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Herbicides perception and utilization among cassava farmers in Delta State, Nigeria

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Abstract

Over the years, herbicides have been widely used by farmers to control weeds in their farms. However, this study ascertained herbicides' perception and utilisation among cassava farmers in delta state, Nigeria. The specific objectives were to: ascertain farmers knowledge about herbicide usage, ascertain cassava farmers perception of herbicide, determine cassava farmers level of herbicide utilisation; and identify constraints cassava farmers encounter with the use of herbicides. The multi-stage sampling procedure was used to select a sample size of 180 with the aid of questionnaire. Various descriptive statistics and logit regression were used for data analysis. The Results for perception reveal that eight statements were favourably perceived while three were not favourably perceive by the respondents. Statements that were favourably perceived include: herbicides can cause health problems, (mean = 3.90) use of herbicides saves labour time (mean = 3.36); herbicides make weeding easier (mean 3.76); herbicides reduce cost of weeding (mean = 4.0) while utilization of herbicides results reveals that 76% of respondents use herbicides. The respondents that do not use herbicides could be associated to ignorance, cost, and non-availability of herbicides. Several constraints were responsible for the utilization of herbicides usage included the heavy weight of the knapsack sprayers they use during herbicides application and undesired wind carriage of herbicides. The study recommends, among others, that farmers should be encouraged to participate in herbicides spraying techniques and Delta State government should subsidized the cost of herbicides for the farmers.

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Introduction

Weeds are major challenges in crop production in both the humid and sub-humid tropics where rainfall, humidity and temperature favour their growth. Their presence in farms reduces yield by competing with crops for light, space, moisture, and nutrients. Most rural subsistence farmers are unaware of the gravity of the effects of weeds on their crops mainly because its deleterious effects are serious when compared with other creatures that are harmful to crops. The amount of food lost through weed competition, despite weed control, was 25% of potential production rate in developing countries and was one of the major labour-consuming operations in traditional crop production, amounting to 30-70% of the total labour input (Kughur, 2013). In the rain forest region, weed competition is one of the most important economic constraints in cassava production (Gianessi, 2013).

Cassava (*Manihot Spp*) is an important tuberous crop in which about 700 million people obtain more than 500 calories per day from its roots (Chavez, Sanchez, and Jaramillo, 2005). It is widely accepted as food for humans in various forms in Nigeria; hence it has a wide market (Okon and Amalu, 2003). Nigeria is the world's largest producer of cassava, with about 46 million metric tonnes (Food and Agriculture Organisation (FAO), 2007). Half of the world's cassava production is from Africa, with Nigeria, the Democratic Republic of Congo, and Tanzania producing about 70 percent of this total volume (FAO, 2000). A large amount of cassava products are exported to other countries in their processed forms as starch, chips, flours, and industrial chemical components for various uses. Cassava is the chief source of dietary food energy for the majority of the people living in the lowland tropics, and much of the sub-humid tropics of West and Central Africa (Simouyan, 2005). Its production and utilisation, therefore, must be given prime attention in food policy. Although, farmers have not yet attained the desired technical efficiency in cassava production because of weak access to external inputs such as herbicides for weed control (Ezedinma *et al.*, 2006), As such, Low yields in cassava production are attributed to failure on the part of the farmers to abide by the recommended practises of regular weeding. Low yields could be achieved if weeding is not carried out at the appropriate time. However, for various reasons, farmers use different weed management practises.

Weed control is one of cassava production's most important challenges (Akobundu, 2009). Primarily, weeds reduce crop yield by competing for water, light, nutrients, and space. Other associated problems with weed are that it reduces crop quality by contaminating the commodity, interfering with harvest, serving as a host for crop disease, limiting the choice of crop rotation sequence, and limiting cultural practises, among others.

In Nigeria, most farmers adopt the traditional farming system, which depends largely on land, crude implements, and cheap household labour. Manual weeding is the predominant method of weed control used by small farmers in Africa, but this method is time consuming, laborious, and very expensive compared to herbicides, which have been shown to improve yield (Anonymous, 2003). Several herbicides have been evaluated for weed control in cassava in different parts of the world, with varying degrees of success. Their performance is influenced by climatic and edaphic factors as well as weed flora, rate of herbicide application, cultivar grown, and crop management practises. Bonabona-Wabbi (2002) reported that the average cassava yield on farmers' fields is still very low in Africa. If the emerging opportunities of increased food production are not properly harnessed to keep pace with the corresponding population growth, the result portends a future of declining food availability. Studies on farmers' perceptions and herbicide utilisation are scanty. As a result, there is a knowledge gap among cassava farmers in Delta State regarding the important role herbicides play in crop production. Armstrong (2014) attributes this partly to the large number of herbicide types, which include new products, old products with new names, new formulations of old products, premixes, and generics, which make the use of herbicides a difficult and confusing task.

In addition to knowing the crop in which a particular herbicide can be used, the weed it will control, the appropriate rate, the necessary adjuvant to include, and the herbicide mode of action, it is also important to design successful herbicide usage (Chikoye *et al.,* 2012). Several authors have reported that weed infestation has reached the point of being the single most important factor limiting yield (Ahuama and Adelusi, 2001; Banjo, Aina, and Rije, 2010; Okon and Amalu, 2003). Despite additional lands that have been converted by rural farm families for cassava production in Delta State, its yield has continued to decline. The use of herbicide by farmers in cassava production is at various levels of adoption in Delta State because a large number of the farmers still practise their traditional methods of using hoes and cutlasses in weed control. Even those that employ herbicides on their farms have not gotten a commensurate yield. This was blamed on farmers to have either failed to apply or improperly applied it to their farms. The practice of herbicide utilisation by cassava farmers in Delta state is yet to gain full acceptance in combating weed, and accelerating food production to meet both local and commercial demands. For various reasons farmers use different weed management practices which may not be sustainable. The adoption of an efficient and effective method of weed control mechanism that would satisfy the need of both rural resource poor and progressive farmers will go a long way to improve food production. Farmers in Delta state are yet to keep abreast with the technical knowhow involved in herbicide usage in scuttling weed infestation.

The perception of farmers in the area in this regard on the use of herbicide in cassava production has not been ascertained. This study sought to fill this gap. Knowledge of the study will suggest a better understanding of the mindset, challenges and socio-economic status of the farmers. This will help concerned stakeholders especially the government to make proactive policy that will encourage the use of herbicides for cassava production. Therefore, this study was an attempt to answer the following questions.

i. What is the socio-economic characteristic of farmers?

ii. How much do cassava farmers know about herbicide use?

iii. What is farmers' level of herbicide utilisation?

iv. What are the various types of herbicides used by cassava farmers?

v. Which problems do cassava farmers encounter with the use of herbicide?

The general objective of the study examined herbicides' perception and utilization among cassava farmers in Delta state. The specific objectives are to:

i. Describe the socio-economic characteristics of cassava farmers;
ii. Ascertain farmers knowledge about herbicide usage;
iii. Ascertain cassava farmers perception of herbicide;
iv. Determine cassava farmers level of herbicide utilisation; and
v. Identify constraints cassava farmers encounter with the use of herbicides.

The following Hypotheses were stated: Respondents socioeconomic do not significantly affect their utilisation of herbicide and respondents perception of herbicides do not significantly affect their level of herbicides utilization.

Materials and methods

The study area is Delta State. It has three agricultural zones based on ADP administrative delineation which include Delta North, Delta South, and Delta central. The state lies between longitude 5^0 00 and 6^0 45^1 East and Latitude 5^0 00 and 6^0 30^1 North. It is bounded in the North by Edo State, in the East by Anambra State, in the South by Bayelsa State and in the West by the Bright of Benin. The State has a land mass of about 18,050 km^2 and a coastline of about 160 kilometers. The coast belt is interlaced with rivulets and streams which form parts of the Niger Delta.

The State is made up of 25 Local Government Areas with the capital in Asaba and has a total population of about 4,098,391 people (NPC, 2006). The vegetations of the state vary from one ecological zone to other. It is mangrove swamp along the coast in the Southern part of the State to evergreen forest in the central parts and savannah in some parts. Delta has a tropical climate with distinct dry and rainy seasons.

The dry season occur between December and April while rainy season occurs between May to November with a brief dry spell in August "known as August break". The average rainfall is about 266,5cm in the coastal areas and 190.5cm in the Northern part with the heaviest rainfall in the month of July. The daily temperature ranges from 29°C to 44°C with an average of about 30°C. The major crops produced are cassava, yam, cocoyam, plantain, maize, tomatoes, rubber, oil palm, citrus and cocoa. With about one third of the population engaged in fishing, since a significant proportion of the state is riverine.

Conceptual Framework

A conceptual framework for analysing the respondents' perceptions and utilization of herbicides as shown in figure 1. It consist of (i) perception of herbicides, (ii) knowledge regarding herbicide, (iii) socio-economic characteristics of respondents, (iv) intervening variable, and (v) farmers' utilization of herbicides.

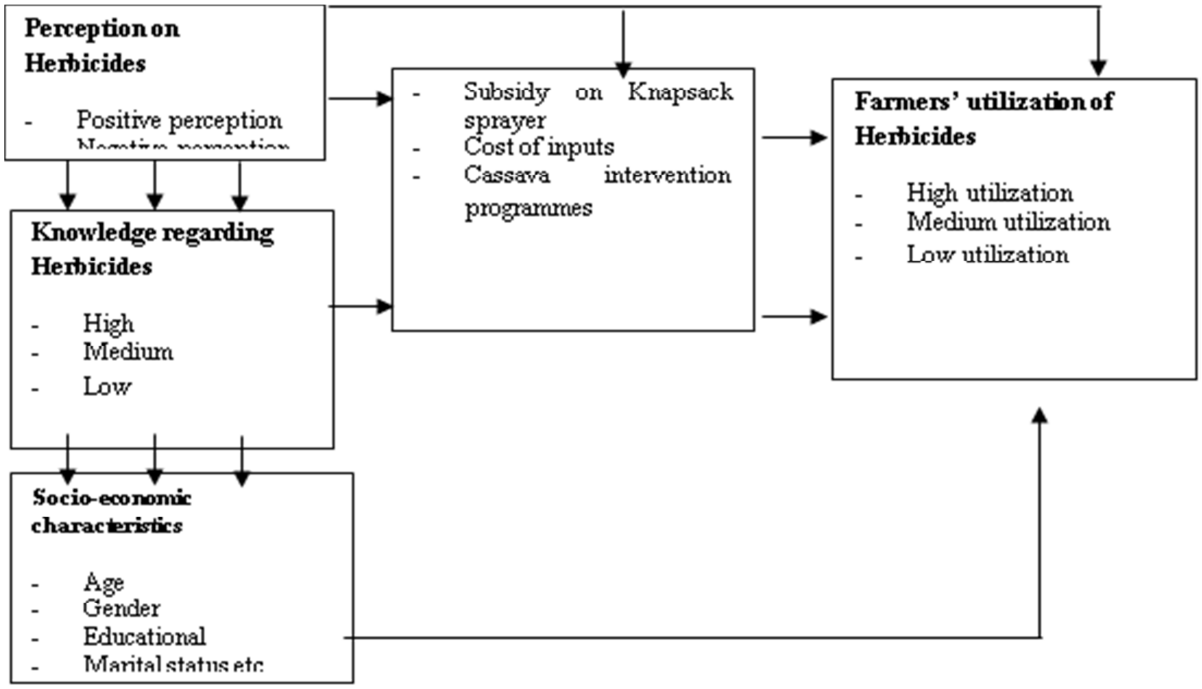

Fig. 1. Conceptual framework for analyzing the respondents' perception and utilization of herbicides.

Sampling Techniques and sample size

Cassava farmers in Delta state formed the population from which sample for the study was selected. Multi-stage sampling procedure was used. The first stage involved random selection of two extension blocks from each of the three agricultural zones. The second stage involved random selection of three cells from each of the selected extension blocks. The third stage involved random selection of 10 cassava farmers from each of the selected extension cells. This sampling procedure will give a total of 180 cassava farmers who served as respondents of the study.

Data Collection

Primary data for the study were obtained with the use of a structured interview schedule. The interview schedule was divided into sections. Section A dwelt on socio-economic characteristics of farmers, section B focused on farmers' knowledge on herbicides, section C elicited information on cassava farmers' perception on herbicides, section D, was on cassava farmers' level of herbicide utilisation, and section E elicited information on constraints to herbicides utilization by cassava farmers. Secondary sources of information are textbooks, journals, magazines, internet browsed materials etc.

Measurement of variables

Socio-economic characteristic of respondents such as age, education and farming experience were measured in years, farm size in hectares, while farmers annual income was measured in naira (₦).

To ascertain respondents' knowledge on herbicides, ten questions relating to the concept, benefits and problems associated with herbicides utilization were developed and respondents were asked to answer the questions. A maximum of 1 point was awarded for a correct answer and 0 point for wrong answer. Their scores were collated and used to categorize the respondents as follows: Low knowledge (for those with 0-3 points), Moderate knowledge (for those with 4-7 points) and High knowledge (for those with 8-10 points)

Perception on herbicide was determined by developing some positive and negative statements and respondents were asked to indicate their level of agreement to the statements along a 4-point likert type scale with values as follows: strongly disagree = 1, disagree = 2, agree = 3, strongly agree = 4. The mean value of the respondents' option which is 2.50 was taken as the cut-off point to select statements which were perceived favourably by the respondents. The grand mean and perception index were computed to know the knowledge level of herbicides utilization. The grand mean was be computed by dividing the total mean by the number of statements, while the perception index was computed by dividing the grand mean by the number of ratings as applied by Nwalieji, Madukwe, Agwu, and Umerah (2014). To determine herbicide utilization by cassava farms, respondents were asked to indicate whether they use herbicides to control weeds or not. A score of 1 point was awarded for a (yes) response and 0 point for a (no) response. Their responses were collated to ascertains the percentage of respondents that use herbicides. If 50% and above of respondents use herbicides, it is considered as high utilization level, while below 50% is considered low utilization level. Besides, respondents were also asked to indicate the types of herbicides used by them from a list of common herbicides in the area. Constraints to the use of herbicides were measured by making a list of possible constraints and requesting the respondents to rate the level of importance on such constraints. A four-point Likert- type scale of very important = 4; important = 3; barely important =2; and not important = 1 was used to ascertain their responses. The mean score of the response values which is 2.50 was taken as the cut-off point. Thus, constraints with score of 2.50 and above were considered important, while those with scores of below 2.50 were not important.

Data Analysis

Descriptive and inferential statistics were used to analyse data that were generated. Descriptive statistics such as frequency counts, means and percentages were used to summarise data. Hypothesis one was tested with the use of logistic regression technique. Although the logistic regression model is like the linear regression model, it was best suited for this study because the dependent variable was dichotomous. The binary response in this study was whether the respondents utilised herbicides in weed control or not, i.e., yes or no. The logistic model was implicitly stated as:

$$\text{In}\left[\frac{Pi}{1-P}\right] = \exists i + \sum_{J=i}^{n} \exists j \, x \, ji + \varepsilon$$

The empirical model specifying utilisation of herbicides by the it farmer is explicitly specified:

$$\text{In}\left\{\frac{Pi}{1-Pi}\right\} = \exists 0, \exists_1 X_1, \exists_2 X_2, \exists_3 X_3, \exists_4 X_4, \exists_5 X_5, \exists_6 X_6, \exists_7 X_7, \exists_8 X_8, \exists_9 X_9, \exists_{10} X_{10}, \varepsilon$$

Where:

Y = Utilisation of herbicides (dummy)

$\exists 0$ = constant term

X_1 = Gender (male = 1, female = 0)

X_2 = Age (years)

X_3 = Marital Status (married = 1, single = 0)

X_4 = Level of formal education (number of years of schooling)

X_5 = Farm size (ha)

X_6 = Household size (number of persons)

X_7 = Farming experience (number of years of schooling)

X_8 = Membership of farmer's group (yes = 1, no = 0)

X_9 = Extension contact (Number of extension visit per month)

X_{10} = Farm income (₦)

ei = Error term

Utilization of herbicides was regressed against the defined socioeconomic characteristics of the farmers. Hypothesis 2 (Ho_2) was tested with the use of Pearson's product moment correlation.

$$r = \frac{n\sum XY - (\sum X)(\sum Y)}{\sqrt{n\sum X^2 - (\sum X)^2}\sqrt{n\sum r^2 - (\sum Y)^2}}$$

Results and discussion

Socio-economic Characteristics of Respondents

Age

Information in Table1 shows that 65.56% of the cassava farmers were females. This implies that cassava farming is dominated by females with average age of 42.62 years. This is in agreement with the findings of Simonyan (2015) who reported that there were more female than male cassava farmers in Abia State, Nigeria and they were in their productive age.

Sex

Respondents female (66%) and male (44%) were recorded in the study. Females tend to participate more. Males and females' issues in agricultural production and adoption of innovations have been studied over time and most of these studies showed evidence mix with respect to different roles played by them. In gender analysis on participation in cassava production, it was reported that females participated more in cassava production (Ezedinma, 2006).

Education

In education sector, 36.67% of the respondents had primary education, 31.67% had no formal education, while 30% of the respondent had secondary education and 1.67% had tertiary education. This indicates that most cassava farmers in the study area had one level of formal education or the other. Formal education is expected to influence their level of adoption of herbicide technologies. Okoye *et al.* (2004) argued that educated farmers are expected to have a higher acceptance level of improved agricultural technologies.

Farming Experience (Years)

It was observed that 41.67% of the respondents had cassava farming experience of 10 years and below, as 30.56% had farming experience of 11-20 years; 21-30 years and 11.11% had 31-40 years of farming experience. The respondents had an average of 21.10 years of cassava farming experience. The number of years of experience of the famers is enough for them to have made a lot of observations and adjustments, especially with regards to weed control. Farmers' Cooperative/Association**:** With respect to membership of farmer's cooperative/associations, 52.78% of the respondent did not join farmers' cooperative or farmers' association as against 47.22% of respondent who subscribed to one farmers' cooperative / association or the other. Membership of cooperative societies and farmers association have been found to increase to access credit facilities and extension information Ofuoku and Chukwuji (2012). These are the individual needs farmers have and which they always want to satisfy through membership of such groups (Ofuoku, 2013). Annual Farm Income (₦):Information on annual farm income reveal that 44.4% of the farmers earned of N201,000 - N300,000 annually, with an average income of N241,200 annually. Income earned is expected to be one of the motivating factors in adoption of farming technologies. Farm Size (Ha): In world standard, all the farmers operates on small and medium scale as many of the respondent; 14.44%, less than 1 hectare and 1.67% 2.6 - 3 hectares with an average farm size of 1.68 hectare (45.0%) had farm sizes of 1.6 - 2.0 hectares; 21.11%, 1.1 - 1.5 hectares, 17.78%, 2.1 - 2.5 hectares tares. This average farm size report is confirmed in a separate study on Niger Delta farmers that most farmers average farm sizes were 2.0 (Ovharhe, 2019).

In various studies of farm size has been found to be one of the variables that influence adoption of farm technologies (Overfield and Flemming, 2001); Bonabona Wabbi, 2002; Simonyan (2015). Household Size: Respondents had an average household size of 4 persons as 41.67% had household sizes of 4 - 6 persons, 30.56% had household sizes of 7 -9 persons, while 16.67% had household sizes of above 9 persons and 11.11%, 1 - 3persons. This implies that the study area is dominated by farmers with large household sizes. This is not unexpected as larger households tend to be more likely to secure labour required in cassava production.

Effiong (2005), Idiong (2005) observed that household sizes that are relatively high promote labour availability. Extension Contact: It was discovered that 61.11% of the respondents had no contact with the extension agents, while 25% had contact with extension agents 1 time in every month and 13.89% had 2 contacts with extension agents 2 times in every month.

Table 1. Socioeconomic Characteristics of Respondents (n = 180).

Variables	Frequency	Percentage	Mean
Sex			
Male	62	34.44	
Female	118	65.56	
Age			
11 - 20	3	1.67	
21 - 30	40	22.22	
31 - 40	84	46.67	42.62
41 - 50	50	27.75	
51 - 60	3	1.67	
Marital status			
Married	150	89.33	
Single	30	16.67	
Level of education			
No formal	57	31.67	
Primary	66	36.67	
Secondary	54	30.0	
Tertiary	3	1.67	
Farming experience			
1 - 10	75	41.67	
11 - 20	55	30.56	21.10
21 - 30	30	16.67	
31 - 40	20	11.11	
Farmers' Cooperative /Association			
Yes	85	47.22	
No	95	52.78	
Annual farm income			
10,000 - 100,000	15	2.78	
101,000 - 200,000	42	23.33	
201,000 - 300,000	80	44.44	241,200
301,000 - 400,000	49	27.22	
401,000 - 500,000	4	2.22	
Farm size (Ha)			
0 - 1	26	14.44	
1.1 - 1.5	38	21.11	
1.6 - 2.0	81	45.0	1.68
2.1 - 2.5	32	17.78	
2.6 - 3.0	3	1.68	
Household size (number)			
1 - 3	20	11.11	
4 - 6	75	41.67	4.32
7 - 9	55	30.56	
10 - 12	30	16.67	
Extension contact (monthly)			
0 time	110	61.11	
1 time	45	25.0	
2 times	25	13.89	
3 times	0	0	

Source: Computed from survey data, 2020

This is attributed to the dearth of extension agents experience in Nigeria and in Delta State in particular. Agbamu (2005) suggests that the ratio of extension agents to farmers is very poor in Nigeria. This affects their frequency of contact between extension agents and farmer. The few extension agents in the study area are a challenge facing the farmers and constraining them of access information.

Respondents' Knowledge for Herbicides

Table 2 indicate that most (67.22%) of the respondents had high knowledge of herbicides, while 18.33% had medium knowledge of herbicides and 14.44% had low knowledge of herbicides. This implies that most of the farmers know about herbicides. This is attributable to the popularity of herbicides as a means of saving labour and high cost of weeding. The cost of labour occasioned by rural-urban migration has become an issue in this era of economic recession. Ovharhe, Ebewore and Alakpa (2020) found that rural - urban migration prompted shortage of farm labour in rural areas as able-bodied young men and women migrated to urban areas.

Table 2. Distribution of respondents according to their knowledge of herbicides (n = 180).

Knowledge level	Frequency	Percentage
High knowledge (8 - 10 points)	26	67.22
Moderate knowledge (4 - 7 points)	33	18.33
Low knowledge (0 - 3 points)	121	14.44

Source: Computed from survey data, 2020

Respondents' Perception on Herbicides

Entries in Table 3 show the mean scores of respondents' perception of herbicides. Results reveal that eight statements were favourably perceived while three were not favourably perceive by the respondents. Statements that were favourably perceived include: herbicides can cause health problems, (mean = 3.90) use of herbicides saves labour time (mean = 3.36); herbicides make weeding easier (mean 3.76); herbicides reduce cost of weeding (mean = 4.0). Herbicides saved time of weeding (mean = 3.96); Herbicides are for literate farmers only (mean = 2.2); the implication was that most were able to read the instructions on the labels of herbicides containers with adherence to information on usage.

Herbicides deposits found in crops (mean= 2.32). This indicated that the literate farmers knew how to manage the processes of application.

Respondents' perception on health issues regarding the use of herbicides are in line with the general believes that when herbicides are handled carelessly, they can cause health problems. The chemical components of most herbicides have been found to affect human skins or eyes if not well handled. Herbicide has been found to reduce cost of labour drastically. A little of herbicide well applied can clear the weeds in a hectare of farmland. Comparatively, the cost of buying a herbicide will be far cheaper than engaging labourers to clear the same portion of farmland. In line with the expectation of the researcher, respondents disagreed with the statement that herbicides are for literate farmers only. You do not need to be literate to use herbicide, rather all you need is to be properly trained on its utilization.

Table 3. Mean score of respondents' perception on herbicides (n = 180).

S/N	Statements	Mean	Remark	Perception condition
1	Herbicides can cause health problems	3.90	A	F
2	Use of herbicides saves labour time	3.96	A	F
3	Herbicides makes weeding easier	3.76	A	F
4	Herbicides reduce cost of weeding	4.0	A	F
5	Herbicides are expensive	3.56	A	F
6	Herbicides are for rich farmers only	3.82	A	F
7	Herbicides are for literate farmers only	2.2	D	NF
8	Herbicides deposits are found in crops	2.32	D	NF
9	Herbicides are poisonous to humans	3.90	A	F
10	Herbicides are causing blindness	3.86	A	F
11	Herbicides affects storage of farm produce	2.00	D	NF
Overall Mean = 3.39 (favourable perception)				

Source: Computed from survey data, 2020. Key: A = Agree; D = Disagree; F= Favourable; NF = Not Favourable

Respondent's types and utilization of herbicides

Table 4 reveals that 76% of respondents use herbicides, while 24% do not use herbicides. The respondents 24% that do not use herbicides could be associated to ignorance, cost, and non-availability of herbicides. The distribution of respondents according to various types of herbicides that are used. Majority of farmers (88.4%) use Paraforce, Uproot (87.5%), Forceup (71.1%), Relisate (65.4%) and Drysate (64.7%) herbicides on a regular basis. Others like Gobarat (10.9%) and Flysate (5.9%) herbicides were less utilized by farmers. The utilisation of herbicides in the study area cut across many types of herbicides which contributed to crop productivity. Wilson and Tisdell (2001); Oyinbo, Saleh, and Rekwot (2013) reveal that farmers have high utilisation in herbicide for weed control in arable farmland in Kogi and Kaduna States respectively.

Table 4. Distribution of respondents according to types and utilization of herbicides used (n = 136).

Herbicides type (Trade names)	Frequency	Percentage	Rank
Paraforce	121	88.4	1
Uproot	119	87.5	2
Forceup	96	71.1	3
Relisate	89	65.4	4
Drysate	88	64.7	5
Drag	46	33.8	6
Vinasah	34	25.0	7
Sunphosate	70	20.2	8
Weedcut	57	16.4	9
Glyspring	41	11.8	10
Gobarat	38	10.9	11
Flysate	20	5.76	12

Source: Computed from survey data, 2020

Key: Multiples Responses Recorded. Note: respondents 44 do not use herbicides (24%)

Constraints to herbicide utilization

Table 5 shows the mean scores of constraints to herbicides utilization. Result revealed that serious constraints associated with herbicide utilization by cassava farmers included wind carriage of herbicides (mean=3.78), high cost of herbicides (mean = 3.74) and high cost of knapsack sprayer (mean= 3.73). On windy days, herbicides molecules are carried by winds to other directions and sometimes to crops. This wind factor creates utility shortage and adverse effect on crops. The implication is that farmers need to be more familiar with herbicide spraying techniques in windy situations which call for capacity building as supported by Echebiri and

Edasa (2012). The cost of procuring herbicides has doubled recently and the price surge was not prepared for by the farmers, as they complained (Agumagu *et al*. 2007).

Table 5. Means scores of Constraints to Herbicides Utilization.

S/N	Constraints	Not important (1)	Somewhat important (2)	Important (3)	Very important (4)	Total	Mean score
1	Wind drift	4(4)	7 (14)	14 (42)	155 (620)	680	3.78*
2	High cost of herbicides	6(6)	7 (14)	15 (45)	152 (608)	673	3.74*
3	High cost of knapsack sprayer	6(6)	7(14)	16(48)	151(604)	672	3.73*
4	Negative effects of herbicides on humans	48 (48)	50 (100)	52(156)	30(120)	4.24	2.36
5	Lack of information on herbicides	122 (122)	50 (100)	5 (75)	3(12)	309	1.72
6	Problem of adulterated herbicides	112 (112)	24 (48)	28 (84)	16 (64)	308	1.71
7	Adverse effects of herbicides on crops	141(141)	37(74)	16(48)	6(24)	287	1.59
8	Low knowledge regarding herbicides	130 (130)	26 (54)	15 (45)	9 (36)	263	1.46
9	High cost of spraying herbicides	136(136)	27 (54)	7 (21)	10 (40)	251	1.39
10	Weight of knapsack sprayer	142 (142)	25 (50)	7 (21)	6 (24)	237	1.32
Cut-off point = 2.50							

Note: Figure in asterisk (*) are the most important constraints.

Respondents socioeconomic do not significantly affect their utilization of herbicide.

The coefficient of multiple determination for the lead equation R^2 = 0.59 was significant at 5% probability level, indicating that 59% of the variations in herbicides utilization by cassava farmers were significantly explained by the variables investigated in the study (Table 6). The coefficients of farm income (x_7) farm size (x_8) and household size (x_9) positively and significantly affect herbicide utilization among cassava farmers in the study area. This indicates that an increase in farm income would likely increase herbicides utilization and vice versa. It also indicates that larger farm sizes and household sizes would lead to increase herbicides utilization and increase in farm income. Where there was increase in herbicide utilization with increase household sizes, there was reduction in labor cost. However, the variables of age (X_2) and extension contact (X_{10}) negatively and significantly affected herbicides utilization. These imply that lower age led to lower utilization level of herbicides and inadequate extension contact also led to lower utilization of herbicides. Younger farmers who still have energy and with low financial resources often decide to control weeds manually using self-labour. This is like beginners who just started farming. In the presence of inadequate extension contact, farmers are not encouraged to utilize herbicides because forth information desired by the farmers could not be accessed when needed.

Table 6. Estimation of effect of socioeconomic variables on farmer's utilization of herbicides.

Model	Unstandardized Coefficients		Standardized Coefficients	Wald	Sig.
	B	Std. Error	Beta		
(Constant)	2.417	.878		2.752**	.011
Sex(x_1)	.170	.172	.034	.986	.333
Age(x_2)	-.028	.013	-.140	2.098**	.046
M. Status(x_3)	.338	.340	.066	.994	.329
Edu. (x_4)	.067	.198	.029	.337	.739
Farm. Exp.(x_5)	.003	.012	.014	.223	.825
Farm. Coop(x_6)	-.330	.289	-.066	1.140	.265
Income (x_7)	.192	.081	.147	2.358**	.026
Farm Size (x_8)	.720	.138	.604	5.219**	.000
HH Size (x_9)	.174	.073	.203	2.397**	.024
EXT. Cont. (x_{10})	-.354	.164	-.124	2.160**	.040

Dependent Variable: Utilization, R^2 = 0.59, R = 0.71

** Significant at 5% level

Ho_2: Respondents perception of herbicides does not significantly affect their level of herbicides utilization.

Information in Table 7 Indicates that utilization of herbicides positively correlated with cassava farmers' perception on herbicides (r = 0.769). These imply that high perception on herbicides encouraged the utilization of herbicides among cassava farmers in the study area. Nwalieji *et al.* (2014) reported that perception of agricultural technologies influences the response of farmers to technology adoption.

Good utilization of herbicides and their positive perceptions on them prompted the productivity among cassava farmers in the study area.

Respondents' perception of herbicides does not significantly affect their level of herbicides utilization
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Table 7. Estimation correlation effect between utilization of herbicides and farmers' knowledge and perception of herbicides.

		Utilization	Knowledge	Perception
Utilization	Pearson Correlation	1.000	.723	.769
Knowledge	Pearson Correlation	.723	1.000	-.210
Perception	Pearson Correlation	.769	-.210	1.000

Conclusion and recommendations
From the results of the study, it can be concluded that the Respondents' knowledge of herbicides was good. They had medium-level utilisation of herbicides, and the constraints associated with their usage included the heavy weight of the knapsack sprayers they use during herbicides application and undesired wind carriage of herbicides among respondents in the study area was influenced by socioeconomic characteristics such as age, farm income, farm size, household size, and extension contact. Herbicide utilisation was also influenced by the farmers' knowledge and perceptions about herbicides. In consideration of the findings, the following recommendations were suggested:
i. Farmers should be encouraged to participate in herbicide spraying techniques.
ii. The cost of herbicides should be subsidized for the farmers.
iii. Farmers are encouraged to form cooperative to benefit from corporate donors.
iv. There should be more training sessions to encourage respondents improve in areas where less serious constraints exist such as knowledge in negative effects of herbicides on humans and crops.

Contributions to knowledge
This study has established that:
1. Respondents' use of herbicides is determined by their level of knowledge about them.
2. Socioeconomic factors such as sex and income determine the utilisation of herbicide among respondents, and
3. Cassava Farmers' perception and knowledge of herbicides influence their level of herbicide utilisation.

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