions of herbicide used. It was revealed that all of the respondents has heard of herbicide before while only 9 (11.3%) does not use one of the herbicides while majority 88.8% uses one of the herbicides. Also, type of herbicide(s) used: among the respondent that uses herbicides, 22.5%, 23.9%, 36.6% uses paraquat, atrazine, and glyphosate respectively while among the remaining only 7%, 8.5%, 1.4% were using 2,4-D, butylate, and bladex respectively while non uses accent and roundup and no other herbicide is being use by the respondents.

The results also showed that majority (70.0%) of the maize farmers agreed that herbicide controls the weevils within the maize field. 62.5% of the maize farmers strongly agreed that herbicide use gives good quality. 43.75% of the maize farmers agreed that herbicide can lead to crop injury. 46.25% of the maize farmers agreed that herbicide use can cause soil injury while 58.75% agreed that herbicide use can affect farmer's health.

The relationship between fertilizer use and socio-economic characteristics of maize farmers

The results in Table 3 shows the relationship between socio-economic characteristics of maize farmers and herbicide use. The results shows that age (p=0.009), secondary occupation (0.029), and farm size (p=0.000) were significant 1%, 5% and 1% respectively.

Decision: Since p-value is less than α for age, secondary occupation, and the farm size of the farmers. $\mathbf{H_0}$is rejected for only age, secondary occupation, and the farm size of the farmers with the values 0.009, 0.029 and 0.0000 respectively. These results, therefore, reveal that the type of herbicides used by the maize farmers depends on the age, secondary occupation, and farm size of the farmers in the study area. The findings from this study is in line with Odefedehan (2017) who discovered farm size influenced the level of labour used in Ondo State.

Constraints to the use of herbicide in the study area

Table 4 presents the distribution of the respondents based on the constraints to the use of herbicide in the study area. The results showed that price (42.0%), market information (37%), availability of herbicide (36%), and market information (42.0%) were severe constraints to the use of herbicide while natural constraints (14%) were not severe to the use of herbicide in the study area. The findings from this study are in line with Odefadehan (2017) who discovered that price of agricultural inputs is one the problems that affected oil palm in Ondo State.

Table 3: Chi-square test of independent between the herbicide type and socio-economic characteristics of the maize farmers

Variable Crosstab	Chi-Square	Degree of freedom	P-Value	Decision
Age * Type Of Herbicide Used	30.988	15	0.009	Reject H_0
Gender* Type Of Herbicide Used	1.871	5	0.867	Do Not Reject H_0
Household Size * Type Of Herbicide Used	5.035	10	0.889	Do Not Reject H_0
Education Status * Type Of Herbicide Used	14.546	15	0.485	Do Not Reject H_0
Primary Occupation * Type Of Herbicide Used	17.332	15	0.299	Do Not Reject H_0
Secondary Occupation * Type Of Herbicide Used	26.993	15	0.029	Reject H_0
Marital Status * Type Of Herbicide Used	4.020	10	0.946	Do Not Reject H_0
Farm Size * Type Of Herbicide Used	35.547	10	0.000	Reject H_0
Year Of Experience * Type Of Herbicide Used	22.720	20	0.303	Do Not Reject H_0

Source: Field Survey, 2019

Table 4: Constraint(s) to the use of herbicide in the study

Constraints	Very severe	Severe	Not severe	mean
Market Information	13(16.9)	42(54.5)	22(28.6)	1.88
Market Access	22 (28.6)	37(48.1)	18(23.4)	2.05
Price	32(41.6)	42(54.5)	3(3.9)	2.38
Availability of Herbicide	18(23.4)	36(46.8)	26(29.9)	1.95
Natural Constraint	9(11.3)	14(17.5)	57(71.3)	1.40

Source: Field Survey, 2019 **percentage are in parenthesis **

CONCLUSION AND RECOMMENDATIONS

The study, therefore, concluded that the herbicide use by maize farmers influenced by age, secondary occupation and farm size. The result showed most of the maize farmers made use of herbicide in the study area. The maize farmers were faced with constraints including market price of herbicide, market information and availability of the herbicide. It is therefore recommended that Government should provide more support to farmers by subsidizing the cost of those herbicides and also make them available. There should be proper management of extension agencies so that farmers will receive adequate information on the use of herbicides for their effectiveness.

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