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ANALYSIS OF IMPROVED TOMATO HYBRIDS CULTIVATED AND SUSTAINABLE AGRICULTURAL PRACTICES IN SOUTHWEST, NIGERIA

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ABSTRACT

The study investigated the improved tomato hybrids cultivated and sustainable agricultural practices in southwest Nigeria. Specifically, the study aimed to examine the socio-economic characteristics of tomato farmers, describe the main improved varieties available and cultivated by the farmers; examine the SAP adopted by the farmers and determine factors affecting the varieties cultivated and number of SAP adopted by the farmers. The first stage involved deliberate selection of Osun and Ekiti States due to their large populations of tomato producers while the second phase also required the intentional selection of three (3) LGAs from each state according to the density of tomato farmers. A total of thirty (30) villages were included in the study by purposefully selecting five (5) villages from each LGA identified in the second phase. In the final phase, three hundred (300) tomato farmers were surveyed, which involved randomly selecting ten (10) farmers from each village. Descriptive statistics and Poisson regression analysis were used to analyze the data. The study discovered that among the numerous tomato hybrids available in southwest Nigeria, fourteen varieties were identified, with Platinum F1 being the most preferred at 24.2%, followed closely was Padma F1 at 22.3%, both of which are from the same brand (East West Seed International). The perceptions of the respondents regarding the characteristics of improved tomato varieties were assessed and the results revealed that tomato size (9.7%) is the primary attribute valued by the farmers in the study area. The findings from the statements about sustainable practices, categorized under ten (10) SAP indicators, indicated that Soil Health (% Mean = 26.0), Soil Loss (% Mean = 31.8), Integrated Pest Management (% Mean = 37.8), and Biodiversity (% Mean = 25.5) were adopted to some extent, while the Value of the Product (% Mean=61.2), Social and Human Capital (% Mean = 70.0) , and Local Economy(% Mean = 55.7) were fully embraced by the participants in the study area. There was minimal to no adoption concerning Nutrients (% Mean = 0.3), Energy (% Mean = 3.6), and Water Conservation (% Mean = 7.5). The results of the Poisson Regression model showed that education ($p < 0.10$), farm labourers ($p < 0.05$), income status ($p < 0.05$), access to credit ($p < 0.05$) and planting time ($p < 0.05$) were statistically significant and had a positive correlation to the number of improved tomato hybrids cultivated revealing a unit increase in these factors will increase the likelihood of cultivating more improved hybrids in the study area. Similarly, out of the fourteen variables analysed as factors that influence the number of SAP adopted, soil quality, tenancy status, gender and access to extension agents had a negative relationship with the number of SAP adopted, meaning they were less likely to have an impact on the number of SAP adopted in the study area. In contrast, factors like farmers' education, family size, access to credit, period of planting, and farm size which were significant at 5%

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probability level cum farm workers and income status ($P < 0.01$), had a positive correlation with the number of SAP adopted, suggesting that an increase of one unit of these factors would likely affect the number of SAP adopted in the study area.

Keywords: Sustainable Agricultural Practices (SAP); Improved Tomato Hybrids; Poisson Regression; Adopters; SAP indicators.

1. INTRODUCTION

The family Solanaceae includes tomatoes. Globally, one of the most significant vegetables is the tomato (*Solanum lycopersicum L*). The crop's economic appeal stems from its high yield and very short growing season. In Nigeria, it is grown mostly in the northern regions of many agro-ecological zones. The sub-humid and moist regions of the middle and south belts, respectively, are also susceptible to it. Tomatoes are a fruit that is eaten daily in every home in the country, whether they are processed or consumed fresh (Adegboye, Omotesho and Akinrinde, 2021). Because tomatoes are rich in minerals and vitamins, they can assist in compensating for deficits in certain micronutrients (Dossou, Soule, and Montcho, 2007). From a health perspective, the tomato fruit is a powerful antioxidant with high quantities of lycopene, which helps prevent prostate cancer in males. According to Onifade, Aregbesola, Ige, and Ajayi (2013), eating tomatoes lowers the chance of developing potentially fatal conditions including cancer, heart disease, bone problems, etc. Tomatoes are frequently grown in home gardens, in structured agricultural plans, either as a single crop or in combination with other crops in the off-season and/or around the rainy season. According to Sahel Research (2017), nearly 45% of the fresh tomato production produced each year was wasted. Post-harvest losses can be due to inadequate supply chain management, including ineffective storage facilities and subpar transportation networks (Akinbola, Borokini, Ijigbade and Ilesanmi, 2023). As a result, Nigeria imported tomato paste in 2016 and 2017, expected to cost USD360 million yearly (NGF, 2015). The tuta absoluta epidemic, a significant pest infestation that occurred in 2016 and caused a post-harvest loss of tomatoes of 80% (Borisade, Kolawole, Adebo, and Uwaidem, 2017), was felt throughout the nation. This led to a tomato shortage for the processing business, a sharp spike in market prices, and an increase in imports. Because of the nation's dependence on imported tomato products, it is susceptible to changes in international pricing. The rising population of the nation may experience challenges with food insecurity as a result of a considerable increase in the price of tomato paste. Improved variety development and releases, production and cultural methods, and lowering post-harvest losses have been the main areas of focus for research on horticulture items like tomatoes in the past. For growing in Nigeria, a number of tomato cultivars have been created or imported. But you'll find that markets carry extremely few of these variations. This discrepancy between the number of varieties added to the production systems and the number often seen in the markets appears to be partially explained by limitations imposed not only by socioeconomic and technological factors but also by the difficulty of satisfying consumer demand for high-quality fruits. Nigeria grows both conventional and enhanced tomato types. The term "heirloom tomatoes" refers to traditional tomato varieties that are handed down through the generations. Examples of these include Beefsteak, Big Rainbow, Cherry, Brandy Wine, and so on (Adegboye et al; 2021). In the agricultural context, however, farmers' adherence to old varieties is no longer popular in preference for enhanced varieties because of their higher yielding factor. When two distinct tomato types cross-pollinate, better tomatoes known as tomato hybrids are produced. These new varieties, which would possess

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traits from both parents, include the following: Padma F1, Platinum F1, Cobra F1, Mona F1, Tylka F1, Chibli F1, Kilele F1, Shanty F1, Commando F1, Maxim F1, Master F1, Laila F1, Rounder F1, Danny F1, and Sifa F1, Rambo F1, Anna F1 etc. A handful of these kinds are available in Nigerian market places. Farmers choose different tomato varieties for a number of reasons, one of which being the variances in their qualities. According to Hellyer, Fraser, Haddock-Fraser (2012), the yield, socioeconomic traits, farmer attitudes and behaviours, risk perception, and climate variables all influence a variety's choice.

Long-term environmental, social, and economic sustainability is the main goal of sustainable farming. The goal is to maximize output while limiting the use of chemicals and natural resources. For a number of reasons, sustainable farming is significant and pertinent in Nigeria (Ndor, Obadiah and Nasir, 2020). Initially, it can aid in resolving the problem of food security by guaranteeing a consistent supply of food for the expanding population. Second, it encourages environmental protection by lowering pollutants and protecting biodiversity. Furthermore, by improving revenue creation in rural areas and generating jobs, sustainable farming may help reduce poverty. Nigeria may enhance its agricultural output while reducing adverse effects on the environment by implementing sustainable farming methods. Composting and crop rotation are two organic agricultural practices that may be used to preserve soil fertility and cut back on the need of artificial fertilizers (Idoko, 2023). In order to increase crop performance via the richness of the soil ecosystem and to promote soil health, which is extremely important to agriculture, Unilever Guide (2004) and Donkoh (2019) defined many indicators of sustainable agriculture in tomato production. By increasing soil organic matter and rotating crops with the addition of cover crops for nitrogen fixation, sustainable agriculture practices aim to prevent long-term deterioration in soil fertility and structure, which could lead to soil compaction, especially under mechanization. Deterioration in soil fertility can be caused by variations in the pH, nutrient levels, and structure of the soil, as well as by the accumulation of saline, which is a potential irrigation-related side effect (Unilever Guide, 2004). Existing literature often overlooks the specific agricultural conditions in Southwest Nigeria, where varying climatic and soil conditions significantly influence farming practices and crop outcomes (PWC, 2018). Moreover, there is an insufficient understanding of the factors influencing farmers' choices regarding tomato varieties and how these choices affect their potential for improved yield and sustainability (Adegboye et *al*., 2021). Additionally, there is a lack of comprehensive data on how improved varieties and sustainable practices can mitigate post-harvest losses, which are considerably high in Nigeria (Borisade et *al*., 2017). The majority of people in developing nations rely on agriculture for their living, and it continues to be the backbone of their economy, accounting for 70% of employment. Previous research has indicated that the focus should be on narrowing the current yield gap by technical improvement, as there is no credible evidence of large yield loss or manufacturing inefficiencies in developing nations. It is imperative that this be taken into account in this study because the majority of Nigeria is a tropical country with high suitability for tomato growing (Siedenburg, 2022). This study was to thereby ascertain the socioeconomic characteristics of the tomato farmers in the area; describe the main improved varieties available and cultivated by the farmers; examine the SAP adopted by the farmers and determine factors affecting the number of varieties cultivated and number of SAP adopted by the farmers.

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2.METHODOLOGY

2.1. Study Area

Southwest Nigeria was the site of the study. One of Nigeria's six geographical regions is the southwest. According to NPC (2006), 27, 511, 992 people are living in the area. The Yoruba ethnic group, which makes up over 21% of the country's population, dominates the region (NPC, 2006). Ekiti, Ondo, Ogun, Osun, and Lagos are the southwest states; they are all situated in tropical forest regions. According to Taofeeq and Judith (2016), the region is located between longitudes 4^0 West and 6^0 East and latitudes 6^0 North and 4^0 South. There are 76,852 square kilometers of land in the region. The region is bordered by the Kwara and Kogi States to the North and East, the Republic of Benin to the West, and the Atlantic Ocean to the South. According to Taofeeq and Judith (2016), the area has 1486mm of annual precipitation and an average annual temperature of 26^0C.

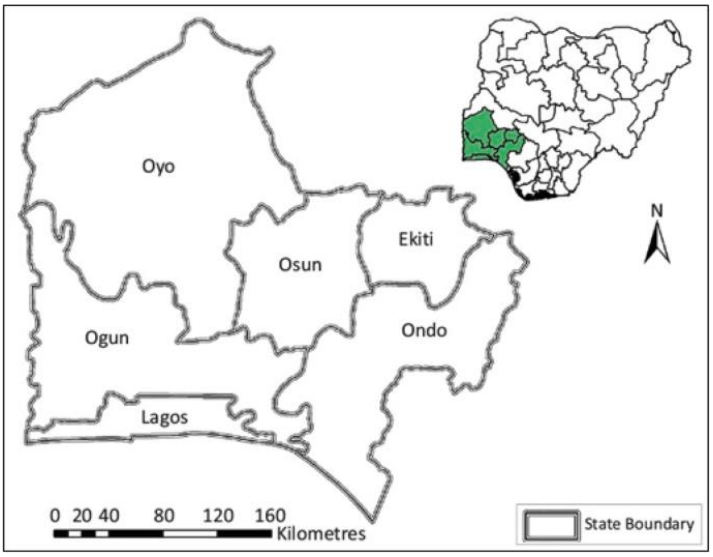

Figure 1: Map of Southwest Nigeria Showing the Study Area

Source: Ogunleke and Baiyegunhi, (2019)

2.2. Data Source and Data Collection

For this research, primary data was utilized. The primary data were collected from tomato farmers through carefully designed questionnaires and detailed personal interviews. The questionnaire provided insights into various factors, including the socioeconomic traits of tomato farmers (age, gender, educational background, production experience, household size, funding sources, and knowledge of advanced tomato varieties and sustainable farming practices), input factors (labour, seeds, land area used/acres), and output measures (tomato yield/tonne).

2.3. Sampling Procedure and Sampling Size

A multi-stage sampling method was employed throughout the study. From the six states in Southwest Nigeria depicted in Figure 1, the first phase involved deliberately selecting Osun and Ekiti States due to their large populations of tomato producers (Afolami and Ayinde, 2001; Oyedokun, Yesufu, Ayorinde and Ogunmola, 2020). To identify a total of six (6) Local Government Areas (LGAs) for the research, the second phase also required the intentional selection of three (3) LGAs from each state according to the density of tomato farmers. A total of

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thirty (30) villages were included in the study by purposefully selecting five (5) villages from each LGA identified in the second phase, based on the reported concentration of tomato farmers in those villages as indicated by ADP in the state. In the final phase, three hundred (300) tomato farmers were surveyed, which involved randomly selecting ten (10) farmers from each village and this was shown in Table 2. To ensure fair gender representation and to eliminate researcher bias, simple random sampling was implemented.

Table 1 Sampled Local Government Areas and Communities/Villages of Osun and Ekiti State

State	LGA	Communities/ Villages	Number of Respondents Sampled
Osun State	Atakunmosa East	Alarere	10
		Bolorunduro	10
		Igangan	10
		Onigbogi	10
		Sokoto Owena	10
	Atakunmosa West	Akilapa	10
		Alaagba	10
		Apaara	10
		Kajola Ijesha	10
		Laala	10
	Ede South	Adeigbe	10
		Adejuwon	10
		Alaajoe	10
		Lasupo	10
		Olode	10
Ekiti State	Ido/Osi	Ayetoro	10
		Igbole	10
		Ilogbo	10
		Orin	10
		Osi	10
	Irepodun/Ifelodun	Aba Osun	10
		Aroto	10
		Itaase	10
		Odo Uro	10
		Surulere	10
	Ise /Orun	Afolu	10
		Kajola Ise	10
		Obada	10
		Ogbese	10
		Temidire	10
		Total	**300**

Source: Computed from field survey, 2024.

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2.4. Data Analysis and Model Specification

The study utilized two analytical tools to meet its objectives - descriptive statistics like percentage and frequency tables and Poisson Regression Analysis which were used to make inferences about the relationships among the data variables.

2.4.1 Poisson Regression Analysis

The factors affecting the number of Sustainable Agricultural Practices (SAP) adopted and the varieties grown by farmers were determined through Poisson regression analysis. Aside from utilizing a count that fits the Poisson distribution as the dependent variable (Y), Poisson regression functions similarly to standard multiple regression. Therefore, the possible outcomes for Y are nonnegative integers such as 0, 1, 2, 3, and so on. It is assumed that larger numbers occur less frequently. Poisson regression is also similar to logistic regression since both methods involve a discrete response variable; however, unlike logistic regression, the response values in Poisson regression are not limited to specific categories (Cameron and Trivedi, 1998). The research assessed how various environmental factors and dilutions influenced the counts of SAP utilized by tomato growers and the varieties they produced. The Poisson distribution models the probability of y events (i.e., SAP adopted and Varieties cultivated) with the formula:

$$\Pr(Y = y/\mu) = \frac{e^{-\mu}\mu^{y}}{y!} \text{ (y = 0, 1, 2, ……)} \quad \text{…….. (1)}$$

Where:

e is the Euler's number (e = 2.71828….)

y is the number of occurrences

y! is the factorial of y

μ is equal to the expected value (EV) of y when μ is equal to its variance

The explanatory factors indicated the number of Sustainable Agricultural Practices (SAPs) adopted by tomato growers, along with the varieties they cultivate. The Poisson regression model suggested that a set of k regressor variables, or the X's, influences the mean of Poisson incidence, denoted as μ. The formula that relates these variables is:

$$\mu = t \exp(\beta_0+\beta_1X_1+\beta_2X_2+\cdots+\beta_kX_k) \quad \text{…….. (2)}$$

Where:

β_0 is the intercept

$\beta_1, \beta_2, \ldots\ldots\ldots \beta_k$ are unknown parameters that will be estimated from the set of data.

The fundamental Poisson regression model is expressed thus:

$$\Pr(Y = yi/\mu) = \frac{e^{-\mu}\mu^{y}}{y!} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

$$\Pr(Y = y_i / \mu_i, t_i) = \frac{e^{-\mu_i, t_i}(\mu_i, t_i)^{y}}{y_i!} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (4)$$

Where:

$$\mu_i = t_i\, \mu\, (x_i'\, \beta) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (5)$$

$$= t_i exp\,(\beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \cdots \ldots \ldots . \beta_k X_{ki}) \ldots\ldots\ldots\ldots\ldots\ldots\ldots (6)$$

Table 2. Description and Measurement of Explanatory Variables used for Poisson Regression Analysis

Code	Explanatory variable	Measurement.
X_1	Age of the farmers	(In years)
X_2	Marital Status	(Married = 1 and 0, otherwise)
X_3	Gender	(Male = 1, Female = 0)
X_4	Family Size	Numbers
X_5	Farmers' Education	years of schooling
X_6	Experience	In years
X_7	Farm Workers	In Numbers
X_8	Size of land	In acre
X_9	Soil Quality	(Good = 1 and 0, otherwise)
X_{10}	Land Tenancy Status	Owned = 1 and 0, otherwise
X_{11}	Period of Planting	Wet season = 1 and 0, otherwise
X_{12}	Income Status	High = 1 and 0, otherwise
X_{13}	Access to Credit	Yes = 1 and 0, otherwise
X_{14}	Access to Extension Agents	Yes = 1 and 0, otherwise

Source: Computed from field survey, 2024.

3. RESULTS AND DISCUSSION

3.1. Socio-economic Characteristics of Respondents

The age distribution of the respondents is shown in Table 4. The average age among the surveyed tomato farmers was 41 years, which aligns with the results of Abolusoro, Ogunjimi, and Abulusoro (2014) in their research on farmers' perceptions regarding strategies to enhance tomato production in the Kabba-Bunu local government area of Kogi state, Nigeria, where the respondents' mean age was reported as 45.6. A notable portion of the respondents, precisely 33.3%, belonged to the adult age range of 40 to 49 years. Additionally, 47.7% of the respondents belonged to the age range of 20 to 39 years, which is primarily considered the youth in these communities. In total, the majority of age groups, representing the active segment of the population, account for 93% of the respondents, while the dependent class constitutes 7.00% of the respondents. This indicates that the active population plays a dominant role in the production of improved tomatoes in the area under study. Gender is a crucial element in assessing

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availability for agricultural work and roles. Males were dominant, making up approximately 70% of the population in the study area. This corroborates the reports by Baba, Umar and Ibrahim (2008) and Gabriel, Olajuwon and Michael (2021) revealing that about 76.7% and 86.0% of Tomato farmers at Bade local government area of Yobe State and Northwest zone of Nigeria, respectively, were male. The analysis revealed that 90.7% of participants were married, while 6.0% identified as single. Approximately 1.7% of respondents were widowed, and just 1.3% reported being divorced. According to Abolusoro et al (2014) and Iwuchukwu, Nwobodo and Ugwuja (2017), the majority of the tomato farmers were married and this raises the possibility that this is rather a stable population, which could be an advantage to enhance a sustainable production and increase the number of improved varieties cultivated. The educational background showed that approximately 29.3% of the respondents have received tertiary education, while 7.3% of them lack any formal education. Furthermore, the proportion of improved tomato farmers who have completed any level of the education system is greater than that of those who have no formal education, indicating that education may enhance the adoption of improved tomato varieties and subsequently lead to an increase in tomato production levels. The proportion of respondents with family sizes ranging from 4 to 6 is 71.0% and this was also in line with the findings of Abolusoro et al (2014) who had larger percentage of tomato farmers in their study area that have family size ranging from 5-8 persons. Farmers tend to have larger families to support tomato production through effective management and operational tasks. 40.0% of the participants inherited their tomato farms, while 7.7% rented theirs. Approximately 22.3% of these farmers acquired their tomato farms through purchase, whereas those who rented the farms maintained their tenancy for a period of time. An evaluation of the respondents during data collection indicated that farmers who actually borrowed (30.0%) their farms were divided into two groups: those who cultivated other crops like oil palm and cocoa on their farms as a method of repaying the leasehold, and those who compensated the original owner by giving a certain percentage of their produce for using the farm. The study also revealed that 55.3% of the respondents, own farms between 0.5 and 1 acre, while 44.7% possess farms ranging from 1.5 to 2 acres. This is indicative of the fact that the operations of the tomato farmers interviewed in the study area are within the small scale. In respect to the labour hiring on the farms, the majority of farmers that indicated they employ between 1 and 3 subordinate workers to help them on their tomato farms, accounted for approximately 55.0% of the respondents. Meanwhile, 37.6% of the respondents reported having between 4 and 6 farm workers assisting them. Just 4.7% and 2.7% of the respondents stated that they hire 7 to 9 and 10 or more workers on their tomato farms, respectively. The income distribution among the respondents that may also reflect their perception of status revealed that majority of farmers (61.7%) reported having a low-income level, which could influence their willingness to adopt sustainable agricultural practices for enhanced tomato production. Furthermore, only 21.3% of the respondents indicated a medium-income level, while 17.0% reported having a high-income level. The low-income level was ₦0 - ₦1,000,000; medium-income level was ₦1,000,001 - ₦2,000,000 and; high-income level was above ₦2,000,000. The distribution of respondents regarding their access to credit and the sources of that credit was found that a significant majority (58.0%) of the respondents did not have access to credit, while approximately 42.0% reported having access. Additionally, among those with access to credit, around 92.8% and 4.8% identified cooperative societies and money lenders as their credit sources, respectively. Only 2.4% of respondents with credit access opted to obtain funds from family and friends. The table also showed the respondents' distribution by

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access to extension agents. The vast majority of respondents (59.3%) said they do not have access to extension agents, whereas around 40.7% said they do. In addition, some 94.3% and 4.1% of respondents who said they had access to extension agents said they did so once a year and three times a year, respectively. Having access to extension agents twice a year was cited by just 1.6% of the respondents. The distribution of respondents by planting season revealed that the majority of farmers (82.7%) acknowledged that they prefer to grow tomatoes during the wet season, while 16.7% of respondents said they prefer to plant tomatoes during both the dry and wet seasons. Since they were mostly using open-field, unirrigated planting methods, it appears that no tomato grower plants tomatoes during the dry season.

Table 3 Socio-economic Characteristics of Respondents

Characteristics	Frequency	Percentage	Mean
Age Range (Years)			40.97 years
< 30	53	17.7	
30 – 39	81	27.0	
40 – 49	100	33.3	
50 – 59	45	15.0	
60 and above	45	7.0	
Sex of the Respondents			
Male	212	70.7	
Female	88	29.3	
Marital Status			
Single	18	6.0	
Married	272	90.7	
Divorced	4	1.3	
Widowed	5	1.7	
Widower	1	0.3	
Educational Attainment			
No Formal Education	22	7.3	
Primary Education	71	23.7	
Secondary Education	119	39.7	
Tertiary Education	88	29.3	
Family Size			4.497
1-3	64	21.3	
4-6	213	71.0	
7-9	23	7.4	
Tenancy Status			
Inherited	120	40.0	
Rented	23	7.7	
Purchased	67	22.3	
Leasehold	90	30.0	
Farm Size (acre)			1.45 acres
0.5 – 1	166	55.3	
1.5 – 2	134	44.7	

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Number of Farm Workers		
1 – 3	165	55.0
4 – 6	113	37.6
7 – 9	14	4.7
10 above	8	2.7
Level of Income		
Low	185	61.7
Medium	64	21.3
High	51	17.0
Access to Credit Facilities		
Have Access	126	42
No Access	174	58
Credit Source (If Access)		
Cooperative Society	117	92.8
Money Lender	6	4.8
Family and Friends	3	2.4
Access to Extension Agents		
Have Access	122	40.7
No Access	178	59.3
How often (If Access)		
Once in a year	115	94.3
Twice in a year	2	1.6
Thrice in a year	5	4.1
Planting Periods		
Dry Season	2	0.7
Wet Season	248	82.7
All Season	50	16.7

Source: Computed from field survey, 2024.

3.2. Distribution of Respondents Based on Improved Varieties Available and Cultivated by the Farmers

In Table 4, the distribution of respondents based on tomato varieties available and preferred in the study area is presented. Among the numerous tomato hybrids available in southwest Nigeria, fourteen varieties were identified, with Platinum F1 being the most preferred at 24.2%, known for being the highest yielding hybrid seed in Nigeria (Afrimash, 2024). Following closely was Padma F1 at 22.3%, both of which are from the same brand (East West Seed International) and exhibit a determinate growth habit. Sayo F1, from the Harvest Field brand, was ranked third, while Diva F1 and Cobra F1, both from the Technisem brand, were ranked fourth and fifth respectively. Maxim F1, produced by Continental Seed, was at the bottom of the list with only 0.5%, indicating that it was not well recognized and preferred among the farmers in the study area; while Danny F1 and Rambo F1 were placed 12th.

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Table 4: Distribution of Respondents Based on Improved Varieties Available and Cultivated by the Farmers

		Farm 1		Farm 2		Farm 3		Farm 4		Total		
Tomato Hybrid	**Brand**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**Rank**
Platinum F1	East West Seed	63	21.0	77	43.3	0	0.0	0	0.0	140	24.2	1
Padma F1	East West Seed	55	18.3	34	19.1	40	72.7	0	0.0	129	22.3	2
Sayo F1	Harvest Field	41	13.7	15	8.4	0	0.0	12	26.7	68	11.8	3
Diva F1	East West Seed	25	8.3	10	5.6	0	0.0	28	62.2	63	10.9	4
Cobra F1	Technisem	26	8.7	29	16.3	5	9.1	0	0.0	60	10.4	5
Anna F1	Seminis	34	11.3	0	0.0	0	0.0	0	0.0	34	5.9	6
Mona F1	Technisem	10	3.3	8	4.5	4	7.3	0	0.0	22	3.8	7
Tylka F1	Syngenta	17	5.7	0	0.0	0	0.0	0	0.0	17	2.9	8
Kilele F1	Syngenta	8	2.7	0	0.0	1	1.8	5	11.1	14	2.4	9
Commando F1	Continental Seed	9	3.0	0	0.0	0	0.0	0	0.0	9	1.6	10
Chibili F1	Syngenta	4	1.3	0	0.0	5	9.1	0	0.0	9	1.6	10
Rambo F1	Royal Seed	0	0	5	2.8	0	0.0	0	0.0	5	0.9	12
Danny F1	Continental Seed	5	1.7	0	0.0	0	0.0	0	0.0	5	0.9	12
Maxim F1	Continental Seed	3	1.0	0	0.0	0	0.0	0	0.0	3	0.5	14

Source: Computed from field survey, 2024. Multiple response exists

3.3 Perception of the Respondents on the Attributes of Tomato Varieties

The respondents' perceptions of the attributes of improved tomato varieties (Table 22) were ranked using a three-point scale to evaluate the farmers' feedback. These ratings, which are 5, 4, and 3, correspond to "always," "sometimes," and "never," respectively. Overall, around 12 distinct attributes were identified. The findings revealed that tomato size (2.89) is the most significant feature among the farmers in the area, making it the top-ranked attribute and indicating its importance to them. Following closely were colour (2.82) and sweetness (2.78) of the improved tomato varieties, which were ranked 2nd and 3rd, respectively. Attributes such as early maturity, high market demand, and resistance to pests and diseases were placed in the 4th, 5th, and 6th positions. Additionally, seed brand, water content, and growth habit were ranked 9th, 10th, and 12th, showing that farmers do not prioritize these factors when selecting a variety. Instead, their focus is on maximizing profits by choosing attributes that increase market demand among buyers and consumers. The shape of the tomato is of little significance, as it was rated last among the other characteristics, indicating that attributes like being oval, round, oblong, or blocky do not matter to the farmers unless they enhance market demand for profit maximization.

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Table 5: Distribution of the Respondents by Perception on the Attributes of Tomato

	Degree of Preference				
Attributes	**Always**	**Sometimes**	**Never**	**Mean**	**Rank**
Size	266	34	0	2.89	1st
Colour	245	55	0	2.82	2nd
Sweetness	234	66	0	2.78	3rd
Early maturity	221	79	0	2.74	4th
High market demand	206	94	0	2.69	5th
Resistant to Pest and Disease	198	102	0	2.66	6th
High Yield	165	135	0	2.55	7th
Thick Flesh	136	164	0	2.45	8th
Seed brand	71	227	2	2.23	9th
Water content	68	200	32	2.12	10th
Shape	95	101	104	1.97	11th
Growth habit	16	189	95	1.74	12th
Total					

Source: Computed from field survey, 2024.

3.4 Sustainable Agricultural Practices (SAP) Adopted by the Farmers

Table 6 presents statements regarding sustainable agricultural practices, organized under ten SAP indicators according (Unilever Guide, 2004; Donkoh, 2019), to show the percentage of respondents who are both aware of and actively implement these measures on their farms.

Soil Health: The findings showed that a majority of farmers, 81.7%, were aware of practices such as crop rotation and the planting of cover crops to restore soil nutrients, but only 50.0% actually implemented these sustainable practices, which involve allowing previously cultivated land for tomato production to rest or planting cover crops to enrich the soil. Additionally, 71.7% of the participants acknowledged their awareness of measures to enhance soil organic matter, while 59.0% reported that they actively prohibited the burning of organic materials on their farms, opting instead to till them into the soil for decomposition to promote nutrient restoration.

Soil Loss: The sustainable agricultural practices aimed at preventing soil erosion include avoiding farming on steep or sloped land; encouraging the construction of contour banks to reduce run-off; leaving light soils rough or covered after tilling; and advocating minimum tillage techniques to mitigate erosion and maintain soil structure. The study found that just 3.0% of the farmers adhered to the sustainable practice of avoiding cultivation on sloped fields, indicating that the majority of farmers in the area prioritized utilizing available land for production over considering land structure. Although 66.7% of respondents were aware of the practice of leaving light soil rough after tilling, only 48.0% implemented this sustainable method; similarly, only 36.0% adopted minimum tillage practices. This suggests that, despite farmers' educational levels and awareness, there is still a significant gap in the implementation of the appropriate measures.

Nutrients: Properly maintaining nutrients involves utilizing fertilizer correctly and understanding the most suitable fertilizer to match the soil's nutrient content. The findings of this study indicate that the participants were both small-scale and medium-scale farmers, and it was noted that only 1.0% of these farmers made their choices based on soil testing, despite a 44.0% awareness of this practice, likely due to prior exposure or education. Farmers in the area still

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struggle to comprehend the use of calibration tools for fertilizer application and establishing a nutrient budget, which leads to a lack of nutrient sustainability among the farmers surveyed in this area

Integrated Pest Management (IPM): One of the sustainable agricultural practices included in integrated pest management is the choice of tomato varieties that are disease-tolerant, resistant, and more vigorous. A significant percentage of respondents (47.7%) made an effort to carefully select tomato seeds for cultivation rather than randomly choosing seeds from friends or unreliable sources. A larger proportion of the surveyed individuals implemented the practices associated with the IPM indicator, with 62.0% preparing their seed beds early to allow for weed germination and subsequent removal. Meanwhile, 39.7% employed mechanical or manual methods to manage weeds, and 34.0% selected herbicides based on factors such as weed species, timing, soil type, weather, and crop health. Additionally, 25.3% reported using targeted pesticides only, when necessary, on their farms. This indicates that a significant number of respondents embraced integrated pest management as a sustainable practice in their tomato farming.

Biodiversity: Four sustainable agricultural measures were identified under biodiversity indicator and the study revealed that studying activities on the farm maybe it negatively or positively affects the environment and carrying out environmental impact assessment before any extension of the tomato growing season were not actually practiced by the tomato farmers in the study area; however, 50.0% of the respondents said that they were aware of the integrated pest management (IPM) principles and 62.0% of the farmers engaged in farming practices that improves the habitat.

Value of the Product: The production value of tomatoes is a crucial aspect of sustainable agriculture, which involves choosing varieties that yield well, determining the appropriate time for fruit ripening prior to harvest, and enabling extension agents to provide updated and effective technical guidance to maximize crop results. The findings indicated that 95.0% of respondents indeed establish a timeline for the ripening of fruits before they are harvested, while 65.0% reported that they carefully select varieties that can deliver optimal yields for the best production and profitability. Only 23.7% acknowledged that they received comprehensive information and technical assistance from extension agents.

Energy: Many sustainable agricultural practices related to energy, such as the efficient use of water, safe waste disposal through recycling, reducing, and reusing, and the timely maintenance of farm equipment, were not widely adopted. This can be attributed to the fact that the respondents were small and medium-sized farmers, and minimizing energy use was not a common practice among them. However, this practice might be more evident among large-scale farmers who utilize greenhouses for their production. In the meantime, just 5.0% of those surveyed reported their efforts to reduce fuel consumption for powering engines, particularly pumping machines used to extract water from streams and rivers, by planting in the wet season, thereby saving costs and reducing carbon emissions as part of sustainable practices. On the other hand, 7.7% of the respondents acknowledged their careful choice of equipment, specifically the use of tractors during land preparation, to prevent soil compaction.

Water Conservation: 63.3% of the respondents indicated that they are aware of the need to ensure that the quantity of water used does not surpass the soil's water holding capacity. This highlights that during the peak rainy season, they consistently take measures to prevent water logging on their farms, thereby safeguarding the soil's water holding capacity, while 33.3% of the participants actively implemented this sustainable practice. None of the respondents reported

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minimizing water wastage due to leaks in irrigation systems, as their water source is solely derived from streams, rivers, and brooks, rather than from advanced irrigation equipment. Similarly, no respondents claimed to utilize dedicated water tanks for filling and cleaning spraying equipment because they lack awareness of such practices as sustainable approaches. Furthermore, 8.0% of the respondents acknowledged their awareness of the sustainability measure concerning the monitoring of irrigation water quality, which may be attributed to their higher education levels or exposure; however, only 1.7% mentioned that such monitoring of the river or stream water quality used for agriculture is practiced during specific periods.

Social and Human Capital: The sustainability initiatives focused on social and human capital highlighted the importance of communication among fellow farmers, nurturing positive relationships with authorities and local communities, and promoting engagement with tomato buyers and consumers, with 67.7%, 65.7%, and 76.7% of respondents indicating their participation in these initiatives, respectively. The results of engaging in this sustainable indicator indicated that it was well-accepted by the farmers, highlighting the extent of collaboration among tomato farmers, buyers, and consumers, which ultimately contributes to sustainable production.

Local Economy: Local economy focuses on encouraging the employment of local farm workers, with 47.7% of respondents stating they hire labour from the nearby area rather than seeking workers from other regions. Furthermore, 76.7% of respondents indicated that essential inputs for tomato production, such as sprayers, seeds, baskets, stakes/ropes, herbicides, and insecticides, were procured locally, highlighting the sustainability of tomato farming in the area. Additionally, 42.7% of the respondents reported collaborating with local communities to foster the development of other agribusinesses, underpinning the findings in Table 9 which show that tomato farmers often engage in other crop farming.

Table 6. Distribution of Respondents Based on Awareness and Adoption of Sustainable Agricultural Measures

SAP Indicators	Sustainable Agricultural Practices	Awareness	%	Adoption	%
Soil Health	Improving soil organic matter	215	71.7	177	59.0
	Practicing crop rotation with cover crops	245	81.7	150	50.0
	Conducting soil testing for organic matter	100	33.3	67	22.3
	Liming the soil if it is too acidic	28	9.3	3	1.0
	Minimize number of times machines and heavy equipment passed the field to avoid soil compaction	30	10	6	2.0
	Regular testing of the soil for presence of soil borne diseases e.g. Root knot nematode	55	18.3	45	15.0
	Use of organic fertilizer	120	40	99	33.0
	Mean	**113.3**	**37.8**	**78.1**	**26.0**
Soil Loss	Avoid cultivating steeply sloping fields	145	48.3	9	3.0
	Encourage construction of contour banks to	145	48.3	120	40.0

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	arrest run-off				
	Covering of light soils or leaving it rough after ploughing	200	66.7	144	48.0
	Promoting minimum tillage systems to help prevent erosion and to preserve soil structure	174	58	108	36.0
	Mean	**166.0**	**55.3**	**95.3**	**31.8**
Nutrients	Choosing fertilizers based on soil test	132	44	3	1.0
	Ensure fertilizer application equipment is regularly calibrated and maintained	3	1.0	0	0.0
	Establishing nutrients budget to fine-tune fertilizer rate and methods of application	5	1.7	0	0.0
	Mean	**46.7**	**15.6**	**1.0**	**0.3**
Integrated Pest Management	Select disease tolerant, resistant and more vigorous tomato varieties	222	74.0	143	47.7
	Use of cultural methods of pest and weed control whenever possible	89	29.7	54	18.0
	Use of target specific pesticides if necessary	92	30.7	76	25.3
	Use mechanical/manual weed control	153	51.0	119	39.7
	Prepare seed bed as early as possible to germinate weeds to be removed	276	92.0	186	62.0
	Herbicide choice should be made on basis of weed species, timing, soil type, weather conditions, crop health.	234	78.0	102	34.0
	Mean	**177.7**	**59.2**	**113.3**	**37.8**
Biodiversity	Studying activities on the farm maybe it negatively or positively affects the environment	95	31.7	9	3.0
	Carrying out environmental impact assessment before any extension of the tomato growing season	57	19.0	6	2.0
	Adhere to integrated pest management (IPM) principles	150	50.0	105	35.0
	Farming activities improve the habitat	192	64.0	186	62.0
	Mean	**123.5**	**41.2**	**76.5**	**25.5**
Value of the Product	Selecting varieties for the ability to produce good yields	198	66.0	195	65.0
	Stipulate to time of ripening before harvesting	294	98.0	285	95.0
	Allowing Extensionist providing good up-to-date technical advice to get the best from the crops	190	63.3	71	23.7
	Mean	**227.3**	**75.8**	**183.7**	**61.2**
Energy	Minimize the use of fossil fuel for power generation	55	18.3	15	5.0

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	Careful selection of equipment	34	11.3	23	7.7
	Ensure proper and timely maintenance of equipment	22	7.3	14	4.7
	Minimize power wastage	10	3.3	3	1.0
	Test alternative practices for reducing, re-using, recycling and/or safe disposal of waste	51	17.0	0	0.0
	Improve irrigation system water use efficiency through the use of drip system	18	6.0	9	3.0
	Mean	**31.7**	**10.5**	**10.7**	**3.6**
Water Conservation	Ensure the amount of water applied does not exceed the water holding capacity of the soil	190	63.3	100	33.3
	Minimize water wastage via leaks by maintaining irrigation equipment and system	15	5.0	0	0.0
	Monitor the quality of irrigation water applied	24	8.0	5	1.7
	Keep irrigation records and measure water consumption	11	3.7	8	2.7
	Use dedicated water tanks for filling and cleaning spray equipment	0	0.0	0	0.0
	Mean	**48.0**	**16.0**	**22.6**	**7.5**
Social and Human Capital	Establish communication links with other farmers	252	84.0	203	67.7
	Maintaining good relationship with the authority and local communities	233	77.7	197	65.7
	Facilitate interaction with the product buyers and consumers	245	81.7	230	76.7
	Mean	**243.3**	**81.1**	**210.0**	**70.0**
Local Economy	Promote employment of local workforce on the farm	145	48.3	143	47.7
	Purchase of basic inputs from the local areas	236	78.7	230	76.7
	Working with the local communities to develop other agribusinesses	145	48.3	128	42.7
	Mean	**175.3**	**58.4**	**167.0**	**55.7**

Source: Computed from field survey, 2024

3.5 Determination of Factors Influencing the Number of Varieties Cultivated and Number of SAPs adopted by the Farmers

The overall model demonstrated a good fit, with a log-likelihood of -387.84 and a highly significant likelihood ratio chi-square statistic (LR chi2 = 114.74, $p < 0.01$). The pseudo-R-squared value of 0.1289 indicates that while the model explains a substantial proportion of the variation in the number of varieties cultivated, additional unobserved factors may also contribute.

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Table 7 presented the outcomes of the Poisson Regression model, which included the coefficients and the incidence rate ratio (IRR), along with their significance levels.

Out of the fourteen variables analysed, eight demonstrated a positive correlation with the number of varieties cultivated, while the remaining six negatively impacted this aspect. Among the variables, nine were found to be statistically significant: age of the farmers, level of education, experience in tomato farming, farm workers, income level, access to credit, access to extension agents, planting period and soil quality. Only the gender of the farmers, marital status, family size, tenancy status and farm size were not statistically significant. The findings indicated that the gender and age of the farmers had a lower likelihood of affecting the number of varieties cultivated, with reductions of approximately 2.87% and 0.03%, respectively. These findings suggest that age-related risk aversion or traditional farming practices may limit diversification efforts. Similarly, tenancy status and access to extension agents were about 0.27% and 47.89% less likely to influence the number of varieties cultivated. This potentially reflects barriers associated with land tenure insecurity and inadequate advisory support.

Additionally, farmers' education, marital status, family size, farm workers and access to credit revealed a positive relationship with the number of varieties cultivated and respectively depicting 1.005, 1.015, 1.003, 1.014 and 1.895 times higher in cultivating various improved varieties than those that were not educated, those that were not married, those that have low number of family size, those that have low number of farm workers and those that have no access to credit. The experience of farmers and their income levels are statistically important and are both significant at 1% probability level. Nevertheless, the impact of farming experience on the number of varieties grown was minimal, leading to reductions of 0.53%. This depicted being into tomato farming for years does not dictate the number of improved varieties to be cultivated but rather centre towards increase in yield for profit maximization. Conversely, an increase in income greatly enhanced the probability of selecting a larger number of varieties to cultivate by 1.3976 times higher incidence rate than the farmers that have low income. This suggests that financially stable farmers have greater flexibility in adopting diverse crops, potentially as a risk management strategy or to optimize returns.

The planting period is also statistically significant at the 5% level, and it positively influences the number of varieties grown, resulting in a 39.47% increase in the likelihood of choosing more varieties for cultivation. Soil quality was another crucial factor, negatively affecting variety selection by 85.38% ($p < 0.05$). This result suggests that farmers cultivating in higher-quality soils may rely on specific, high-yielding varieties rather than diversifying. Conversely, farmers operating in less fertile soils might experiment with multiple varieties to mitigate risk and enhance resilience against soil-related constraints.

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Table 7 Result of Poisson Regression on the Factors Influencing the Number of Varieties Cultivated by the Farmers

Variable	Coef.	Std. Err.	z	P>|z|	IRR
Sex	-0.0291	0.1025	-0.28	0.777	0.9713
Age	-0.0003**	0.0001	-2.09	0.038	0.9997
Farmers' Education	0.0052*	0.0028	1.89	0.059	1.0052
Marital Status	0.0154	0.1231	0.13	0.900	1.0155
Family Size	0.0033	0.0394	0.08	0.934	1.0033
Experience	-0.0054***	0.0013	-4.18	0.000	0.9947
Farm Workers	0.0142**	0.0066	2.15	0.030	1.0143
Tenancy Status	-0.0028	0.0433	-0.06	0.949	0.9973
Income Status	0.3347***	0.0728	4.6	0.000	1.3976
Access to Credit	0.6391**	0.3118	2.05	0.041	1.8947
Access to Extension Agents	-0.6519**	0.3292	-1.98	0.046	0.5211
Period of Planting	0.3327**	0.1364	2.44	0.015	1.3947
Soil Quality	-0.1581**	0.0794	-1.99	0.047	0.8538
Farm Size	0.0348	0.0447	0.78	0.437	1.0354
_cons	-0.5415	0.5523	-0.98	0.327	0.5819
Log likelihood	-387.84245				
LR chi2(14)	114.74				
Prob> chi2	0.0000				
Pseudo R^2	0.1289				

Note: *** = significant at a 1% level; ** = significant at a 5% level; * = significant at a 10% level

Source: Computed from field survey, 2024

3.6 Poisson Regression on the Factors Influencing the Number of Sustainable Agricultural Practices Adopted by the Farmers

A log-likelihood of -333.69 and a highly significant likelihood ratio chi-square value (LR chi2 = 58.58, $p < 0.01$) indicated that the model matched demonstrated a good fit. The pseudo-R-squared value of 0.0807 suggests that although the model accounts for a significant amount of the variance in the number of sustainable agriculture practices implemented, there may be other unobserved factors at play. The Poisson Regression model's results, including the coefficients, incidence rate ratio (IRR) and their significance levels, were shown in Table 8. Out of the fourteen variables analysed, eight demonstrated a positive correlation with the number of SAP adopted, while the remaining six negatively impacted this aspect. Among the variables, eleven were found to be statistically significant but four of the significant variables which are gender of the farmer, tenancy status, access to extension agents and soil quality were found to have a negative relationship with the number of SAP adopted, indicating that they had a lower likelihood of affecting number of SAP adopted in the study area; while factors such as farmers' education, family size, farm workers, income status, access to credit, access to extension agents, period of planting and farm size have positive correlation with the number of SAP adopted depicting that an increase in one unit of these factors will likely influence the number of SAP adopted in the study area. The number of SAP implemented was positively correlated with farmers' marriage status, but the other three variables—farmers' age, marital status, and

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agricultural experience—were not statistically significant. The results showed that, with decreases of around 2.78% and 0.73%, respectively, the gender and tenancy status had a lesser chance of influencing the number of SAP implemented. These results imply that the research area's adoption of SAP may be constrained by tenancy and gender barriers among farmers. Similarly, the number of SAP adopted was less likely to be influenced by soil quality and farmers' experience, which were about 3.47% and 1.72% less likely, respectively. Farmers' age and access to extension agents also had a negative relationship with the number of SAP adopted, with the incidence rates being 1.001 and 1.019 times higher than those who were not of active age and those who did not have access to extension agents, respectively. Furthermore, farmers' education, family size, access to credit, and planting period all showed a positive correlation with the number of SAP adopted, increasing the likelihood of selecting multiple sustainable agricultural practices by approximately 1.11%, 2.94%, 1.87%, and 6.03%, respectively. Farm workers ($P < 0.01$), income status ($P < 0.01$), farm size ($P < 0.05$), and marital status also increased the incidence rate by 1.008, 1.431, 1.130, and 1.008 times higher in adopting various SAP compared to those with low income, few farm workers, insufficient use of farm size, and single status.

Table 8 Result of Poisson Regression on the Factors Influencing the Number of Sustainable Agricultural Practices Adopted by the Farmers

Variable	Coef.	Std. Err.	z	P>|z|	IRR
Sex	-0.0291**	0.013	-2.23	0.026	0.9722
Age	-0.0003	0.0109	-0.08	0.935	1.0009
Farmers' Education	0.0052**	0.0024	2.19	0.026	0.9889
Marital Status	0.0154	0.1507	0.05	0.959	1.0077
Family Size	0.0033**	0.0016	2.01	0.044	0.9706
Experience	-0.0054	0.0547	-0.31	0.755	0.9828
Farm Workers	0.0142***	0.0027	5.22	0.000	1.0079
Tenancy Status	-0.0028*	0.0016	-1.74	0.085	0.9927
Income Status	0.3347***	0.0768	4.36	0.000	1.4305
Access to Credit	0.6391**	0.3043	2.10	0.035	0.9813
Access to Extension Agents	-0.6519**	0.3196	-2.04	0.041	1.0189
Period of Planting	0.3327**	0.1672	1.99	0.047	0.9397
Soil Quality	-0.1581***	0.0299	-5.28	0.000	0.9653
Farm Size	0.0348**	0.0577	2.39	0.017	1.1300
_cons	-0.5415	0.5906	-0.18	0.86	0.8891
Log likelihood	-333.68986				
LR chi2(14)	58.58				
Prob> chi2	0.0000				
Pseudo R^2	0.0807				

Note: *** = significant at a 1% level; ** = significant at a 5% level; * = significant at a 10% level

Source: Computed from field survey, 2024

4. CONCLUSION

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In conclusion, among tomato farmers in southwest Nigeria, the number of improved tomato hybrids cultivated was likely to be influenced by the farmers' education, marital status, family size, farm workers, period of planting, income status, farm size and availability of credit; while the number of varieties cultivated was less likely to be influenced by the farmers' age, gender, tenancy status, farmers' experience and access to extension agents. Other factors that were statistically significant to the number of improved tomato hybrids cultivated included soil quality, planting season, income level, and farming experience. In the same vein, eleven of the variables were found to be statistically significant, but four of the significant variables—soil quality, tenancy status, gender of the farmer, and access to extension agents—had a negative relationship with the number of SAP adopted, meaning they were less likely to have an impact on the number of SAP adopted in the study area. In contrast, factors like farmers' education, family size, income status, access to credit, availability of extension agents, period of planning, and farm size had a positive correlation with the number of SAP adopted, suggesting that an increase of one unit of these factors would likely affect the number of SAP adopted in the study area.

5. RECOMMENDATION

According to the findings of this study, recommendations were made on the note that farmers should be encouraged to improve on the adoption of sustainable agricultural practices by increasing their level of education through access to extension agents as these factors were quite important and also increase the number of varieties cultivated to positively influence the productivity of the farmers. The Osun State and Ekiti State tomato farmers associations and cooperatives both in the state and in the local levels should see towards forums with researchers, NGOs, Extension agents, Input dealers on newly improved tomato varieties and sustainable agricultural measures as these will apprise them and pragmatically increase their efforts to improve tomato production yearly.

REFERENCES

Abolusoro P. F., Ogunjimi S. I., and Abulusoro S. A. (2014). Farmers' Perception on the Strategies for Increasing Tomato Production in Kabba-Bunu Local Government Area of Kogi state, Nigeria. *Agrosearch (2014) Volume 14(2):144-153* http://dx.doi.org/10.4314/agrosh.v14i2.5

Adegboye A., Omotesho K. And Akinrinde A. (2021). Assessment of Variety Preference among Tomato Farmers in Oyo State, Nigeria. Journal of Applied Life Sciences and Environment Vol. LIV, No. 1 (185) / 2021: 25-41. DOI: 10.46909/journalalse-2021-003.

Afolami C. A. and Ayinde I. A. (2001). Economic of Tomato Production in Yewa North Local Government Area of Ogun State, Nigeria. Journal of Tropical Agriculture, Food, Environment and Extension. Volume 2, number 1, Janaury, 2001. Pp 17 -23.

Afrimash (2024). Platinum F1 Tomato Seed (East West Seed | 10g). https://afrimash.com/shop/offer/office-pickup/crop-office-pickup/platinum-f1-tomato-seed-east-west-seed-10g

Akinbola A. E., Borokini E. A., Ijigbade J. O., Ilesanmi J. O. (2023). Economic Analysis of Tomato (Solanum lycopersicum) Marketing in Ondo State, Nigeria. Asian Journal of

Agricultural and Horticultural Research Volume 10, Issue 4, Page 383-393, 2023; Article no. AJAHR.105999 ISSN: 2581-4478

Baba B. A., Umar J., and Ibrahim A. (2008). Production Efficiency in Small Scale Irrigated Tomato Production in Bade Local Government Area of Yobe State, Nigeria. Global Journal of Agricultural Science. Vol. 7 No. 2 2008: 135 - 139

Borisade et al. (2017) The tomato leafminer (Tuta absoluta) (Lepidoptera: Gelechiidae) attack in Nigeria: effect of climate change on over-sighted pest or agro-bioterrorism. Vol 9(8) pp.163-171

Cameron, A.C., and Trivedi, P.K. (1998) Regression Analysis of Count Data. Cambridge University Press, Cambridge, UK. https://doi.org/10.1017/CBO9780511814365

Donkoh S. A. (2019). Agricultural Input Credit and The Adoption of Sustainable Agricultural Practices (SAPs) In Selected Sub-Saharan Africa (SSA) Countries: An Endogenous Poisson Regression Approach. UDS International Journal of Development [UDSIJD] ISSN: 2026-5336 Volume 6 No. 3, 2019 http://www.udsijd.org

Dossou, J., Soule, I., & Montcho, M. (2007). Evaluation des caracteristiques physico-chimiques et sensorielles de la puree de tomate locale produite a petite echelle au Benin [Evaluation of the physicochemical and sensory attributes of locally produced small-scale tomato puree in Benin]. Tropicultura, 25, 119–125.

Gabriel I., Olajuwon F., and Michael B., (2021). Smallholder Farmers' Perception on Tomato (*Solanum lycopercicum*) Seedling Technologies in the Northwest Zone of Nigeria. International Journal of Agricultural Extension. Int. J. Agr. Ext. 09 (01) 2021. 79-89. DOI: 10.33687/ijae.009.01.3545

Hellyer N. E., Fraser I., Haddock-Fraser J. (2012). Food choice, health information and functional ingredients: an experimental auction employing bread. Food Policy 37:232–245

Idoko Nicholas (2023). Introducing Sustainable Farming in Nigeria. *Disciple in Nigeria.* https://disciplines.ng/sustainable-farming-in-nigeria/

Iwuchukwu J. C., Nwobodo C. E., and Ugwuja E. I. (2017). Practices of Farmers in Production and Marketing of Tomato in Nsukka Local Government Area of Enugu State, Nigeria. Sustainability, Agri, Food and Environmental Research, (ISSN: 0719-3726), (2017) 5(4): 22-41 http://dx.doi.org/10.7770/safer-V5N4-art1306

National Population Commission, (2006) Census. Federal Republic of Nigeria, December, 2006.

Ndor E., Obadiah A. A., Nasir U. I. (2020). A review of sustainable agricultural development and economic growth: Nigerian experience. World Journal of Advanced Research and Reviews, 2020, 08(01), 019–025. Article DOI: https://doi.org/10.30574/wjarr.2020.8.1.0353

Nigeria Governors' Forum (2015). DFID-Mapping of Tomato Clusters in Northern Nigeria (GEMS4). https://ngfrepository.org.ng:8443/jspui/handle/123456789/2828

Ogunleke, A.O., Baiyegunhi, L.J.S. (2019). Effect of households' dietary knowledge on local (ofada) rice consumption in southwest Nigeria. *J. Ethn. Food* **6**, 24 (2019). https://doi.org/10.1186/s42779-019-0023-5

Onifade, T.B., Aregbesola, O.A., Ige, M.T. & Ajayi, A.O. (2013). Some physical properties and thin layer drying characteristics of local varieties of tomatoes (Lycopersicon lycopersicum). Agric.Biol.J.N.Americ., 4(3): 275- 279, DOI: 10.5251/abjna.2013.4.3.275.279

Oyedokun A. O., Yesufu O. A., Ayorinde V. A., and Ogunmola O. O. (2020). Economic Analysis of Tomato Marketing in Ile Ife, Osun State, Nigeria. Journal of Agriculture and Verterinary Sciences. Volume 12, number 1, 2020. ISSN: 2277 – 0062.

Vol. 10, No. 02; 2025

ISSN: 2456-8643

Price Waterhouse Coopers (PWC) Limited, (2018). X-raying the Nigerian tomato industry: Focus on reducing tomato wastage. https://www.pwc.com/ng/en/assets/pdf/nigeria-tomato-industry (Accessed June 26, 2024).

Sahel Research 2017 - The Tomato Value Chain in Nigeria https://sahelcapital.com/wp-content/uploads/2021/07/Sahel-Newsletter-Volume-15_Tomato.pdf

Siedenburg R. J. (2022). Local Knowledge and Natural Resource Management in a Peasant Farming Community Facing Rapid Change: A Critical Examination. [PDF]

Taofeeq, A. A., and Judith, B. S., (2016). Ordered Probit Analysis of Factors Influencing Farmers' Contributions to Climate Change Adaptation Decisions in Southwest, Nigeria. *Trends in Agricultural Economics*, 10(1), 1 – 11. https://doi.org/10.3923/tae.2017.1.11

Unilever Guide, (2004). Sustainable Tomatoes – Good Agricultural Practice Guidelines. https://www.unilever.com/files/origin/136709a3f63425c7a6a95ae1d21a5008c0d69211.pdf/