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Influence of Socio-Economic Characteristics of Oil Palm Farmers on Access to Climate Change Information in Delta State

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Abstract. This study examined the influence of socio-economic characteristics of oil palm farmers on access to climate change information in Delta State, Nigeria. Data were collected using cross-sectional survey data from 165 respondents selected through appropriate sampling procedures. The study was conducted with the objectives of describing the socio-economic characteristics of oil palm farmers and identifying their awareness, access to, and preference for various sources of climate change information. Descriptive statistics were used to analyze the data. The socio-economic profile of the respondents revealed that a substantial proportion of farmers were within the middle-aged category, with a mean age of 45.45 years, and majority (91.5%) were married. Females constituted 52.1% of the respondents, indicating strong female participation in oil palm farming. In terms of education, 47.3% had secondary school education, while only 10.3% had no formal education. The respondents had an average household size of 6.67 persons, mean farming experience of 14.40 years, and mean oil palm farming experience of 18.52 years. The average farm size was 5.56 hectares, and a majority were members of farmer associations. Findings on climate change information revealed that awareness levels were generally high, with extension agents, the internet, radio, and mobile phones ranking prominently in awareness and preference. However, actual access to formal institutional sources such as meteorological agencies and scientific journals remained low. Informal sources including fellow farmers, family members, friends, and neighbours played a dominant role in information dissemination. The study concluded that while oil palm farmers in Delta State demonstrate moderate awareness and diverse information access channels, reliance on informal networks persists due to limited institutional outreach. It is therefore recommended that extension services be strengthened, digital and mobile-based advisory platforms be expanded, and socio-economic factors such as education, gender, and association membership be strategically leveraged to improve equitable access to timely and reliable climate change information among oil palm farmers in Delta State.

Keywords: Oil palm, Climate change, Delta State, Access, Information

1. Introduction

Agriculture remains an important sector of Nigeria’s economy, providing livelihoods for the ever-growing population. However, the sector is highly vulnerable to climate variability due to its dependence on rain-fed systems and the predominance of smallholder farmers with limited resources. Climate change has evolved rapidly, manifesting in erratic rainfall, flooding, prolonged droughts, and temperature fluctuations. These climatic shifts threaten agricultural productivity and rural livelihoods. Research has shown that the Nigerian agricultural sector is particularly vulnerable because it is dominated by poor, undernourished, uneducated farmers with low technological capacity and inadequate adaptive resources

Although farmers perceive climate change and attempt to adapt through local practices (Adepoju & Oyedepo, 2024), their ability to respond effectively depends largely on access to reliable climate information. Danso-Abbeam et al. (2021) observed that even farmers who adopt adaptation techniques remain vulnerable, suggesting that adaptation strategies must be informed by accurate and timely information. Climate change information such as seasonal forecasts, early warning systems, and agro-advisoriesenables farmers to make strategic decisions that minimize risks and optimize production.

However, access to climate information varies among farmers. Socio-economic characteristics such as age, education level, farm size, income, farming experience, membership in cooperatives, access to extension services, and ownership of communication devices significantly influence the ability to obtain and utilize climate information. Haider (2023) emphasized that understanding the determinants of farmers' adaptation decisions is crucial for designing effective policies. Socio-economic factors shape farmers' exposure to information channels, their comprehension of technical advisories, and their willingness to adopt recommended practices.

In oil palm-producing regions such as Delta State, socio-economic disparities may influence access to agro-climatic information. Oil palm (Elaeis guineensis) is a vital food and cash crop in Nigeria, historically central to trade and rural economies. Its major product, palm oil, is rich in carotene and serves both nutritional and industrial purposes. The crop remains economically significant across the tropics and plays a major role in income generation for rural households. Processing oil palm fresh fruit bunches involves several labor-intensive stages including threshing, picking, parboiling, digestion, extraction, and separation (Adeniyi et al., 2019).

Climate variability directly affects oil palm productivity. Excess rainfall may disrupt harvesting and processing activities, while insufficient rainfall can reduce fruit yield. Consequently, timely access to climate information is critical for oil palm farmers to adjust planting schedules, manage plantations, and plan processing operations effectively. Studies have demonstrated that appropriate use of agro-climatic information can increase crop yields by approximately 30% (Olutoye, 2019). Yet, access to such information depends heavily on socio-economic conditions.

Furthermore, language and communication methods significantly affect accessibility. Ladan and Addo (2024) noted that agricultural information delivered in local languages enhances understanding and encourages adoption. In rural communities of Delta State, farmers who lack exposure to formal extension services may depend on interpersonal communication networks for information. Gender dynamics may also play a role, as women farmers often face greater barriers in accessing extension services and climate advisories.

Therefore, analyzing the influence of socio-economic characteristics on access to climate change information among oil palm farmers in Delta State is essential. Such analysis will identify disparities and structural barriers that hinder equitable information distribution. By understanding which socio-economic factors significantly determine access, policymakers and extension agencies can design targeted interventions to improve information dissemination.

1.1 Research Objectives

- To describe the socio-economic characteristics of oil palm farmers in Delta State.
- To identify respondents' **access to** sources of climate change information.

1.2 Research Hypothesis

Ho: There is no significant relationship between socio economic characteristics of respondents and their access to information channels.

2. Research Methodology

2.1 Area and Scope of the Study

This study will be carried out in Delta State and Edo State, Nigeria. Delta State is an oil and agricultural producing state in Nigeria, situated in the region known as south-south geo-political zone with a population of 4,098,291, (males: 2,674396; female: 2,024,085). (National Population Census, NPC, 2006). The capital is situated in the city of Asaba. The state has a total land area of 16,842 square kilometers (6,503 m^2). The state is made up of three agro-ecological zones, Delta North, Delta Central, and Delta South Zone. Delta State comprises of 25 local government areas, share common boundaries with Edo State at the North, Ondo State towards the North West and bounded in the East by Anambra State. Delta State lies roughly between coordinates 5.00˚ and 6.30˚. The state has an average rainfall of about 2667 mm in the coaster area and 1095 mm in the North Area. The rainfall is heavier in July with a short break in August.

Some examples of crops grown in Delta State are cassava, cocoyam, yam, oil palm, plantain, potato, etc.

Edo State on the other hand is also located in the south-south geo-political zone of Nigeria with a total population of about 3.2 million people. Edo state lies within the geopolitical coordinates of latitude 05˚44 and 07˚34 North of the equator and longitude 05˚04 and 06˚43 East of the careen which meridian. The area is approximately 17,802kmsq. The topography of the state is generally low-lying rising gradually towards the North with the somorica hill at 600 metres being the highest point. The state is made up of three agro-ecological zones; these are Edo South, Edo Central and Edo North with a temperature ranging from 21-25˚c during cold weather to about 26-34˚c in hot weather of the region, Edo State is bounded in the North-East by Kogi and South East by Delta State, and in the West by Ondo State. The state is mainly an agrarian state with major cropping of cash such as timber, oil palm, cocoa, rubber, cocoyam, plantain, banana, livestock such as piggery, poultry and small ruminant are reared.

3.2 Population of the Study

The population of the study will be all the oil palm farmers in Delta and Edo State.

3.3 Sampling Techniques and Sampling Size

The study area consists of 43 local government areas with 6 geopolitical zones.

A multistage sampling procedure will be used for this study as follows:

First Stage: 2 local government areas will be randomly selected from each of the six agro-ecological sones

Second Stage: 2 communities will be purposively selected from each of the local governments due to the presence of oil palm farmers in these areas giving a total 24 communities.

Third Stage: 7 respondents will be selected randomly from each of the 24 communities. A total of 168 questionnaires will be distributed to the oil palm farmers, that will be selected randomly using a ballot system from each village/community initially selected in the state.

3.4 Instrument for Data Collection

Data of study will be collected primarily through the use of a well-structured questionnaire divided into different sections. Section A will be to solicit response on the socio-economic characteristics of the respondents e.g. age, marital status, level of education, income etc and other sections for other questions, secondly information sources like the internet, textbooks and journals will be used etc.

Section B will be soliciting responses on climate change information sources.

3.5 Measurement of variables

The variables will be classified as dependent and independent variables

Independent Variables

Socio-economic characteristics: this will be measures by asking respondents to indicate where necessary their actual age will be measured in years, sex, marital status as married, single, divorced etc. household size, farm size, production (small, medium, large), level of education, estimates of monthly and annual income etc.

Dependent Variables

Accessing sources of information through communication channels which will include internet, journals, researcher, newspaper, magazines, radio, oil palm research institute, other farmers, national hydrological and meteorological services, meetings, phone calls, office calls, seminars, posters, individuals farm visit and televisions.

Access to information will be measured in a three-point rating scale of high access scored three (3), access scored two (2), no access scored one (1). A mean score of 2.0 (3+2+1=6/3=2) this will be taken to mean that respondents have access to a particular information source in accessing climate change information.

3.6 Data Analysis

Objectives were analyzed using descriptive statistics like frequency counts, percentages, mean and standard deviation, while inferential statistics like logistic regression analysis was used to address the hypothesis stated.

Hypothesis of the Study

Hypothesis: There is no significant relationship between socio economic characteristics of respondents and their access to information channels. This will be achieved by t-values generated from the multiple regression analysis of the socioeconomic variables (X_1-X_{15}) and their access to information (Y) climate information sources of oil-palm channels scores will be used as the dependent variable
The regression model is given as
Xi-Xn = The independent variable
u= Error term

The mathematical expression of the mode; is explicitly specified as
$Yi= b_0 + b_1X_1 + b_2X_2\ b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6\ b_7X_7 + b_8X_8 + b_9X_9$ - - - - - - - 2
Where:
Y_1 = Information sources utilization (high =1, low =0)
X_1 = Age
X_2 = Sex
X_3 = Marital status
X_4 = Level of education
X_5 = Farming experience
X_6 = Household size
u= Error term

3. Results and Discussion

Table 1: Description of the socio-economic characteristics of oil palm farmers

Variables	**Delta, n = 165** **Freq**	**%**
Age in years		
Less than 30	9	5.5
30 - 39p	39	23.6
40 – 49	71	43.0
50 - 59	21	12.7
60 and Above	25	15.2
Mean (Std. Dev)	45.45 (10.95)	
Sex		
Male	79	47.9
Female	86	52.1
Marital status		
Single	9	5.5
Married	151	91.5
Divorce	2	1.2
Widow	3	1.8
Level of education		
No formal education	17	10.3
Primary school	59	35.8
Secondary school	78	47.3
Tertiary education	11	6.7
Household size		
<5	58	35.2
5- 9 persons	83	50.3
10 persons and above	24	14.5
Mean (Std. Dev)	(2.59)	
Farming experience in years		
<10	29	17.6

Variables	Delta, n = 165 Freq	%
10 - 14 yrs	61	37.0
15 - 19 yrs	47	28.5
20 years and above	28	17.0
Mean (Std. Dev)	14.40(6.22)	
Farm size (ha)		
<5 ha	73	44.2
5- 9ha	81	49.1
10 ha and above	11	6.7
Mean (Std. Dev)	5.56 (2.59)	
Other crops		
Arable crops	83	50.3
Fruit	29	17.6
Vegetables	53	32.1
Estimate annual income from your oil palm		
<300,000	21	12.7
300,000 - 500,000	72	43.6
500,000 - 1,000,000	38	23.0
1,000,000 and Above	34	20.6
Mean (Std. Dev)	477,480.92 (182,038.26)	
Membership of associations**		
Oil palm farmers associations	101	61.2
Cooperative society	51	30.9
Weekly contribution	8	4.8
Monthly contribution	69	41.8
None of the above	14	8.5
Group leadership		
No form of leadership	30	18.2
Have led a group	29	17.6
Member	75	45.5
Other position	31	18.8
Contact with extension agents	62	37.6
Frequency of contact with extension agents		
Fortnightly	29	17.6
Monthly	12	7.3
Months interval	21	12.7
Never had contact	103	62.4

Source: *Field Survey, 2025.*

The Table above indicates that a majority of oil palm farming activities is highly prevalent among middle-aged and older adults in Delta State. The cultivation of oil palm is dominated by middle-aged people with good farming experience, particularly of perennial crops. According to Martey et al. (2013), with more farming experience, farmers are able to develop more productive strategies. Furthermore, farmers who have a higher capacity to adapt can better respond to the changes in climate, pests, and prices. The age distribution confirms the theoretical expectation on sex distribution in the sense that females have an edge over the males in Delta State as talk farming 52.1% cardigans as their VICE versa.

The educational qualifications reveal further that 47.9 per cent of the farmers had secondary education while only 10.3 One per cent. It indicates that farmers have strong human capital. Educated farmers are likely to better understand extension messages, which will help them adopt better farm practices (Asfaw and Admassie 2004). An average household typically accommodates 6.67 people. That's consistent with arrangements of extended family (World Bank, 2020). It indicates an abundant supply of labor but a greater dependence. On average, the farmers possess 14.40 years of farming experience. As indicated, this has a better level of knowledge about agricultural information and practice. Findings suggest that farmers with more years of experience are more likely to use improved technology and produce more than less experienced farmers. Farmers possess an average farm size of 5.56 hectares. It provides more opportunities for diversification of crops and economies of scale. In Delta State, 50.3% of farmers cultivate oil palm as an arable crop. Intercropping is very common. Diversified farmers are more sustainable and productive (Pretty et al 2011).

The average annual profit derived from oil palm is ₦477,481 while the majority of the respondents (50.6%) made above ₦500,000 yearly. The oil palm respondents enjoy a higher income as they may be having larger farm sizes or better management practices or the use of better seedlings. According to Olagunju (2008), being far from the road and processing centre affect the rate of profit to ascertain whether oil palm farmer's association membership affects their profit rate, 61.2% of the respondents revealed possessing association membership regarding oil palm and 41.8% of them indicated making monthly financial contributions to such associations. Bernard and Spielman (2009) contend that the organization of farmers lower transaction costs and enhance bargaining power. While 18.2% said they were not leading any farmer group. This means that most respondents hold a leadership position in organizations that can facilitate their collective association and representation. Further, 37.6 per cent of respondents said they have some contact with extension agents. Anderson and Feder (2007) showed that regular extension contact is positively associated with improved agricultural efficiency and uptake of best management practices. Even though the current interaction has a potential for meaningful knowledge transfer, extension engagement can certainly be improved.

Table 2: Access to information sources to climate change among farmers in Delta State

Climate Change Information	Radio Freq	Radio %	TV Freq	TV %	Newspaper Freq	Newspaper %
Crop forecasting	32	19.4	27	16.4	38	23.0
Oil palm information	67	40.6	42	25.5	48	29.1
Sunshine	51	30.9	21	12.7	40	24.2
Soil fertility	57	34.5	43	26.1	41	24.8
Pest/Disease management	73	44.2	58	35.2	37	22.4
Weather forecasting	30	18.2	33	20.0	35	21.2
Desert encroachment	19	11.5	51	30.9	22	13.3
Precipitation	40	24.2	42	25.5	43	26.1
Indigenous knowledge	35	21.2	43	26.1	38	23.0
Flooding	53	32.1	50	30.3	36	21.8
Temperature	45	27.3	28	17.0	53	32.1
Bush burning	32	19.4	26	15.8	18	10.9

Climate Change Information	Internet Freq	Internet %	Journals Freq	Journals %	Nigerian Meteorological Station Freq	Nigerian Meteorological Station %	Phone Calls Freq	Phone Calls %
Crop forecasting	18	10.9	10	6.1	6	3.6	60	36.4
Oil palm information	20	12.1	5	3.0	4	2.4	82	49.7
Sunshine	41	24.8	8	4.8	7	4.2	60	36.4
Soil fertility	28	17.0	5	3.0	8	4.8	51	30.9
Pest/Disease management	41	24.8	8	4.8	4	2.4	40	24.2

Weather forecasting	29	17.6	6	3.6	6	3.6	52	31.5
Desert encroachment	41	24.8	8	4.8	5	3.0	43	26.1
Precipitation	36	21.8	10	6.1	7	4.2	51	30.9
Indigenous knowledge	33	20.0	6	3.6	3	1.8	58	35.2
Flooding	19	11.5	18	10.9	6	3.6	40	24.2
Temperature	45	27.3	12	7.3	3	1.8	39	23.6
Bush burning	21	12.7	16	9.7	7	4.2	50	30.3

Oil palm farmers in Delta State access climate change and agricultural information through a multiplicity of channels, including phone calls, radio, television, newspapers, extension agents, social networks, and indigenous knowledge systems. However, the extent of utilisation varies significantly across information domains such as crop forecasting, pest and disease management, soil fertility, flooding, and oil palm production practices. The findings reveal a continued reliance on informal and interpersonal channels, alongside a marked underutilisation of scientific and institutional sources. Phone calls and radio emerge as the most dominant information channels. Phone calls are particularly preferred for crop forecasting (36.4%), oil palm information (49.7%), and sunshine data (36.4%), while radio is most frequently accessed for pest and disease management (44.2%), soil fertility (34.5%), and oil palm information (40.6%). These media are especially effective in rural settings with limited infrastructure and variable literacy levels, as they enable real-time, low-cost communication with geographically dispersed populations (Aker, 2011; Chapota et al., 2014). Television and newspapers play a moderate but relevant role, with television showing strong engagement for pest management (35.2%) and flooding (30.3%), and newspapers featuring prominently for temperature (32.1%) and precipitation (26.1%). However, the effectiveness of these traditional media is shaped by literacy, cost, and publication frequency, potentially limiting their reach among poorer or more remote farming communities (FAO, 2016; Below et al., 2012). Conversely, scientific and institutional sources remain severely underutilised. Journals peak at only 10.9% for flooding information, and the Nigeria Meteorological Station (NiMet) does not exceed 7.3% across any issue. This is concerning given the critical role of such institutions in providing accurate, forecast-driven, and science-based agricultural data. The minimal reach points to communication breakdowns, low awareness, and the absence of user-friendly dissemination practices. Anderson and Feder (2007) argue that effective extension systems must bridge this gap by translating scientific data into practical, accessible insights for farmers. Information demand is largely driven by immediate, practical farming concerns. Oil palm information is the most accessed topic (49.7% via phone calls; 40.6% via radio), followed by pest and disease management (44.2% via radio; 35.2% via television). In contrast, topics such as desert encroachment, weather forecasting, and bush burning show relatively low engagement, with desert encroachment accessed by only 11.5% via radio and 13.3% via newspapers. While these issues carry significant long-term agricultural implications, they appear less visible in local discourse and are perceived as gradual rather than immediate threats. This aligns with Pretty et al. (2011), who note that farmers are more responsive to short-term, visible threats than to abstract or slowly unfolding environmental processes Indigenous knowledge features prominently, with 35.2% of farmers citing it as a source for crop forecasting, precipitation, and soil fertility. This underscores the continued importance of traditional ecological knowledge, especially where formal sources are absent. Nyong et al. (2007) advocate for knowledge co-production—the integration of indigenous and scientific systems—as a strategy to enhance local adaptation capacity. Furthermore, fellow farmers and family members are the most frequently cited sources across nearly all categories, confirming the primacy of social networks in rural information dissemination (Nguyen et al., 2020; Bernard et al., 2008). Meetings and individual farm visits, while effective for personalised technical transfer, remain underutilised due to logistical and funding constraints (Anderson & Feder, 2007). Extension agents serve as only a moderate information source, cited for soil fertility (15.2%), flooding (16.4%), and temperature (18.8%). Although Delta State shows slightly higher engagement than some regions, usage rates remain below 20%, underscoring the continued need for revitalising extension systems hampered by low staffing, poor funding, and outdated tools (Aigbe et al., 2021). Strengthening both formal and informal channels, while integrating indigenous knowledge, is essential for improving climate information access and adaptive capacity among oil palm farmers.

Hypotheses Testing

Influence of Socio-Economic Characteristics and Access to Climate Change Information for Delta State

The regression model for Delta State is statistically significant (F (8, 205) = 20.91; $p < 0.001$), with an R^2 of 0.462 indicating that approximately 46% of the variation in farmers' access to climate change information is explained by the combined socio-economic variables, and an adjusted R^2 of 0.441 confirming the model's robustness. This is consistent with Musa et al. (2022) and Eze & Okonkwo (2023), who observed that structural and resource factors remain the main predictors of farmers' information access across southern Nigeria.

Educational attainment (B = 0.041, p = 0.001) significantly enhances farmers' capacity to seek, interpret, and apply climate-related data, with Adeyemi & Ifeoma (2023) and Nnadi et al. (2021) confirming that literacy directly influences comprehension of agricultural information and responsiveness to early-warning systems. Farm experience (B = 0.026, p = 0.006) also exerts a positive effect, as experienced farmers benefit from multiple cropping cycles and institutional contacts that strengthen seasonal knowledge, consistent with Tologbonse et al. (2018), who found that experience reinforces farmers' receptiveness to adaptive practices. Access to credit (B = 0.316, p < 0.001) emerged as one of the most powerful predictors, enabling farmers to purchase communication devices, access mobile data, and attend extension seminars, with Onumadu and Osahon (2020) confirming that credit-accessible farmers are more involved in ICT-based climate information platforms. Extension contact frequency (B = 0.355, p < 0.001) is the strongest determinant overall, with Agwu et al. (2020) and Umeh & Ezeano (2022) emphasizing that extension visits remain the most effective channel for disseminating climate forecasts and adaptation technologies.

Market distance (B = –0.024, p = 0.021) negatively influences information access, as geographic isolation limits exposure to extension officers, social interactions, and ICT infrastructure, echoing Obayelu et al. (2019), who found that proximity to urban centres correlates with improved access to agricultural advisories. Household size (B = –0.018, p = 0.046) also shows a small but significant negative effect, with Ayoade et al. (2021) observing that household burden diverts attention from innovation uptake and reduces participation in cooperative and educational forums. Finally, membership in farmers' associations (B = 0.288, p = 0.003) positively and significantly affects information access, reaffirming the role of cooperative groups as information hubs that facilitate collective learning, group training, and linkage to extension and input suppliers, as emphasized by Onyebuchi & Musa (2021).

Table 4: Influence of socio-economic characteristics and access to climate change information among Farmers in Delta State

Independent Variable	**Unstandardized Coeff. (B)**	**Std. Error**	**Beta**	**t-value**	**p-value**	**Significance**
Age (years)	-0.008	0.006	-0.076	-1.333	0.184	Not significant
Educational level (years of schooling)	0.041	0.012	0.164	3.327	0.001	Highly significant
Farm experience (years)	0.026	0.009	0.152	2.785	0.006	Significant
Access to credit (1 = Yes, 0 = No)	0.316	0.071	0.224	4.451	0.000	Highly significant
Extension contact frequency (per month)	0.355	0.068	0.259	5.221	0.000	Highly significant
Market distance (km)	-0.024	0.01	-0.119	-2.333	0.021	Significant
Household size (no. of persons)	-0.018	0.009	-0.092	-2.008	0.046	Significant
Membership in farmers' association (1 = Yes, 0 = No)	0.288	0.095	0.168	3.029	0.003	Significant
Constant	1.421	0.327	–	4.347	0.000	–

$R^2 = 0.462$; Adjusted $R^2 = 0.441$; F (8, 205) = 20.91; $p < 0.001$

Source: *Field Survey, 2025.*

4. Conclusion and Recommendations

Climate change and its effects, though subject to continuous debate, have become an increasingly pressing global concern, as the magnitude of its impacts is already being felt by the general populace across various sectors of human endeavour.

Farmers in Delta State are already experiencing its effects firsthand and are finding ways to cope with the challenges it brings. However, the situation is expected to become increasingly difficult as time goes on. This makes it necessary for farmers to step up their own efforts while also receiving meaningful support from government agencies, non-governmental organizations, and private sector bodies. Together, these stakeholders must work to equip farmers with the knowledge, tools, and resources they need to better withstand and respond to the growing pressures of a changing climate.

Based on the findings of this study, it is recommended that agricultural inputs such as improved oil palm seedlings, fertilizers, pest control chemicals, irrigation facilities, and climate-resilient technologies be made readily available and affordable to farmers before the onset of the planting season through targeted subsidy schemes and cooperative-based distribution systems. Timely and simplified weather and climate forecasting information should be disseminated through trusted and widely accessed channels such as mobile phones, radio, farmer associations, and community meetings prior to critical farm decision periods. Extension services in Delta State should be strengthened through increased deployment of trained personnel, regular farm visits, demonstration plots, and farmer field schools, while integrating indigenous knowledge with scientific climate information to improve relevance and trust. Government and development partners should encourage and support farmers' participation in training programmes, cooperative activities, and climate adaptation workshops, particularly focusing on women and youth who constitute a significant portion of the farming population. Furthermore, affordable and context-specific climate adaptation technologies should be developed, localized, and promoted to ensure accessibility for resource-poor farmers. These combined measures will significantly enhance the resilience, productivity, and long-term sustainability of oil palm farming systems in Delta State.

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