

SOCIO-ECONOMIC FACTORS INFLUENCING THE INTENSITY OF USE OF CHEMICAL WEED CONTROL TECHNOLOGY BY FARMERS IN MARTE LOCAL GOVERNMENT AREA OF BORNO STATE, NIGERIA

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Abstract

The study analyzed socio-economic factors influencing the intensity of use of chemical weed control method in Marte Local Government Area of Borno State, Nigeria. A total of 5 wards were purposely selected out of the 13 wards for the study. These are areas where millet, groundnut and sorghum selected for the study are predominantly grown. A total of 120 farmers were randomly and proportionately selected from 5 wards for the study. Primary data was mainly used while descriptive statistics and multiple regression analysis were used as analytical tools. The result shows that majority 77.5% of the respondents were male, 40.0% were in the age group of 21-40 years while 65.0% had farming experience between 21-40 years. About 72.0% had farm sizes between 3- 4 hectares, 62.5% had household size between 1-10 persons while 55.0% had annual income between N200, 000 and N299, 000; also 37.5% had Tertiary

education in the study area. The result also indicates that the coefficients of age, farm size, annual farm income and gender variables were all positive and significant at 10%, 5%, 1% for millet, sorghum and groundnuts production respectively. Poor knowledge on how to use chemicals, inability to read and understand instructions and lack of technical skills to operate the chemical spray machines were the major problems associated with the use chemical by farmers. It was recommended that extension agents in the State should be properly trained and provided with all the necessary technological packages required to teach and guide farmers on chemical weed control technology.

Keywords: Socio-economic Factors, Agro-economics, Weed Control Technology, Nigeria

INTRODUCTION

Weeds like crops are components of agro-ecosystems. They may be annuals or perennials (Egunjobi, 2005). They compete with crops for space, light, nutrients and water. However, they have to be adequately controlled in order for the crop to perform maximally. Weed is the most under-estimated serious crop pests in the tropics, yet in no other part of the world do weed cause so much yield reduction and so much human suffering as in the tropics. Consequently, weed control has continued to take up more of the time of resource limited farmers than does the other crop production activities.

Research has shown that unchecked weed growth reduces the yield of the principal crops while untimely weeding reduces the returns from the overall investment in the production of these crops (Adu, 2005, National Advisory Committee on Weed Control (NACWC), 1994). Yield reductions of as much as 40 percent in maize, sorghum and millet; and 100 percent in rice have been observed (NACWC, 1994; Adu, 2005). For instance, *Striga hermonthrica* is an important root parasite of cereals causing substantial losses in sorghum. In Africa, Gwary and Rabo (2001) indicated that 21 million hectares were infested with the parasite weed striga with the consequent loss of 4.1 millions tons of grain per year. In Nigeria, the losses range from 10 – 100%, sometimes leading to land abandonment (Gwary and Rabo, 2001). Small holder farmers cannot control weeds e.g spear grass adequately and abandon speargrass infested land owing to poor crop yield, low cash returns from physically damaged produce and the high cost of labour needed to cultivate infested fields (Akobundu and Ekeleme, 2000). Because of the prevailing climatic conditions in these latitudes, excessive weed growth is one of the most serious problems associated with crop production in Nigeria (Egunjobi, 2005). A major factor limiting hectareage of land under the traditional farming system in most developing countries is

the problem of land clearing and weed management (Adu, 2005; Okigbo, 1978). A gradual decrease in the per capital land area available for cultivation in Nigeria, because of increasing population growth rates (Adu, 2005). Consequently, it would appear that the option available of averting impending food problem will be through the adoption and use of improved weed control technology.

Weeds have remained the major threat to Nigeria's quest for food self-sufficiency and environmental management. As the population increases ahead of food supply, there is every need to boost food production through intensive and extensive cultivation; this can succeed only if weeds and other pests are controlled effectively. Weed control can be described as the science of manipulating weeds such that they do not interfere with growth, development and economic yield of crops and animals (Akobundu, 1982). This would involve the judicious use of weed control practices to minimize weed introduction. The spread of weeds, competition with crops and adaptation of given habitat, while at the same time not loosening any beneficial effects of weeds in soil conservation. Similarly, Egunjobi (2005) observed weed control as how to reduce the competitive ability of these other plants in favour of the crops. Chemical weed control using herbicide is a practical and economical alternative to hand weeding. If herbicide is applied appropriately it could prevent weed infestation from planting to harvesting and promote higher yields by allowing closer drop spacing and therefore, higher plant population (Adeosun and Lagoke, 2005).

The control of weeds is crucial for the economical production of crops such as sorghum, millet, groundnut and other crops. The high cost and decreasing availability of labour make it necessary to fit the use of herbicides into the production practices already in use on many crops in Borno State and Nigeria as a whole because sorghum, millet, groundnut are grown as staple food crop in larger parts of the State. The effectiveness of chemical weed control in increasing crop yield and reducing the labour cost in the tropics especially in Nigeria have been documented (Akobundu, 1987; Lagoke *et. al*, 1987). Herbicides are agricultural chemicals used to kill plants or adversely affect their growth (Kolo, 2004). Chemical weed control will make weeding effective and efficient resulting into higher yields and freeing the farmers from other priority tasks (Kolo, 2004). The intensity of weeding and weed control methods adopted, however, depend, among other things, on the costs and returns implication as well as the socio-economic status of the farmer (Iheanacho *et. al.*, 2009). This study analyzed the socio-economic factors influencing the intensity of use of chemical weed control method in Marte Local Government Area of Borno State, Nigeria to bridge the gap in existing knowledge on weed control research in the study area.

Objectives of the Study

The main objective of the study was to analyze the socio-economic factors influencing the intensity of use of chemical weed control method in Marte Local Government Area of Borno State, Nigeria. The specific objectives of the study were to:

- i. examine the socio-economic characteristics of the farmers;
- ii. determined the socio-economic factors influencing intensity of use of chemical weed control method by farmers; and
- iii. problems associated with the use of chemical weed control method by the farmers in the study area.

Hypothesis of the Study

The following hypotheses were postulated for testing:

- i. The socio-economic characteristics of the farmers have no significant influence on the frequency of weeding (intensity of use) using chemical weed control method.
- ii. The socio-economic characteristics of the farmers have significant influence on the frequency of weeding (intensity of use) using chemical weed control method.

THEORETICAL FRAMEWORK AND LITERATURE REVIEW

Based on the econometric theory of classical multiple regression analysis model, the relationship between dependent and independent variables can be estimated. Earlier studies on the relationship between dependent and independent variables using multiple regression models such as Nchinda and Mendi (2008), Otieno *et. al.* (2009), Olubiyo *et. al.*, (2009) and Chagunda *et. al.* (2006) have demonstrated the influence of age, gender, marital status, education level, household size and distance on relative profitability of smallholder dairy enterprise. Other studies conducted by Basoru and Fasakin (2012), Ayoola *et. al.* (2011) and Jamala *et. al.* (2011).

Ajewole and Aiyeloya (2004) using multiple regression analysis model noted that socio-economic characteristics enable planners and policy makers to appreciate and develop a more user-friendly policies and strategies that will enhance productivity.

Nandi *et. al.* (2012) used multiple regression model and analyzed socio-economic factors influencing farmers' adoption of rice varieties with high yielding and weed suppressing abilities in Kano River Irrigation Project. They employed multistage random sampling technique to select 135 rice farmers and used descriptive statistics, logit regression analysis and likert scale rating to analyze the data. Their findings indicates that the rice farmers were mostly (67 percent) males with average age of 43 years and had one form of education or the other. Nandi

et. al. (2012) further indicated that farming experience, household size, farm size and extension contact averaged 13 years, 7 persons, 1.7ha and 6 times respectively. The study also revealed that rice farmer's adoption decision was influenced by credit availability, gender, market availability, education, extension contact, labour availability and farm size.

Kolawole *et. al.* (2012) examined farmers' perception of *Sawah* rice production technology in Nigeria a structured questionnaire was used to interview 40 rice farmers. They employed five point Likert scale to calculate the farmers' perception of the various *sawah* activities. They analyzed and described the data on the socio-economic characteristics of the farmers using descriptive statistics, while multiple regression model was used to analyze socio-economic characteristics influencing *Sawah* rice farmer's perception in the study area. Their findings indicates that 74.5 percent of the rice farmers fall between age 18 years and 50 years, about 97.90 percent of the farmers were males, 93.60 percent married, 34 percent have no formal education, and 70.2 percent have *sawah* farm size between 1ha and 13ha. The result also showed that age, occupation, farm size, membership of association and knowledge of *sawah* technology socio-economic characteristics that influence the farmers' perception of the *sawah* rice production technology in the study area.

Julius and Chukwumah (2014) examined the effects of some socio-economic factors on small rice farmers' output in Abuja, Nigeria. The population for the study included all small-scale rice farmers. A simple random technique was adopted for sample selection while semi-structured questionnaires were used for data collection. A total of 88 rice farmers drawn from all the agricultural zones (eastern, central, western and northern zones) were used for the study. Descriptive and multiple regression statistics were used to analyze the data. The results of a semi-log function (lead equation) indicated that fertilizer application, cost of chemicals (other than organic fertilizers) and farm size were the significant factors influencing rice output at 5 percent level while the quality of seed planted was significant at 10 percent level. The average farm size of was 1.84 ha with mean rice output per farmer per hectare as 1349.50 and 730.367kg, respectively. The fertilizer application rate was 107.32kg/ha while the seed rate was 62.66kg/ha. The socio-economic characteristics indicates that majority (90.91 percent) of the farmers were married with mean household size, age, education, years of farming experience as 8, 44, 7 and 14, respectively. Majority of the farmers indicated that their main reason for cultivating rice were to get income and for household consumption. The study recommended that socio-economic characteristics that influence the rice output should be properly addressed in the formulation of policies and programmes that are aimed at improving the output of rice in the study area.

METHODOLOGY

Study Area

The study area was Marte Local Government Area of Borno State, Nigeria. It is located in the northeastern part of the State and lies within latitudes 12° 05' – 12° 45' N and longitudes 13°25' – 14°15'E, occupying a total landmass of 3.015 square km (Ministry of Land and Survey Maiduguri, 2012). It shares boundaries with Monguno Local Government Area to the West, Ngala to the East, Dikwa to the Southeast, Mafa to the Southwest and Lake Chad to the North. It also shares international boundaries with the republic of Chad and Cameroon.

The climate of the study area is characterized by dry and wet seasons. The average annual temperature is about 30°C with the maximum of 45°C in March and a minimum of 15°C during the dry Harmattan season (Iheanacho *et. al.*, 2009). The annual rainfall ranges from 292mm to 871mm with an annual average of 509mm (Iheanacho *et. al.*, 2009). The soil types are clay, sandy loam and clay loams, with common weeds such as Sudan grass, Spear grass, *Pennisetum spp*, Gamba grass, *Striga spp* and shrubs. Major crops grown in the area include millet, sorghum, groundnut, rice, wheat, cowpea, vegetables such as tomatoes, okra, onion, pepper, etc and livestock such as cattle, sheep goats, camel, horse and donkey Marte Local Government Area has an estimated population of 129,370 people with a population density of 80 persons per square kilometer (National Population Commission, 2006). The major occupations of people in the area are farming, cattle rearing and fishing. The principal ethnic groups are Kanuri and Shuwa Arabs others include Fulani, Bura and Hausa. Marte is made up of 13 wards headed by Lawans (who are the wards head in the area).

Sampling technique

A total of five (5) wards (extension blocks) were purposely selected out of the 13 wards for the study. These are areas where millet, groundnut and sorghum selected for the study are predominantly grown. These wards are Kulli, Badairi, Kabulawa Gumna, Allalawanti and Njine. A total of 120 respondents were randomly and proportionately selected from the five wards for the study. These were farmers growing sorghum, millet and groundnut solely.

Data Collection

Data for the study were obtained from both primary and secondary information sources. The primary data were collected using structured questionnaire administered to the farmers. Data were collected on socio-economic variables such as educational level, annual farm income, age, farming experience, gender, farm size and household size. Data were also collected on

problems associated with the use of chemical weed control method. The secondary data were obtained from journals, textbooks, internet, conference paper, etc.

Analytical Techniques

Descriptive Statistics

The descriptive statistics used include percentage and rank order. These techniques were used to examine the socio-economic characteristics of the respondents and problems associated with the use of chemical weed control method to achieve specific objectives (i) and (ii).

Multiple Regression Analysis

The multiple regression model was used to determine the socio-economic factors influencing intensity of use of chemical weed control method by farmers to achieve specific objective (iii).

The model is implicitly stated as:

$$Y = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7, e)$$

Where:

Y = Intensity of use of chemical weed control method by the respondents measured in frequency of weeding (Tijani *et. al.*, 2009).

X₁ = Age (years)

X₂ = Farm size (ha)

X₃ = Educational level (number of years spent in formal Education)

X₄ = Household size (number)

X₅ = Annual farm income (N)

X₆ = Farming experience (year)

X₇ = Gender (Dummy, 1 for male, 0 for female)

e = Error term

The following explicitly stated functional forms were tried during the analysis:

- i. Linear: $Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + e$
- ii. Double-log: $\log Y = b_0 + b_1\log X_1 + b_2\log X_2 + b_3\log X_3 + b_4\log X_4 + b_5\log X_5 + b_6\log X_6 + b_7\log X_7 + e$
- iii. Semi-log: $Y = b_0 + b_1\log X_1 + b_2\log X_2 + b_3\log X_3 + b_4\log X_4 + b_5\log X_5 + b_6\log X_6 + b_7X_7 + e$
- iv. Exponential: $\log Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + e$

Out of which the result of the double-log was chosen for groundnut, while exponential functions were chosen for millet and sorghum, respectively. The choice of the best functional form [lead equation] was based on both statistical and econometric criteria [T-test, F-statistics, and R²],

number of significant variables and the *a priori* expectation of the signs of the coefficients. It was expected *a priori* that the coefficients of X_2 , X_3 , X_5 and X_6 would be positive, implying an increase in while those of X_1 , X_4 and X_7 would be negative.

RESULTS AND DISCUSSION

Socio-economic Characteristics of the Respondents

The socio-economic characteristics of the respondents were examined with respect to their gender, age, farming experience, farm size, household size, annual income and educational level. The findings are presented in table 1.

Table 1: Percentage Distribution of Socio-economic Characteristics of the Respondents (n =40)

Socio- economic Variables	% of Respondents
Gender:	
Male	77.5
Female	22.5
Total	100
Age (years):	
21-40	40.0
41-50	37.5
Above 50	22.5
Total	100
Farming experience (years):	
1-20	22.5
21-40	65.0
Above 40	12.5
Total	100
Farm size (ha):	
1-2	15.0
3-4	72.0
Above 4	12.5
Total	100
Household size (number):	
1-10	62.5
11-20	30.0
Above 20	7.5
Total	100
Annual farm income (₦ 000):	
1-99	7.5
100-199	25.0
200-299	55.0
300 and above	12.5
Total	100
Educational level (years):	
No formal education	12.5
Primary	25.0
Secondary	20.0
Tertiary	37.5
University	5.0
Total	100

Analysis of Table 1 shows that majority (77.5%) of the respondents practicing chemical weed control method were male, while only 22.5% were female in the study area. Gender is a significant factor in agriculture because of its vital role in determining the farmers' activities. In the Northern Nigeria, males engage in agricultural activities that are labour intensive such as weeding and harvesting, while females carryout less labour intensive activities such as planting, processing and transporting farm produce. Besides, the purdah system (seclusion of women) limits women's active participation in agriculture (Iheanacho et. al., 2009). The result is supported by the findings of Kolo (2004) that greater than 91% of the Nigerian farmers are male, and the weed control method largely practised is the manual method which is labour intensive.

The result also shows that 40.0% of the respondents practicing chemical weed control method were in the age group of 21-40 years, while (22.5%) were in the age group of 50 years and above. The findings revealed that majority of the respondents practicing chemical weed control method were in their active and productive age group. The age of a farmer has an effect on the type of agricultural activities he may engage in. For instance, in family labour, younger farmers spend much time on the farm and they mostly embark on more strenuous farm operations than older farmers and children. This conformed to the findings of Kolo (2004) that most farmers between 31 to 50 years of age are in their active age which enable them to perform actively in strenuous farm activities and they constitute 82.30% of the farming population.

Also majority (65.0%) of the respondents practicing chemical weed control method had farming experience between 21-40 years, while 12.5% had 40 years and above experience in farming. The finding indicates that majority of the respondents had reasonable farming experience in practising the chemical weed control method in the study area. The farming experience of farmers to a large extent affects their managerial know-how and decision-making. Besides, it influences the farmers, understanding of climatic and weather conditions as well as socio-economic policies and factors affecting farming (Iheanacho, 2000).

Farm size analysis of the respondents' shows that majority (72.0%) practising chemical weed control method had farm sizes between 3- 4 hectares, while 12.5% had 4 hectares and above. According to Iheanacho et. al. (2009) small-scale farmers are those farmers that cultivate land of 0.1 hectare to 5 hectares. From result of the findings, majority of the respondents can therefore be categorized as small scale farmers.

Household size in traditional agriculture influences the availability of family labour, production goals and possible total area of land cultivated which in turn affects output. The higher the productive household size the larger the area of land cultivated, thereby resulting to increase in output. In the modern agriculture, the reverse may be the case. Also majority

(62.5%) of the respondents practising chemical weed control method had household size between 1-10 persons, while those of household size above 20 persons constituted 7.5% in the study area.

Income analysis of the respondents indicates that majority (55.0%) of the respondents practising chemical method had annual income between N200, 000 and N299,000, while 7.5% had between N1,000 and N99,000 in the study area. The result indicates that majority of the respondents practising chemical method had reasonable income in the study area, which might be the reason for small-scale production. This supports the findings by Abubakar (2004) that annual income of a farmer determines his ability to purchase inputs such as fertilizer, hired labour and use of improved technology, which may bring about increase in productivity. The higher the annual income of a farmer, the greater the scale of agricultural production he can undertake.

Analysis of the result also shows that majority of the respondents practicing chemical weed control method were literate, having attempted one form of education or the other. Result of the analysis indicates that (37.5%) of the respondents practising chemical method had Tertiary education while 5.0% attended University education in the study area. Farmer's efficiency in using information on new production technique increases with education and thus, their productivity (Amaza 2000).

Multiple Regression Analysis of Socio-economic Factors Influencing the intensity of Use of Chemical Weed Control Method

In order to determine the socio-economic factors influencing the intensity of use of chemical weed control method, the number of weeding millet, sorghum and groundnut fields using chemical method was regressed against age, farm size, education, household size, annual farm income, farming experience and gender. The estimated regression coefficients and the t-ratios are presented in Table 2.

Table 2: Estimated Multiple Regression Coefficients of Socio-economic Factors Influencing the Intensity of Use of Chemical Weed Control Method for Selected Crops

Estimated Parameters +											
Crops	Function al forms	Consta nt (X ₀)	Age (X ₁)	Farm size (X ₂)	Educationa l level (X ₂)	Househol d size (X ₄)	Annual farm income (X ₃)	Farming experience (X ₆)	Gender (X ₅)	F- ratio	R ²
Millet	Exponentia l	0.727 (1.750***)	-0.021 (-1.269)	0.307 (1.539)	0.014 (0.350)	-0.038 (-0.578)	0.000 (1.864***)	0.014 (0.224)	0.632 (3.704*)	4.533	0.498
Sorghum	Exponentia l	-0.363 (-2.680**)	0.002 (0.557)	0.141 (2.285**)	-0.008 (-0.445)	-0.017 (-1.382)	0.000 (1.340)	-0.019 (-1.366)	0.206 (4.574*)	8.860	0.660
Groundnut	Double-log	-1.649 (-1.020)	1.350 (1.744***)	-0.304 (-1.141)	-0.121 (-0.468)	-0.346 (-0.619)	-0.046 (-0.163)	0.414 (1.042)	0.070 (3.303*)	16.138	0.779

* = Significant at 1%

** = Significant at 5%

*** = Significant at 10%

+ = Figures in parentheses area T – ratios

Analysis of the result indicates that age was positive and significant at 10%. This contradicts the *a priori* expectation that respondents' intensity of use of chemical weed control method for groundnut production is affected negatively by their age. The positive coefficient of the age variable suggests that the use of chemical weed control method is higher amongst old than young farmers. The reason is obvious. Old farmers are frequently using chemicals to control weed on their farms than the young farmers. Since the old farmers cannot withstand the drudgery of the traditional weeding method. They, therefore, use chemicals which are not labour intensive. This supports the finding of Ogunwolu (2004) that the aged farmers in the rural farming communities control weed using chemicals such as herbicides because of the stress and drudgery involved in the traditional weeding method.

The farm size also has a positive coefficient for sorghum and significant at 5%. This conforms to the *a priori* expectation that respondents' intensity of use of chemical weed control method for sorghum production is positively affected by their farm size. The positive coefficient of the farm size variable suggests that the intensity of use of chemical weed control method for sorghum production increases with larger than smaller farm size. Farmers with large farm sizes tend to use chemicals for controlling weed probably because chemical weed control method is less labour demanding, require few mandays and not time consuming. Besides, such farmers may have high capital base. This supports the finding of Tijani (2007) that large-scale farmers are usually high capital base farmers and, therefore, can easily purchase and use improved farm inputs and practices.

The annual farm income coefficient was positive and significant at 10%. This conforms to the *a priori* expectation that respondents' intensity of use of chemical weed control method for millet production is positively affected by their annual farm income. The positive coefficient of the annual farm income indicates that the intensity of use of chemical weed control method is higher among high income than low income farmers. This is probably because high income earners can purchase chemicals such as herbicides no matter how costly it may be than low income earners. This corresponds with the finding of Tijani *et. al.* (2010) that farmers with high capital base can easily purchase and use improved farm inputs due to the advantage of such improved technology.

The gender variable was also positive and significant at 1% for millet, sorghum and groundnuts, and contradicting the *a priori* expectation that respondents' intensity of use of chemical weed control method for millet, sorghum and groundnut production is affected negatively by their gender. The positive relationship between gender and the intensity of use of chemical weed control method means that, the use of chemicals for controlling weed is higher

amongst male than females. This is because male farmers engage more in labour intensive farm operations such as weeding, harvesting etc. This corresponds with the finding of Abubakar (2004) that crop production activities such as weed control are labour intensive, thus more males are mostly involved than females.

Problems Associated with Chemical Weed Control Method

The problems of weed in Nigeria are peculiar to most of the small-scale farmers. Farmers growing sorghum, millet and groundnut using chemical weed control method in the study area were asked to indicate the most important problems associated with the chemical weed control method in order of importance. The major problems of chemical weed control method are presented in Table 3.

Table 3: Major Problems Associated with Chemical Weed Control Method for Selected Crops (n = 40)

Major Problems	*Percentage	Rank order
High cost of Machines	25.0	3
High cost of chemical	25.0	3
Poor knowledge on how to use chemicals	37.5	1
Lack of technical skills to operate the chemical spray machines	32.5	2
Use of expired chemicals	20.0	4
Lack of extension agents to guide farmers	20.0	4
Inability to read and understand instructions	37.5	1
Communication problem	25.0	3

* = Multiple responses existed, hence percentage exceeds 100

Table 3 shows that the major problems associated with the use chemical by farmers were high cost of machine and chemicals, poor knowledge on how to use chemicals, lack of technical skills to operate the chemical spray machines, use of expired chemicals, lack of extension agents to guide farmers, inability to read and understand instructions and communication problems. The result shows that high cost of machines was a problem as indicated by (25.0%) of the respondents in the study area. High cost of machines such as tractor services were the

most pronounced. The withdrawal of subsidy in 1997 by the government led to the collapse and ineffectiveness of Marte Local Government Tractor hiring Unit resulting in non-availability of tractors and high cost of tractor services (Tijani, 2007).

High cost of chemical was also indicated as a problem of the respondents. High cost of chemicals such as Atrazine, paraquate, Roundoff and 2,4-D were the most pronounced. High price charged on chemicals might have hindered the use of chemicals for controlling weeds in the study area as indicated by 25.0% of the respondents practicing chemical method. Kolo (2004) noted that the chemical and spray equipment are largely imported, hence making price control by government difficult and farmers are compelled to pay high price. In addition, the economic activities of Nigeria in the nineties made the use of herbicides uneconomical because they were unaffordable.

Poor knowledge on how to use chemical was a major problem to respondents. Farmers do not have adequate knowledge on how to use chemicals as indicated by 37.5% of them. This might be due to ineffectiveness of the extension services to reach out to farmers. Chikoye (2004) observed that in Nigeria, the Agricultural Development programmes (ADPs) have adopted the use of the Training and Visit (T & V) extension model for disseminating improved weed control technologies. This extension delivery model is not sustainable because of underfunding and shortage of trained human resources.

Lack of technical skills to operate machines was also indicated by 32.5% of the respondents practising chemical method as their major problem in the study area. Machines such as sprayer and other farm operations that involved the use of machines for controlling weeds require some skills for effective control of weed, but most farmers lack these skills. Ogunwolu (2004) revealed that majority of Nigerian farmers lack the technical know-how on how to use machine for sustained weed control.

Inability to read and understand instructions on machine manuals and chemical containers hinders the respondents from using chemicals to control weeds in the study area as indicated by 37.5% of the respondents. Tijani *et. al.* (2010) and Kolo (2004) pointed out that the level expertise needed to understand the working mechanisms of herbicides and how to apply them correctly is beyond the understanding of the average Nigerian farmers, especially the small-scale farmers. Similarly, Gworgwor and Weber (1990) reported that despite the success and the promise, herbicides for control of weeds are still not safe to recommend without precaution because of the problem of illiteracy among farmers. Illiteracy is, therefore, considered as the major problem in the study area.

Use of expired chemicals was also a problem as indicated by 22.5% of the respondents. Illiterate farmers find it difficult to read and understand labels on chemical containers, and some

used expired chemicals. Also farmers in the study area indicated lack of extension agents to guide farmers as their problem. About 20.0% of the respondents practising chemical method opined that extension agents lack the adequate training to guide them on how to use improved weed control technologies appropriately which might be the reason why weed control method such as chemical weed management is not fully practised by the farmers in the study area. Kolo (2004) noted that most extension workers in the Nigeria are expected to advise farmers on a range of topics that include production, postharvest weed control and livestock issues, yet they do not have adequate training in all these areas and lack competent service system.

Communication also constituted a problem to farmers in the study area. About 25.0% of the respondents indicated problem of communication as a problem in the study area. Communication barriers such as language and illiteracy of the respondents are pronounced in causing problems in practising improved weed control technologies by the farmers. This is supported by the findings of Chikoye (2004) that the use of weed control technologies such as herbicide and the combination of or integration of weed control methods has been low among other reasons as a result of poor communication between farmers, extension agents and researchers.

CONCLUSION AND RECOMMENDATIONS

Weeds have remained the major threat to Nigeria's quest for food self-sufficiency and environmental management. As the population increases ahead of food supply, there is every need to boost food production through intensive and extensive cultivation; this can succeed only if weeds and other pests are controlled effectively. The study was conducted within one year and primary data were mainly used. Lack of record keeping by the farmers and high cost of transportation were some of the major limitations encountered during the course of the study. The study was thus restricted to five wards in the Local Government Area, which are prominent in millet, sorghum and groundnut production in Marte Local Government Area. However, despite these limitations effort was made to collect reliable data. The findings are therefore, valid and can be generalized to the entire Local Government Area.

The study concludes that majority of the farmers practicing chemical weed control in sorghum, millet and groundnut production were male, most were in their active and productive age group and had reasonable farming experience in the study area. The findings of the study also reveal that farmers practicing chemical weed control method had small household size, obtained reasonable income and attended one form of education or the other. The study also re-affirmed the claim that socio-economic factors such as age, farm size, annual farm income and gender influence the intensity of use of chemical weed control technology by farmers in the

study area. High cost of machines and chemicals, poor knowledge on how to use chemicals, lack of technical skills to operate the spray machines, use of expired chemicals, lack of extension agents to guide farmers, inability to read and understand instructions and communication problem among others were some of the major problems militating against sorghum, millet and groundnut production in the study area. It is therefore recommended that:

- i. Extension agents in the State should be properly trained and provided with all the necessary technological packages required to teach and guide farmers on chemical weed control technology;
- ii. The communication system should be translated into farmers local languages which will make them understand how to easily use chemical weed control technology;
- iii. The farmers' cooperative organizations and associations should form special groups that will check mate the activities of fake and expired chemical sellers in the country;
- iv. Farmers should be encouraged to actively participate in the adult education extension programme to acquire knowledge on how to read and write.

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