ASSESSMENT OF ARABLE CROP FARMERS PERCEPTION AND UTILIATION OF PESTICIDES IN ODUKPANI LOCAL GOVERNMENT AREA OF CROSS RIVER STATE, NIGERIA

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Abstract
This study examined farmers' perception and utilization of pesticides among arable crop farmers in Odukpani Local Government Area of Cross River State. It specifically aimed to assess the socio-economic characteristics of farmers, identify the types and extent of pesticide use, ascertain farmers' perceptions, and analyze the determinants of pesticide utilization. A hypothesis was tested to examine the relationship between socio-economic characteristics and pesticide usage. A two-stage random sampling technique was used to select 150 respondents from six communities. Data were gathered using validated semi-structured questionnaire and analyzed using descriptive statistics and logistic regression. The findings revealed that most respondents were male (53%), married (40%), aged 41–60 years (53.33%), and had no formal education (60%). Herbicides (93.33%), rodenticides (88%), and insecticides (80%) were the most commonly used pesticides, with crops such as pumpkin (97.33%), waterleaf (93.33%), and tomato (74%) being widely cultivated. Farmers perceived pesticides as effective for pest control but also harmful to humans and beneficial soil organisms. Pesticide usage was significantly influenced by income, education level, farm size, and age. The study recommended provision of credit facilities, farmer training programs, enhanced extension services, and government input support to improve safe and effective pesticide use among farmers.
Keywords: *Pesticides, Farmers Perception, Utilization, Arable Crop farmers, Socio-economic Factors, Odukpani*

Introduction

Pesticides play a critical role in modern-day agriculture by helping farmers control pests, diseases, and weeds that significantly reduce crop yields. Their use has become an essential component of arable crop production in Nigeria, particularly for farmers seeking to meet growing food demands, ensure crop survival, and minimize financial losses (Oyekale, 2022). Arable crops, such as maize, cassava, yams, rice, and vegetables, form the foundation of subsistence and commercial farming systems in Nigeria. These crops, however, are highly vulnerable to pest and disease attacks, especially in humid tropical environments like those found in Cross River State. As a result, many smallholder farmers rely heavily on chemical pesticides to sustain productivity and ensure food security (Akinneye *et al*., 2020).

In Cross River State, farming is the primary livelihood for most rural households. As its favorable agro-ecological conditions support year round arable crop production (Eta *et al.*, 2023). However, pest infestations are common and often force farmers to turn to synthetic chemical control measures. Although the use of pesticides is widespread, knowledge about proper handling, dosage, storage, application frequency, and associated risks remains limited among smallholder farmers (Olaniyan *et al*., 2020). Most farmers rely on informal sources such as agrochemical vendors or fellow farmers for advice on pesticide use, often without formal training or extension guidance. Farmers' perceptions of pesticides as beneficial, harmful, affordable, or easy to use shape their utilization practices and risk-related behaviors. These perceptions are influenced by various socio-economic and cultural factors, including educational level, farming experience, gender, access to information, and previous exposure

to pesticide-related illnesses (Adeola & Adetunji, 2021). In many rural communities, misunderstandings about pesticide efficacy or safety lead to harmful practices, including excessive spraying, incorrect mixing of chemicals, use of banned or unlabelled products, and application without personal protective equipment (FAO, 2022). Such behaviours and practices not only expose farmers and consumers to toxic residues but also threaten environmental sustainability through soil degradation, water pollution, and biodiversity loss.

Furthermore, Eremi *et al* (2023) opined that pesticide utilization among smallholder arable crop farmers has become increasingly important in Nigeria's quest for food security. However, in Odukpani Local Government Area, as in many rural settings, the use of pesticides is often characterized by poor knowledge, unsafe handling, and excessive application. While these chemicals are intended to improve crop yields, their misuse can result in serious public health challenges, economic losses, and environmental degradation (Oyekale, 2022). Most farmers remain unaware of these risks, lacking both training and access to safety equipment. However, existing literature has shown that farmers' perceptions of pesticide effectiveness, cost, and ease of use significantly influence their decisions to use them disregarding health or ecological implications (Olaniyan *et al*., 2020; Adeola & Adetunji, 2021). In Odukpani, no comprehensive study has yet been conducted to examine these perceptions or assess how they relate to actual usage patterns. Without such data, it is difficult for policymakers to design targeted interventions that promote safer and more sustainable pesticide practices.The findings will be vital in informing agricultural extension programs, health education campaigns, and policy efforts aimed at improving pesticide safety and promoting sustainable crop protection strategies.

Methodology

The study was carried out in Odukpani Local Government Area of Cross River State. The area lies within latitude 5°4'52.46N and 8°20'59.7'E and has an elevation of approximately 400m above sea level. Some of the communities in the area are Akpap Okoyong, Eki, Eniong Abatim, Ito, Idere, Ukwa Ibom, Creek Town, Inuakpa Okoyong and Okurikang etc. The Local Government Area covers an estimated landmass of 795 squares kilometers and a population of 257,800 (NPC, 2006). The Local Government is multi ethnic with the Efiks dominating other ethnic groups. It is largely a coastal area and crisscrossed by the Calabar River with several tributaries. It shares borders with Calabar Municipality, Akpabuyo, Akamkpa and Akwalbom State. Odukpani is to a large extent a farming area but fishing and hunting are equally prominent occupations in the area. The soil types, temperature and rainfall are suitable for farming activities.

The population of the study comprised all registered crop farmers in the study area. Data available at the CRADP indicates that there are 1,500 registered crop farmers in the area, consisting of 600 male and 900 female farmers. The study adopted a two-stage sampling procedure. In stage one six (6) communities (Creek Town, Eniong Abatim, Okurikang, Akpap Okoyong, ldere and Eki) were selected using random sampling technique. In stage two, 10 percent of the registered farmers were randomly selected from each community and this gave a sample size of 150 respondents. Furthermore, data was collected using a questionnaire and was subdivided into five main sections based on the specific objectives of the study.

Results and Discussion

Types of Pesticides in the Area

Results in Table 1 show the distribution of pesticides in the study area. The findings revealed that the most commonly used pesticides were herbicides (93.33%), rodenticides (88%), and insecticides (80%). Conversely, fungicides (20%) were the least frequently used. This pattern indicates a strong preference among arable crop farmers for pesticides that control weeds, rodents, and insect pests, which are perceived as the major threats to crop production in the region. This result aligns with the findings of Andrade (2020), who noted that among the various categories of pests, weeds pose the most significant threat to farmers, thereby increasing the popularity of herbicide use. Similarly, Olawale *et al*. (2021) observed a high dependence on herbicides among smallholder farmers in Nigeria, attributing it to their perceived effectiveness and time-saving benefits. Moreover, Usman *et al*. (2022) confirmed that insecticides and rodenticides remain essential components of pest control strategies due to the persistent threat of insect infestations and rodent attacks on stored produce.

Table 1: Types of pesticides in the area
Percentage distribution of pesticides in the area

Pesticides	Frequency (F)	Percentage (%)
Herbicides	140	93.33
Insecticides	120	80
Rodenticides	132	88
Avicides	40	27
Bactericides	37	25
Nematicides	85	57
Fungicides	30	20

Source: Field Survey, 2024; *Multiple response

Crops Grown in the Area

Table 2 presents the types of crops cultivated by farmers in the study area and for which pesticides are applied. The results show that pumpkin (97.33%), waterleaf (93.33%), tomato (74%), and cassava (73.33%) are the most widely cultivated crops. In contrast, millet (1.33%), sorghum/wheat (6.67%), and rice (14%) are the least commonly grown crops. These findings suggest that farmers in the area cultivate a diverse array of crops, with a strong emphasis on vegetables, which dominate the agricultural landscape. This result agrees with Eremi *et al* (2023) and Olawale *et al* (2021), who separately observed that vegetable farming is a major component of smallholder agricultural systems in southern Nigeria, largely due to the short maturity period, high market demand, and profitability of vegetables such as tomato, waterleaf, and pumpkin.

Perception of pesticides by the respondents in the study area

Table 3 presents the perceptions of farmers toward pesticide use in the study area. All items assessed recorded mean scores above the cutoff mean of 2.50, indicating a general agreement among respondents on the listed statements. Notably, farmers agreed that pesticides make crops mature faster (Mean = 3.40), consumers are afraid of crops treated with pesticides (Mean = 3.44), and pesticides negatively affect soil microorganisms and beneficial insects like butterflies (Mean = 3.25).These findings are in line with the study by Olawale *et al.* (2021), who reported that many Nigerian farmers perceive pesticides as essential for faster crop development and protection from pests, yet they are also aware of the associated environmental and health concerns. Similarly, Usman, Ibrahim, and Eze (2022) found that while farmers recognize the productivity enhancing role of pesticides, they also express apprehension about their impact on consumer preferences and soil ecology.

Table 2
Distribution of Respondents According to Crops Grown

Crops	Frequency (F)	Percentage (%)
Yam	42	28
Cassava	110	73.33
Maize	92	61.33
Okra	87	58
Water leaf	140	93.33
Pumkin	146	97.33
Garden egg	52	34.67
Cucumber	98	65.33
Rice	21	14
Millet	2	1.33
Sorghum/wheat	10	6.67
Tomato	74	74
Potato	108	72
Others	36	24

Source, Field Survey, 2024; *Multiple response

Extent of Pesticides Utilization

The findings presented in Table 4 show that insecticides were the most widely used pesticides by farmers in the study area, followed by bactericides, fungicides, and herbicides, in that order. This ranking suggests a prioritization of pest control targeting insects and microbial pathogens, which may reflect the pest burden associated with the types of crops cultivated in the region. These findings align with the study conducted by Awoyemi *et al.* (2021), who reported that smallholder vegetable farmers in Southwest Nigeria predominantly used insecticides due to the high prevalence of insect pests affecting leafy vegetables and fruiting crops. The study emphasized that insecticides were considered highly effective and readily accessible, which increased their popularity among farmers. Similarly, Nwankwo *et al* (2022), observed that fungicides and bactericides were increasingly used in response to rising incidences of fungal and bacterial diseases in staple crops such as tomatoes and cassava. This finding also agrees with Eta *et al* (2025).

Determinants of Pesticides Utilization in the Area

The results presented in Table 5 show that marital status, level of education, and cost of pesticides are the most influential factors affecting pesticide utilization among farmers in the study area. This aligns with the findings of Obinna and Umeh (2021), who noted that married farmers often take more proactive measures to safeguard crop yield due to increased household responsibilities. Additionally, Chukwu *et al*. (2022) emphasized the importance of education, explaining that educated farmers tend to have better knowledge of pesticide application techniques and safety practices, which influences their usage behavior. Cost was also found to be a critical factor, consistent with Okafor and Adeoye (2023), who reported that financial constraints significantly limit smallholder farmers' ability to access and use quality pesticides. These studies collectively underscore the significance of socio-economic and demographic variables in influencing pesticide use.

Table 4: Distribution of respondents based on their perception of pesticides

S/N	Items	SA	A	D	SD	Σ*fx*	Mean	Rank
1.	Pesticides protect crops from rats and grass cutter	70(280)	30(90)	40(80)	10(10)	460	3.06	10th
2.	Pesticides make bird not to eat our crops	65(260)	63(189)	-	22(22)	471	3.14	3rd
3.	Pesticides make plan clearing very easy and faster	73(292)	50(150)	20(40)	7(7)	489	3.26	4th
4.	Pesticides are responsible for good crops yield and harvest	40(160)	80(240)	-	30(30)	430	2.86	13th
5.	Pesticides makes crops matures faster	55(220)	60(180)	35(105)	-	505	3.40	2nd
6.	Consumers are afraid of vegetables applied with pesticides	68(272)	80(240)	2(4)	-	516	3.44	1st
7.	Pesticides can cause poisoning and death	50(200)	50(150)	-	50(50)	400	2.70	14th
8.	If you eat pesticides treated crops you will die	64(256)	55(165)	11(22)	20(20)	46t5	3.10	8th
9.	Pesticides are too expensive	80(320)	-	45(90)	25(25)	435	2.90	12th
10.	Pesticides increase the cost of production and reduce the profit	-	100(300)	30(60)	20(20)	380	2.53	15th
11.	Most pesticides do not work because they are false	66(264)	48(144)	31(62)	5(5)	475	3.16	7th
12.	Pesticides reduce the market value of crops	83(332)	15(45)	52(104)	-	481	3.20	6th
13.	Pesticides can pollute water	78(312)	-	65(130)	7(7)	449	2.99	11th
14.	Pesticides use to kill soil micro-organisms and useful insects like butterflies	46(180)	100(300)	4(8)	-	488	3.25	5th
15.	Many farmers have died because of pesticides poisoning	63(252)	51(153)	20(40)	16(16)	461	3.07	9th

Source, Field Survey, 2024

Table 4: Extent of Utilization of Pesticides by the Respondents

S/N	Pesticides	Very often	Often	Arely	Never	Σ*f*x	Mean	Rank
1.	Herbicides	72(288)	40(120)	3`1(62)	7(7)	477	3.18	4th
2.	Insecticides	48(192)	100(300)	2(4)	-	496	3.30	1st
3.	Rodenticides	80(320)	10(30)	40(80)	20(20)	450	3.00	6th
4.	Avicides	60(240)	-	80(160)	10(10)	410	2.73	7th
5.	Fungicides	70(280)	50(150)	30(60)	-	490	3.26	3rd
6.	Bactericides	45(180)	102(306)	3(6)	-	492	3.28	2nd
7.	Nematicides	90(360)	-	40(80)	20(20)	460	3.06	5th

Source, Field Survey, 2023

Table 5: Distribution of factors influencing the utilization of pesticides in the area

S/N	ITEMS	SA	A	D	SD	Σ*f*x	Mean	Rank
1.	My opinion or view about pesticides	55 (220)	38 (114)	50 (100)	7 (7)	441	2.94	13th
2.	Cost of pesticides	70 (280)	60 (180)	20 (40)	-	500	3.33	3rd
3.	Accessibility of the pesticides	68 (272)	50 (150)	-	32 (32)	454	3.02	12th
4.	Economic profit from using the pesticides	65 (260)	40 (120)	40 (80)	5(5)	465	3.10	11th
5.	Pesticides contribution to crops yield	59 (236)	58 (173)	43 (86)	-	495	3.10	4th
6.	Your age	90 (360)	-	50 (100)	10 (10)	470	3.13	9th
7.	Being married affect your pesticide decision	85 (340)	50 (150)	15 (45)	-	538	3.58	1st
8.	Your level of education influence your pesticides decision	83 (332)	60 (180)	7 (14)	-	526	3.50	2nd
9.	Tyes of pesticides	70 (280)	60 (180)	-	20 (20)	480	3.20	6th
10.	Being a man or woman influence my pesticides decision	45 (180)	60 (180)	20 (40)	25 (25)	425	2.83	14th
11.	My income status decide what I do about pesticides	100 (400)	-	33 (66)	17 (17)	483	3.22	5th
12.	Membership of cooperative	48 (192)	56 (168)	-	46 (46)	226	1.50	17th
13.	My farm size	59 (236)	70 (210)	8 (16)	13 (13)	475	3.16	7th
14.	My family experience	95 (380)	-	36 (72)	19 (19)	471	3.14	8th
15.	Help of extension workers	-	120 (360)	20 (40)	10 (10)	410	2.73	15th
16.	Access to credit facilities and incentives	47 (188)	58 (9174)	45 (90)	-	362	2.14	16th
17.	The culture and tradition of my community	58 (232)	57 (171)	30 (60)	5 (5)	468	3.12	10th

Source, Field Survey, 2023

Test of Hypothesis

H_0: There is no significant relationship between the socio-economic characteristics of the respondents and the utilization of pesticides in the area.

The result presented in Table 6 reveals that farmer utilization and education level significantly influenced pesticide use at a 5% probability level, while income, access to credit, and farm size were highly significant at a 1% level. These findings corroborates prior studies such as Adebayo *et al*. (2022), who emphasized that access to credit and larger farm sizes positively impact farmers' ability to invest in agrochemical inputs like pesticides. Similarly, Yusuf and Adekunle (2023) confirmed that income and education significantly affect the adoption of modern agricultural technologies, including pesticide usage, due to better access to information and decision-making capacity. The model's high explanatory power, indicated by a pseudo R^2 of 0.926, supports the assertion of Olayemi and Nwachukwu (2021) that socio-economic variables are strong predictors of agricultural input utilization among smallholder farmers in Nigeria. The findings equally corroborates that of Eremi *et al* (2021) who documented that farmers' socio-economic variables are, to a large extent, determinants of their behavior towards technologies.

Table 6: Summary of logistic regression of the socio-economic determinants of farmers utilization of pesticides

Variables	Coefficient	Std Error	T-value	Sig.
Sex	- 0.052	0.120	- 0.431	0.668
Ag	0.118	0.066	1.799	0.018**
Marital status	0.023	0.066	0.351	0.727
Education level	0.082	0.057	1.447	0.051**
Occupation	0.059	0.084	0.704	0.484
Farm size	0.115	0.079	1.454	0.149
Income	- 0.033	0.033	- 1.017	0.312*
Year of farming	- 0.072	0.054	- 1.344	0.011*
Access to credit	1.756	0.342	5.134	0.000*
Source of credit	0.014	0.041	0.344	0.731
Model summary	R	R^2	Adjusted R^2	Std. Error of
	0.981*	0.962	0.957	estimated 0.52

* Significant at 1%** Significant at 5%

Conclusion

The study revealed that various types of pesticides, particularly herbicides, insecticides, and rodenticides, are widely used among farmers in the area. Vegetables like pumpkin and waterleaf are the most commonly cultivated crops receiving pesticide applications. Farmers largely perceive pesticides as beneficial, despite acknowledging their environmental impacts. Socio-economic factors such as education, income, and farm size significantly influence pesticide use. The findings underscore the need for better education, regulation, and support systems to ensure sustainable pesticide practices.

Recommendations

Based on the findings of the study, the study recommends the following:

i. Agricultural extension services should intensify awareness on the safe and appropriate use of herbicides, rodenticides, and insecticides to minimize health and environmental risks.
ii. Farmers should be trained on integrated pest management (IPM) strategies especially for vegetables, which are the most commonly cultivated and pesticide-treated crops.

iii. Awareness campaigns should address misconceptions about pesticide benefits and risks, especially regarding consumer safety and impacts on biodiversity.
iv. Government and regulatory agencies should ensure the availability of eco-friendly alternatives to the most commonly used chemical pesticides such as insecticides and bactericides.
v. Subsidized access to pesticides and targeted training for less educated and resource poor farmers should be prioritized to promote safe usage practices.

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