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Evaluation of Factors Influencing Adoption of Sesame (*Sesamum indicum* L.) Improved Production Practices Among Farmers in Central Zone of Taraba State, Nigeria

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ABSTRACT

This study evaluated the factors influencing the adoption of sesame production practices among farmers in the Central Zone of Taraba State, Nigeria. Its specific objectives were to identify improved sesame production practices, determine information sources on sesame technologies and examine factors influencing adoption. Multi-stage sampling technique was used to select 221 farmers for the study. Data were analysed using descriptive statistics and logit regression. The findings showed that majority (99.1%) were aware of improved sesame production technologies. The adoption index was 0.89. The major information source was friends and relatives (91%). Logit regression revealed that six variables (age, marital status, household size, educational level, farm size, and farming experience) significantly influenced the adoption of sesame production practices. However, farmer's decision to adopt improved sesame production practices is influenced by their age (-0.855), marital status (-6.639), education (0.461), household size (-0.833), farming experience (0.367) and farm size (6.106). The study concludes that sesame farmers are very much aware of the improved sesame production technologies and had high level of adoption of these practices. The study recommends provision of training by the government and extension agents, affordable improved seed varieties, better extension services, fair pricing policy by the government, and access to credit to boost adoption of sesame technologies by financial institutions in the state.

Keywords: Adoption, Improved Sesame, Production Practices, Taraba State..

INTRODUCTION

Sesame (*Sesamum indicum* L.) also known as beniseed belongs to the family Pedaliaceae. It is one of the oil seed crops cultivated globally (National Agricultural Extension Research and Liaison Services,

National Agricultural Extension and research liaison services (Teklu, 2022) According Atinga (2021), Sesame origin is not clear is linked to Egypt, where the seed grounded into flour. Manepalli (2022)

reported that Sesame originated from Africa. It is an erect annual herb that grows on a height of between 1 - 2 meters with pubescent leaves and has pale rose of white flowers. The plant has many varieties, which includes NCRIBEN 01M. NCRIBEN 02M. NCRIBEN 03L and E8. In addition to improved seed, other technologies used in Sesame production includes fertilizer, herbicides, pesticides, appropriate spacing, harvesting and storage technologies among others. Reliable records show that in recent times, the crop is widely cultivated in places like China, Ethiopia, India, El-Salvador, Nicaragua, Nigeria, Sudan, Mexico, Guatemala, and the United State of America (Teklu, 2022)

Krisatya *et al.* (2025) suggested that among the methods of improving agricultural productivity is the introduction of improved agricultural technologies to farmers. He also opined that adoption of improved techniques is an important means to increase the productivity of small holder agriculture in Africa, thereby fostering economic growth and improved well-being for millions of poor households. Low adoption of improved agricultural production technologies is generally known to reduce agricultural output. Earlier studies Piot-Lepetit (2025) and Lupondo *et al.* (2025) opined that low rate of adoption of improved agricultural technologies could be due to low expected benefits from the practice or could be due to other factors such as farmers' characteristics or technology factors which may not encourage the adoption of technologies by farmers. The major impediment to the growth of African agriculture is the use of local seed variety. It is in recognition of this situation that Ranjithkumar (2025) suggested that the use of improved technologies will continue to be critical input for improved farm productivity. As recommended by Phiri

(2025) one way of improving sesame productivity is through an enlightened campaign with mass and print media to farmers on the need to embark on improve production technologies of sesame (*Sesamum indicum L.*). The aim and objectives of the State government and other relevant food and raw material development agencies is to encourage the production of sesame among farmers in the State (Phiri, 2025). To that effect, some improved production practices were introduced in the state for adoption by farmers. The expectation is that farmers will adopt these improved sesame production practices as a means of boosting sesame production in the state. However, since the introduction of these improved sesame production technology, there seems to be no empirical study on the adoption of the improved sesame production technology in the study area. According to Phyu (2019) in a study conducted in Taraba State reported that farmers adopt technologies such as improved sesame seed varieties like NCRIBEN and Yandev 55, alongside the use of fertilizers, herbicides, and pesticides technologies to farmers in the study area and examine the factors that influence the adoption of recommended sesame production technologies by sesame farmers.

METHODOLOGY

The study area

The study was conducted in the Central zone of Taraba State, Nigeria. The zone comprises of Gashaka, Sardauna, Bali, Kurmi and Gassol Local Government Area. Gashaka local government area is located between latitude 30⁰.20' and 60⁰.28' North and longitudes 70⁰ 9' and 90⁰ 44' East. Bali local Government lies between latitude 7⁰ 46' N and 7⁰ 54' N of the equator and longitude 10⁰ 30' E and 11⁰ 00' E of the prime meridian (Isah and Mohammed, 2025). The population of Gashaka LGA is

projected to 91,029 people as of (2022) based on 2006 population figure of 87,781 people. The area falls within the tropical forest Zone with thick vegetation cover, tall grasses and trees. The major rivers are: River Gashaka, Moyo Kam and Mayo Jim. Gashaka has a tropical climate marked by dry and rainy season. The rainy season commences early April to October while the dry season commences from October to March. The average rain fall in the area is approximately 1350mm. The following crops are cultivated in the area: Maize, Sorghum, Rice, Yam, Cocoa and land for grazing animal, fresh water for fishing, wildlife and forestry (Taphee *et al.*, 2015).

Gassol local government area is located between latitude $8^{\circ} 28'$ and $9^{\circ} 10'$ of the equator and between longitude $10^{\circ} 23'$ and $11^{\circ} 3'$ east of the Greenwich meridian. Kurmi Local Government Area (LGA) in Taraba State lies within 7° North and $10^{\circ} 11'$ East between $9^{\circ} 00'$ and $12^{\circ} 00'$. The temperature of the area ranges from 280 to 350 with annual rainfall of between 800mm to 1,525mm (Bala *et al.*, 2018). Most of the inhabitants in the area are: Jukun-kona, Mumuye, and Fulani. These ethnic groups are predominantly agriculturally inclined. Most of the agricultural activities found in the area include crops and livestock production such as maize, beans, rice, cowpea cattle, goat and poultry production.

Bali local Government lies between latitude $7^{\circ} 46' N$ and $7^{\circ} 54' N$ of the equator and longitude $10^{\circ} 30' E$ and $11^{\circ} 00' E$ of the prime meridian (Isah and Mohammed, 2025). It is found in dry guinea savannah and the largest local Government in Taraba State, with an estimated land area of 11,540 km² and has some mountains like Gazabu, Dakka, Maihula, Bagoni, among others. Based on the results of the 2022 National

Population projection, Bali local Government had a population of about 218,832 persons. It has a tropical climate marked by two seasons; dry and rainy seasons. The rainy season starts around April and ends October occasionally, with 1350 – 1500mm rainfall annually. The dry season is from November to March. The major ethnic groups in the area include; Jibawa, Tiv, Chamba, Fulani, Hausa, Itchen, Mumuye etc. The major occupation of the inhabitants is farming, fishing and nomadism. In addition, public servants, traders and artisans also inhabit the area. Their water sources for domestic and agricultural uses are River Taraba, Borehole, ponds and wells.

Kurmi Local Government Area (LGA) in Taraba State lies within 7° North and $10^{\circ} 11'$ East between $09^{\circ} 00'$ and $12^{\circ} 00'$ East occupying an area of 4,353 km² with an average elevation of 265 m above sea level, having undulating topography consisting both isolated and chains of mountain across some areas dissected by three main rivers namely River Ndaforo, Belel and Bisaula. River Ndaforo has its source at Fali Mountain, flowing southwards to Ndaforo to join River Donga. River Belel starts from Gashaka mountain and flows to southern part of Abong into River Donga while River Bissaula starts from Cameron Mountain but flows into River Manyan. Rocks in the area consist of glaucites, magmatites and metamorphic, exposed on the surrounding hills usually by streams. The soils are transitional ferruginous tropical varying from clay to loam (below 70 cm) and deep (generally over 100 cm) except where iron, stones, pans are exposed, but are well drained. Average annual rainfall ranges from 1,200 to 2,500mm with mean annual temperature of $28^{\circ} C$ (Danladi *et al.*, 2023).

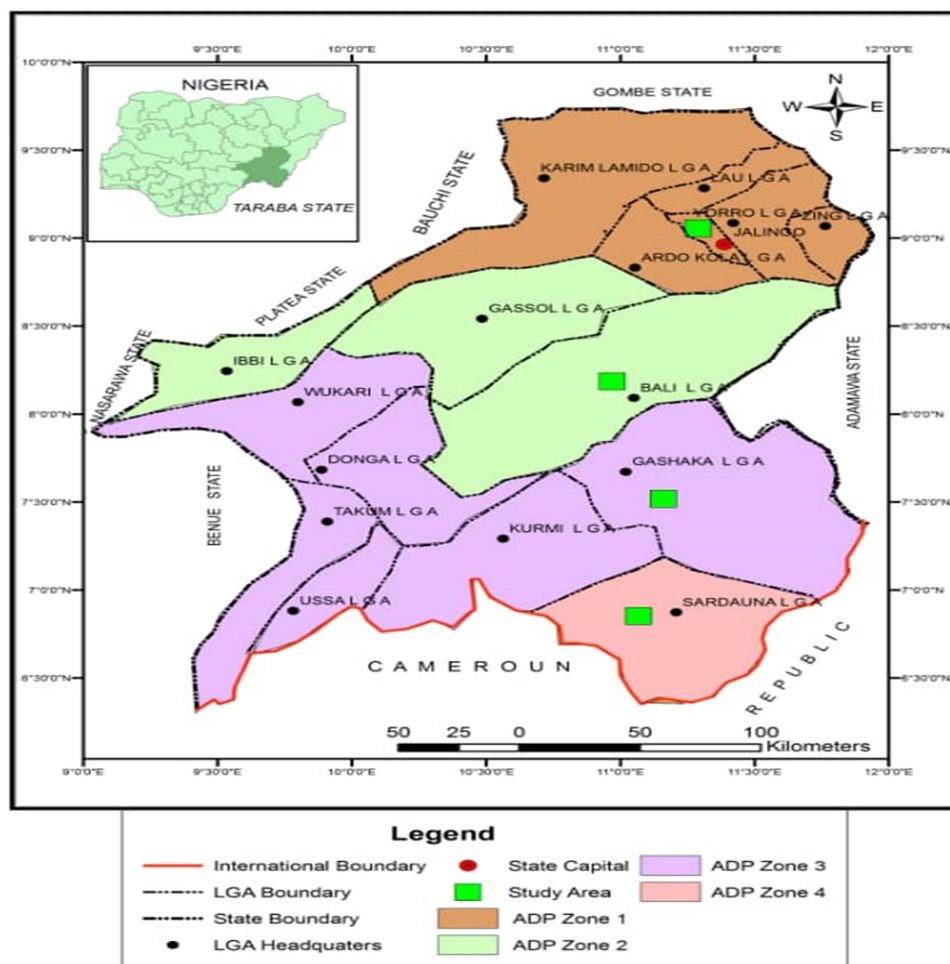


Figure 1: 1 Map of Taraba State Showing Study Area
[Source: GIS Laboratory, Geography Department MAUTECH Yola 2020]

Data collection

Primary data were used for the study and was obtained through interview using questionnaire. A multi-stage sampling technique were used to select respondents from the sample frame of 503 registered farmers from Value Chain Development Program under Taraba Agricultural Development Program (TADP) in the study area. The first stage involved random selection of three (3) out of the five (5) Local Government Areas in the Central Zone namely; Bali, Gassol and Kurmi. The second stage involved random selection of three (3) wards each from the selected Local

Government Areas making a total of nine (9) sampled wards. The third stage involved random selection of 223 farmers using Taro Yamane Formula of sample size determination. The formula is stated as:

$$n = \frac{N}{1+N(e)^2}$$

1 Where:

n= sample size

N= Sampling frame

e= margin of error assumed 95% confidence level at $p = 0.05$

$$n = \frac{503}{1+503(0.05)^2} = 223$$

Proportionate sampling was used to select 125 respondents in Gassol Local

Government, 85 respondents in Bali Local Government and 13 respondents in Kurmi Local Government from the sample size.

Data Analysis

Descriptive statistics such as percentage, frequencies and mean were used to identify adoption of Sesame production technologies such as improved sesame seed varieties like NCRIBEN and Yandev 55, alongside the use of fertilizers, herbicides, and pesticides, source of information on Sesame production technologies and constraints to adoption of Sesame production technologies while Logit regression analysis was used to analyzed factors influencing adoption of Sesame production Technologies among respondents in the study areas.

RESULTS AND DISCUSSION

Awareness of Sesame Production Technology

The result in table 1 shows that majority (99.1%) of the respondents were aware of improve sesame production technologies and only 0.95% are not aware. Despite the level of awareness there is need to achieved a total awareness, and to achieve this there must be a more sensitization and enlightenment for more people to become aware of the existence of improve sesame production technologies. Also, Danladi *et al.* (2021) found that the number of extension contacts has a positive association with technology adoption in South-Western Ethiopia, Nigeria and Central Tanzania respectively, and improved cassava (Lukurugu *et al.*, 2022) in Nigeria.

Similarly, a farmer must be aware of certain technology before adopting it, and some may be aware and will not adopt it due to farmer's reluctance to let go their old ways,

unfavorable product prices, extension contact, unavailability, credit, input delivery, land tenure system and source of information. It further revealed that 79.6% of the respondents practiced the production of improve sesame technologies while few (20.4%) are not practicing. Therefore, farmers may adopt a technology based on the benefit they would drive from it. It yields 19.9% because of ease of harvest, 7.1% because of low cost of seed, 15.2% because of tolerance to local pest, 3.8% because of resistant to pod shattering while 4.2% also shows that 11.4% practice the innovation because of non-complexity, 38.4% because of high because of resistant to local diseases. These shows that improve Sesame technology have attributes that are desired by the respondents. Similarly, 12.3% of the respondents do not use recommended technologies due to its complexity, 32.7% because of lack of seed, 52.6% because of cost of seed and 2.4% of the respondents were not interested (Kehinde *et al.* 2022)

The result shows that 42.2% had access to extension agent while majority (57.8%) had no access to extension personnel. This could negatively affect the farmers. Because access to extension services afford the farmers opportunity to be better informed about production methods as well as to acquire basic training and skills on how and best to adopt certain technology on a particular crop so as to achieved better productivity. This result is in harmony with the findings of Terseer (2018) who studied the technical efficiency of sesame in Makurdi reported that majority (83.3%) of the sesame farmers in the study Area had no access to extension agents.

Table 1: Distribution of respondents Based on Awareness of Sesame Production Technology

Variables	Frequency	Percentage (%)
Awareness:		
Aware	209	99.10
Not aware	2	0.95
Total	211	100.00
Practice:		
Yes	168	79.60
No	43	20.40
Total	211	100.00
Reasons for practice:		
Non-complexity	24	11.40
High yielding	81	38.40
Ease of harvest	42	19.90
Low cost of seeds	15	7.10
Tolerance to local pest	32	15.20
Resistant to pod shattering	8	3.80
Resistance to local diseases	9	4.20
Total	211	100.00
Reasons for not practice:		
Complexity in production	26	12.30
Lack of seed	69	32.70
High cost of seed	111	52.60
Not interested	5	2.40
Total	211	100.00
Access to extension services:		
Yes	89	42.20
No	122	57.80
Total	211	100.00

Source: Field Survey (2025)

Adoption of sesame production technology

The result on table 2 revealed that 90.5% of the farmers that are practicing the production adopt the used of improve seed technology, 41.7% adopt improved land preparation, 36% adopt improved sowing methods, 92.9% agreed to used improve fertilizer application, 95.3% adopt weeding, 36.5% utilizes pests and control measures, 43.1% adopt improved harvesting, 96.2% adopt threshing and winnowing, 42.2% adopt improved storage, while 36.5% adopt improved marketing methods. By Implication the result shows that despite the adoption of some improve sesame production technologies by farmers in the study area, not all of them adopt all the packages rather most of them select one

technology or the other and that Could be on the reason on the way they were convince with the technology or its availabilities. The adoption index which was computed as the ratio of total number of Sesame Production technologies available to the farmer to the one utilized was 0.89. This shows that 89% of the total numbers of technologies available were adopted by the respondents. Farmers have adopted practices like pre-emergence herbicides (e.g., Pendimethalin) and timely fertilizer applications to maximize plant growth and seed yield. These technologies reduce labour costs and improve efficiency, though challenges such as limited access to inputs persist. Abiodun (2022) noted the increasing use of mechanized farming tools, including seed planters and threshers, to enhance sesame

production in Nasarawa State. Mechanization reduces the time and labor required for planting and harvesting.

However, adoption rates are still low due to the high cost of equipment and inadequate training on their use.

Table 2: Distribution of Respondents Based on Adoption of Sesame Production Technology

Improved Technologies	Adopted	% Adopted	Not adopted	% Not Adopted
Improved seed	191	90.50	20	9.50
Improved land preparation	88	41.70	123	58.30
Improved sowing methods	76	36.00	135	64.00
Fertilizer application	196	92.90	15	7.10
Weeding	201	95.30	10	4.70
Pests and disease control	77	36.50	134	63.50
Improved harvesting techniques	91	43.10	120	56.90
Threshing and winnowing	203	96.20	8	3.80
Improved storage	89	42.20	122	57.80
Improved marketing	77	36.50	134	63.50
Adoption Index=	0.89			

Source: Field Survey (2025)

Sources of Information to Sesame Farmers

Information and its source are vital in technology adoption. Agriculture information that is received from experts (extension agents and media) will always facilitate adoption of technologies (Hurst and Spiegel, 2023). Results in table 3 revealed that 51.7% of the respondents received their information through extension agent, 29.4% of the respondents received through non-government organization and 8.5% received information through research institute. It also shows that 74.9% got their information from media which include television and Radio, 91% got information through friends and relatives while 89.6% through fellow Sesame farmers. This result agrees with the findings of (Rust *et al.*, 2022) who reported that farmers preferring other farmers as their first-hand source of their information. This implies that farmers will used obsolete technology if they are not well informed.

Factors Influencing Adoption of Sesame Production Technologies

The influencing the adoption of Sesame recommended practice adopted by the respondents in Table 4 were analyzed using logistic regression analysis. The coefficient of Pseudo R² revealed that 91% of the variations in the adoption index by respondents were explained by the variable included in the models. The LR chi² (9) and log likelihood were significant. Six (6) variables namely; age, marital status, household size, education, farm size and farming experience were significant.

Age (x₂)

Age (X₂) of the farmers is negatively related to adoption of improved Sesame production adopted by the respondents and significant at 5% probability level. The value of the coefficient indicates 0.855% decrease in the probability of adoption of Sesame technologies for every 1% increase in the age of the farmers. This result suggests that

sesame farmers in the study area were still in their active age of production. The result confirmed that youths were those involved in agricultural activities. This finding agrees

with the result at Katanga *et al.* (2017) that majority (74.4%) sesame farmers in Jigawa State Nigeria were within the age of 20-55 years at age.

Table 3: Source of Information on Sesame Production Technologies

Source of information	Frequency (*)	Percentage (%)	Rank
Friends and Relatives	192	91.00	1 st
Fellow Sesame Farmers	189	89.60	2 nd
Media (Radio, television, newspaper etc.)	158	74.90	3 rd
ADP and Extension agents	109	51.70	4 th
Non-governmental Organizations	62	29.40	5 th
Research institute	18	8.50	6 th
Field day	14	6.60	7 th

Source: Field Survey (2025)

Key: * = Multiple Responses

Marital Status (x₃)

Marital status (x₃) is negatively related to adoption of Sesame production technologies and statistically at 5% probability level. This shows that single farmers adopt new technologies more than married ones. The coefficient of the variable indicated that if the number of married households increases by 1% all other things being equal, it will decrease the likelihood of by 6.63%. However, marital status in most cases is considered important in household decision making where married people have always succeed in decision making. This is expected because married is considered important to matured people in African setting (Ononokpono *et al.*, 2022).

Household Size (x₄)

Household size (x₄) of the respondents has negative coefficient and statistically significant at 5% probability level. The value of the coefficient reveals that if household size increases by 1%, it will decrease the probability of adoption of Sesame production technologies by 0.833%. This could be possible since as household size increases; there will be more demand

and financial pressures on the household head which could negatively affect adoption on new practices. This work is in line with Edet *et al.* (2024) revealed that households' size had a negative and significant influence on adoption of improved farm technologies.

Education (x₅)

Education (X₅) is statistically significant at 1% probability level (Table 4). This implies that education enhance the use of improve practices because the knowledge gain enables individuals have basic understanding and utilization of improve practices. The coefficient of education reveals that if year of formal education increases by 1%, it will increase the probability of adoption of Sesame production technologies by 0.461% all things being equal. According to Tineishemo (2018) educated farmers are able to assess the benefits of innovative technologies, and adopt them quicker than non-educated farmers, and successfully adapt a new technology to their particular situations. Another effect of education is that it helps consumers better evaluate the

potential risks posed by new products and technologies.

Farm Size (X_6)

Farm size is positively correlated to adoption of recommended Sesame technologies by the respondents (Table 4). This could be expected because when farmers' farm size (X_6) increases, they are likely to adopt new farming techniques that will boost their productivity and increase in farm income. The coefficient indicated 6.1% increase the likelihood of adoption of recommended Sesame technologies for every 1% increase in farm size of the farmers. Sennuga *et al.* (2020) stated that Farm size plays a critical role in adoption process of a new technology many authors have analyzed farm size as one of important determinant to technology adoption. Farm

size can affect and in turn be affected by the other factors influencing adoption. Some technologies are termed as scale-dependent because of the great importance of farm size in their adoption

Farming Experience (x_7)

Farming experience (X_7) has positive coefficient and significant at 5% probability level (Table 4). This implies that increase in farmer's years of experience will stimulate adoption of improved technology (Awotide and Awoyemi, 2016). The value of the coefficient indicated that if all over variables are held constants, there will be 0.367% increase in the likelihood of adoption of improved Sesame technologies for every 1% increase in the farming experience of the respondents.

Table 4: factors Influencing Adoption of Sesame Production technologies

Variables	Coefficient	Standard Error	Z-Value	P-Value
Sex (x_1)	1.124	1.652	0.68	0.496
Age (x_2)	-0.855***	0.274	-3.11	0.002
Marital status (x_3)	-6.639**	2.475	-2.57	0.010
Household size (x_4)	-0.833**	0.312	-2.67	0.008
Educational level (x_5)	0.461**	0.175	2.63	0.009
Farm size (x_6)	6.106**	2.500	2.44	0.015
Farming experience (x_7)	0.367**	0.128	2.86	0.008
Access to credit (x_8)	0.216	1.826	0.12	0.905
Extension contact (x_9)	0.912	1.568	0.58	0.561
Constant	5.451	5.054	1.08	0.281
Pseudo R2	= 0.9103			
LR chi2(9)	= 256.67***			
Prob > chi2	= 0.0000			
Log likelihood	= -12.642455			
Number of obs	= 211			

Source: Field Survey (2024)

Key: *** and ** = Significant at 1% and 5% probabilities levels

CONCLUSION AND RECOMMENDATIONS

The study concludes that most Sesame farmers in the study are very much aware of the improved sesame production technologies. Media outlets specially Radio and television were the major source of information on Sesame technologies to the respondents. There is high level of adoption of sesame improved production technologies among the respondents in the study area. However, Farmer's decision to adopt more Sesame production techniques is influence by their age, marital status, education household size, farming experience, and farm size. It is also recommended that Government and relevant agencies should provide training to the sesame farmers on improved sesame cultivation and crop management practices at affordable price. This can only be achieved if government and relevant agencies employ and deploy more extension personnel to rural areas to assist farmers in solving complex farming operations associated with Sesame production and ensure affordable price of the inputs and fair price of the output (sesame) for the farmers. This can be achieved by establishment of sesame marketing board or fixing a guarantee minimum price for the produce even at the onset of production season so that farmers can have assurance of a stable price for their produce.

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