

Farmers' Perceptions of Pest and Disease Control Methods in South-South Nigeria

Godspower Oke Omokaro^{1,2}

¹Institute of Environmental Engineering, Peoples Friendship University of Russia (RUDN), 6Miklukho-MaklayaStreet, 117198, Moscow, Russia.

²Department of Soil Science and Land Management, Faculty of Agriculture, University of Benin, P.M.B 1154, Benin City, Edo State, Nigeria.

Citation: Godspower Oke Omokaro (2024). Farmers' Perceptions of Pest and Disease Control Methods in South-South Nigeria. *Acta Biology Forum*. DOI: <https://doi.org/10.51470/ABF.2024.4.1.11>

Corresponding Author: Godspower Oke Omokaro | E-Mail: omokaro.kelly@gmail.com

Received 24 February 2024 | Revised 18 March 2024 | Accepted 27 April 2024 | Available Online May 05 2024

ABSTRACT

This study investigates the perceptions and practices of farmers in Delta and Edo States, Nigeria, regarding pest and disease control methods. A survey of 160 farmers, 80 from each state, was conducted to gather data on their demographic characteristics, pest management strategies, and perceptions of soil fertility loss due to synthetic inputs. In Edo State, 66.25% of respondents were female, with the majority aged between 24 and 37 years (40%). In Delta State, 58.75% were female, with a significant portion aged 15 to 23 years (36.25%). Most farmers in both states have secondary education (45% in Delta, 46.25% in Edo) and substantial farming experience, predominantly between 11 and 20 years (42.5% in Edo, 37.5% in Delta). The study reveals a high reliance on Integrated Pest Management (IPM) techniques, used by 48.75% of farmers in Edo and 45% in Delta. Chemical pesticides, such as Gammalin and ForcedUp, are also widely used, with 30% in Edo and 28.5% in Delta. Non-chemical methods like physical and pheromone traps are utilized by 40% in Edo and 25% in Delta. Manual weed removal is the most common weeding method, practiced by 43.75% of farmers in Edo and 37.5% in Delta, while chemical herbicides are less commonly used. A significant portion of farmers are unfamiliar with organic farming, and perceptions of the impact of synthetic inputs on soil fertility vary between the states. The findings highlight the need for increased education on sustainable agricultural practices and localized research on the long-term impacts of synthetic inputs on soil health. Promoting sustainable pest and disease control methods is crucial for enhancing agricultural productivity and environmental health in these regions.

Keywords: Pest management, Disease control, Integrated Pest Management (IPM), Organic farming, Chemical pesticides, Soil fertility, Nigeria

Introduction

In the 1960s, agriculture accounted for about 64% of Nigeria's Gross Domestic Product (GDP), but in recent times, its contribution has averaged around 25% [1]. The agricultural sector is crucial in Nigeria, providing food, raw materials, and foreign exchange, and 70% of the population relies heavily on it for their livelihood [2, 3]. Vegetables, for instance, are nutritionally valuable and hold great potential as income-generating crops, supplementing diets that are primarily carbohydrate-based [4]. However, various production challenges exist across the country, including high input costs, transportation issues, market accessibility, and infestations by insect pests and diseases. Insect pest attacks are a major barrier to increasing vegetable production, significantly affecting both quality and yield [5]. Due to the country's drive to increase agricultural production and the upsurge of different species of pests that damage and ravage agricultural products in fields and storage, farmers have resorted to the use of agrochemicals as an important control strategy. An estimated 125,000–130,000 metric tons of pesticides are used annually [6, 7]. However, Farmers in the Delta State and Edo States of Nigeria adopt various strategies for controlling pests, diseases, and weeds in

their agricultural practices. Understanding their perceptions and the methods they employ is crucial for improving agricultural productivity and sustainability. More so, this report examines the control methods used by farmers in these states, focusing on biological and organic controls, integrated pest management (IPM), chemical treatments, and other non-chemical methods.

Description of Study Area

This research was conducted in Uhen community, Edo State, and Songhai community, Delta State, Nigeria. Uhen community is in Ovia North East Local Government Area, Edo State (N6°26'49.9" and E5°30'26.1"). It has a hot and humid tropical climate with seasonal rainfall, high temperatures (28°C to 36°C), and relative humidity (70% to 80%). The area receives over 1,500 mm of annual rainfall, peaking in September and October. The soils are derived from coastal plain sand and alluvial deposits, and the terrain is relatively flat with gentle slopes, at an elevation of 100 meters above sea level [8, 9]. On the other hand, the Songhai community is in Sapele Local Government Area, Delta State, 7 km from Sapele town (5°53'38.58" N and 5°40'35.98" E) and at 11 meters above sea level.

Copyright: This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

It has a tropical climate with annual rainfall around 2000 mm, peaking in June through September, and daily temperatures from 23.0°C to 27.6°C. Relative humidity ranges from 72.5% to 95.0%. The area features rainforest vegetation with swampy areas near streams. About 70% of the population is engaged in farming, growing crops like yams, rice, cowpea, watermelon, cassava, plantain, fluted pumpkin, and okra. The main farming system is shifting cultivation. The soils range from light to dark grey, fine sand to silty clay [10, 11].

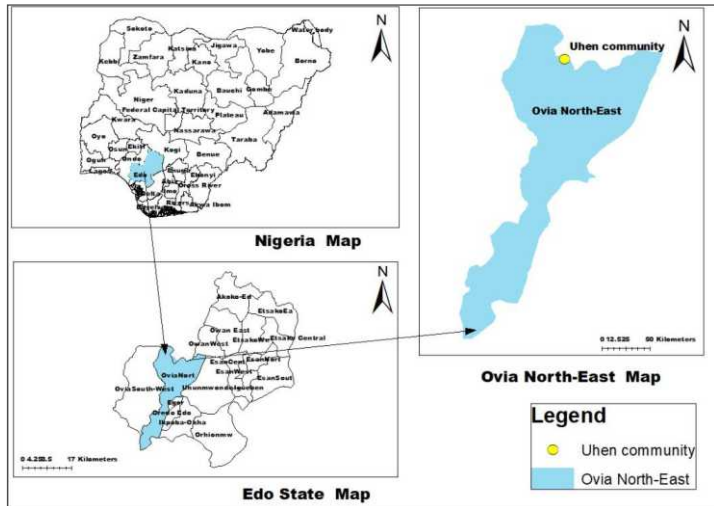


Figure 1: Uhen community, Ovia North, Edo State Study Map.

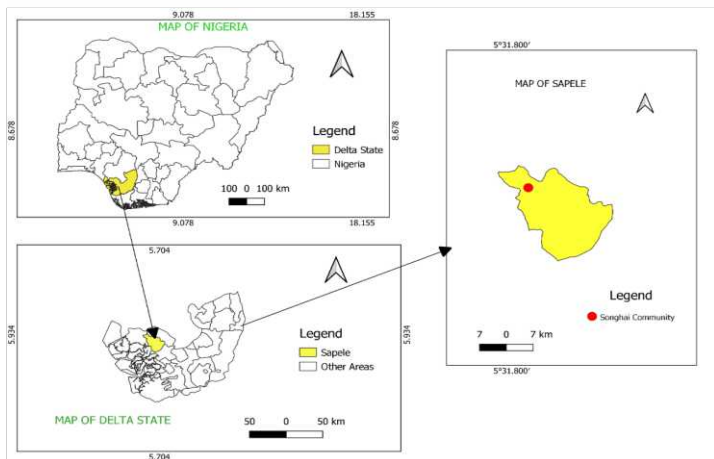


Figure 2: Songhai Community, Sapele Delta State, Study Map.

Material and Method

Data was collected through the administration of questionnaires to randomly selected respondents, who were farmers living in the study area. One hundred and sixty (160) farmers were surveyed, 80 from each state, to gather data on their demographic characteristics and pest and disease control practices. The selection of the village was based on factors such as agricultural potential, location, population density, and representation of socio-economic characteristics of rural life in the state. To collect the data, the researcher visited the local farmers in their farms, shops, and fields. The questionnaires took approximately 15-20 minutes to complete, and assistance was provided to those who had difficulty reading or understanding certain agricultural terms in the questionnaire. The questionnaire consisted of two sections.

Results

Respondents' Demographic

Demographic characteristics of respondents in Edo and Delta States, Nigeria, revealed distinct patterns. In Edo State, the

majority of respondents were female (66.25%), with males comprising 28.75% of the sample. Respondents were predominantly aged between 24 and 37 years (40%), with secondary education being the most common (46.25%). In terms of farming experience, the largest group had 11 to 20 years of experience (42.5%), and mixed cropping was widely practiced (70%). In Delta State, females constituted 58.75% of the sample, while males made up 41.25%. Respondents were primarily aged 15 to 23 years (36.25%), also with a significant portion aged 24 to 37 years (33.75%). Secondary education was the most prevalent (45%), and the majority had 11 to 20 years of farming experience (37.5%). Like in Edo State, mixed cropping was the dominant cropping system (67.5%).

Table 1: Demographic of the Respondents in the Study Area in Uhen, Edo State

Variables	Frequency	Percentage (%)
Gender		
Male	27	28.75
Female	53	66.25
Age (years)		
15 – 23	7	8.75
24 – 37	32	40
38 – 50	23	28.75
50 above	18	22.5
Educational Background		
None	10	12.5
Primary	29	36.25
Secondary	37	46.25
Tertiary	4	5
Farming and Agricultural Experiences		
<5 years	12	15
5 – 10 years	21	26.25
11 – 20 years	34	42.5
20 years and above	13	16.25
Type of cropping system		
Mono-cropping	24	30
Mixed cropping	56	70
Total	80	100

n = 80

Table 2: Demographic of the respondents in the study area Songhai, Delta State

Variables	Frequency	Percentage (%)
Gender		
Male	33	41.25
Female	47	58.75
Age (years)		
15 – 23	29	36.25
24 – 37	27	33.75
38 – 50	13	16.25
50 above	11	13.75
Educational Background		
None	15	18.75
Primary	17	21.25
Secondary	36	45
Tertiary	12	15
Farming and Agricultural Experiences		
<5 years	10	12.5
5 – 10 years	17	21.25
11 – 20 years	30	37.5
20 years and above	23	28.75
Type of cropping system		
Mono-cropping	26	32.5
Mixed cropping	54	67.5
Total	80	100

n = 80

Respondents' Perception and Knowledge of Pest and Disease Control

In Edo State, integrated pest management (IPM) techniques were the most commonly used pest and disease control methods (48.75%), followed by chemical pesticides such as Gammalin (30%), biological and organic control strategies (12.5%), and alternative methods like traps (8.75%). Non-chemical plant protection methods included physical and pheromone traps (40%), burning (43.75%), mechanical methods (10%), and biological predators (6.25%). Manual weed removal was the most common weeding control method (43.75%), followed by mechanical methods like mulching and tilling (37.5%), crop rotation and intercropping (12.5%), and chemical herbicides such as ForceUp (6.25%). Only 36.25% of respondents were familiar with organic farming, while 63.75% were not.

A majority (71.25%) did not perceive synthetic inputs as causing soil fertility loss, while 28.75% did. Similarly, in Delta State, IPM techniques were also the most used pest and disease control methods (45%), followed by Gammalin/chemical pesticides (28.5%), biological and organic control strategies (22.5%), and alternative methods like traps (3.75%). Non-chemical plant protection methods included mechanical methods (37.5%), burning (23.75%), physical and pheromone traps (25%), and biological predators (13.75%). Manual weed removal was the most common weeding control method (37.5%), followed by mechanical methods like mulching and tilling (30%), crop rotation and intercropping (15%), and chemical herbicides such as Uproot (17.5%). Only 38.75% of respondents were familiar with organic farming, while 61.25% were not. A majority (65%) perceived synthetic inputs as causing soil fertility loss, while 35% did not.

Table 3: Pest and Disease Management Practices in Uhen, Edo State

Variables	Frequency	Percentage (%)
How do you manage pests and diseases?		
Biological and Organic Control Strategies	10	12.5
Integrated Pest Management (IPM) Techniques	39	48.75
Chemical Pesticides Used (specify type): Gammalin	24	30
Alternative Methods: Traps	7	8.75
If you use non-chemical plant protection methods, which of the following do you utilize?		
Mechanical Methods	8	10
Physical and Pheromone Traps	32	40
Biological Predators of Pests	5	6.25
Other Approaches: Burning	35	43.75
What methods do you use for weeding control?		
Mechanical Weed Control (specify): Mulching and Tilling	30	37.5
Manual Weed Removal	35	43.75
Crop Rotation and/or intercropping	10	12.5
Chemical Herbicides Used (specify type): ForceUp	5	6.25
Are you familiar with organic farming?		
Yes	29	36.25
No	51	63.75
Does the use of synthetic inputs (fertilizers, herbicides, pesticides) result in soil fertility loss on your farm?		
Yes	23	28.75
No	57	71.25

n = 80

Table 4: Pest and Disease Management Practices in Songhai, Delta State

Variables	Frequency	Percentage (%)
How do you manage pests and diseases?		
Biological and Organic Control Strategies	18	22.5
Integrated Pest Management (IPM) Techniques	36	45
Chemical Pesticides Used (specify type): Gammalin	23	28.5
Alternative Methods: Traps	3	3.75
If you use non-chemical plant protection methods, which of the following do you utilize?		
Mechanical Methods	30	37.5
Physical and Pheromone Traps	20	25
Biological Predators of Pests	11	13.75
Other Approaches: Burning	19	23.75
What methods do you use for weeding control?		
Mechanical Weed Control (specify): Mulching and Tilling	24	30
Manual Weed Removal	30	37.5
Crop Rotation and/or intercropping	12	15
Chemical Herbicides Used (specify type): Uproot	14	17.5
Are you familiar with organic farming?		
Yes	31	38.75
No	49	61.25
Does the use of synthetic inputs (fertilizers, herbicides, pesticides) result in soil fertility loss on your farm?		
Yes	52	65
No	28	35

n = 80

Discussion

The demographic characteristics of farmers in both Edo and Delta States show a significant involvement of females and a wide range of age groups, with a notable portion having secondary education. The present study also supports the findings of [12] and [13] that more men than women are involved in farming in Nigeria. The educational background of respondents reveals that most farmers in both states have at least a secondary education, with 46.25% in Edo State and 45% in Delta State. This level of education influences farmers' ability to make balanced assessments of innovations disseminated to them. [14] opined that the high educational status of farmers enables them to better assess new technology. Most farmers in both states have significant farming experience and predominantly practice mixed cropping, with the majority having between 11 and 20 years of experience (42.5% in Edo State and 37.5% in Delta State). This extensive experience suggests that farmers possess substantial practical knowledge and skills in agriculture, which can be leveraged when introducing new pest and disease control methods. Mixed cropping can be advantageous for pest and disease control as it promotes biodiversity and can reduce the spread of pests and diseases. However, the 30% in Edo and 32.5% in Delta practicing mono-cropping may be more vulnerable to pest and disease outbreaks, highlighting the need for targeted support and education on the benefits of diversified cropping systems. Farmers in both states employ a variety of pest and disease control methods. The most common method in both states is Integrated Pest Management (IPM), with 48.75% in Edo State and 45% in Delta State. IPM is an environmentally friendly approach that combines biological, cultural, and chemical

methods to manage pests. However, this disagrees with the findings of [15] on Integrated Pest Management in Delta State, where the majority (84.37%) of farmers had not adopted IPM, while only 15.63% had. The significant use of chemical pesticides, such as Gammalin and ForcedUp, indicates a reliance on chemical control, which can have environmental and health implications if not managed properly. This finding aligns with [16], who reported that 71% of farmers in Southeast Nigeria use pesticides for weed and insect control to enhance productivity. Manual weed removal is the most common method in both states, indicating the labor-intensive nature of weeding. Mechanical weed control methods, such as mulching and tilling, are also significant, suggesting a reliance on traditional practices. The use of chemical herbicides is relatively low but present, highlighting the need for education on safe and effective herbicide use. This also agrees with [15], who noted that farmers had local organic control technologies before the introduction of chemical pesticides. Additionally, a significant portion of farmers in both states are not familiar with organic farming, with 63.75% in Edo State and 61.25% in Delta State indicating a lack of awareness. This highlights a critical area for intervention, as organic farming can offer sustainable solutions to pest and disease management without the negative impacts of synthetic chemicals. Furthermore, there is a divergence in perceptions regarding the impact of synthetic inputs on soil fertility. In Edo State, 71.25% of respondents do not believe synthetic inputs result in soil fertility loss, while in Delta State, 65% believe they do. This difference may be due to varying experiences and soil conditions in the two states, underlining the need for localized research and education on the long-term impacts of synthetic inputs on soil health.

Conclusion

The study reveals diverse pest and disease management practices among farmers in Delta and Edo States. While there is a significant adoption of IPM techniques, reliance on chemical pesticides remains prevalent. The low familiarity with organic farming and varied perceptions of soil fertility loss due to synthetic inputs suggest areas for further education and support. Promoting sustainable and integrated pest management practices, enhancing awareness of organic farming, and leveraging the extensive farming experience of the respondents can contribute to more effective and environmentally friendly pest and disease control methods in these regions.

References

1. Akubuilu, C. J. C., & Akubuilu, D. U. (2000). Achieving national development and growth: The place of children in agriculture programme. In C. J. C. Akubuilu, J. U. Mgbada, & I. J. Chidobem (Eds.), *Children in sustainable agriculture programme in Nigeria* (pp. 25-40). Enugu: ESUT.
2. Olukunle, O. T. (2013). Challenges and prospects of agriculture in Nigeria: The way forward. *Journal of Economics and Sustainable Development*, 4(16), 37-45. Available from [http://pakacademicsearch.com/pdf-files/ech/520/37-45%20Vol%204,%20No%2016%20\(2013\).pdf](http://pakacademicsearch.com/pdf-files/ech/520/37-45%20Vol%204,%20No%2016%20(2013).pdf)
3. Liverpool-Tasie, L., Kuku, O., & Ajibola, O. (2011). Review of literature on agricultural productivity, social capital and food security in Nigeria. Washington, D.C.: International Food Policy Research Institute. (Nigeria Strategy Support Program working paper; no. 21).
4. Chadha, M. L., & Oluoch, M. O. (2003). Home-based vegetable gardens and other strategies to overcome micronutrient malnutrition in developing countries. *Food Nutrition and Agriculture*. Rome, Italy: Food and Agriculture Organization of the United Nations.
5. Sithantham, S., Matok, C. M., Nyarko, K. A., Reddy, K. V. S., Sileshi, G., & Olubayo, F. (2003). Occurrence of insect pests and associated yield loss on some African indigenous vegetable crops in Kenya. *African Crop Science Journal*, 10(4), 281-310.
6. Maton, S. M., Dodo, J. D., Nelsla, R. A., & Ali, A. Y. (2016). Environmental impact of pesticides usage on farmlands in Nigeria. *International Journal of Innovative Research and Development*, 5(4), 311-317. Available from <http://irepos.unijos.edu.ng/jspui/bitstream/123456789/1870/1/91393-170650-1-SM.pdf>
7. Asogwa, E., & Dongo, L. N. (2009). Problems associated with pesticide usage and application in Nigerian cocoa production: A review. *African Journal of Agricultural Research*, 4(8), 675-683. Available from http://www.worldcocoafoundation.org/wp-content/uploads/files_mf/asogwa2009.pdf
8. Oviasogie, P., & Okoro, D. (2020). Suitability assessment of soils for oil palm cultivation in Ofunwengbe, Ovia North-East Local Government Area of Edo State, Nigeria. *FUPRE Journal of Scientific and Industrial Research*, 4(3).
9. Nigerian Institute for Oil Palm Research (NIFOR). (2013). Investigation of soil related potential for sustainable growth and development of oil palm (*Elaeisguineensis Jacq*) in Nigeria. Uppsala. Retrieved from <http://stud.epsilon.slu.se>
10. Aweto, A. O. (2009). Agriculture in Urhoboland of Nigeria's Niger Delta. *Urhobo Historical Society*, 34-56.
11. Youdeowei, P. O., & Nwankwoala, H. O. (2011). Studies on sub-soil characteristics of sand deposits in some parts of Bayelsa State, Eastern Niger Delta, Nigeria. *Journal of Soil Science and Environmental Management*, 2(34-38).
12. Bassi, A. P., Ramyil, M. C. S., Ogundeko, T. O., Abisoye-Ogunniyan, A., Builders, M., Thliza, S. M., Adeniyi, G. O., Akande, T. I., Ologun, D. O., Damai, C., Pfonkakah, D., Adinoyi, O. A., Dibigbo-Ibeagi, N. M., & Nwankwo, B. (2016). Farmer: Agrochemical use and associated risk factors in FadanDaji District of Kaura LGA, Kaduna State, Nigeria. *American Journal of Medicine and Biology Research*, 4(3), 33-41.
13. Eifediyi, E. F., Omondan, G. O., Takim, F. O., & Animashaun, J. (2014). An assessment of the use of agrochemicals among small-scale farmers in Esanland, Nigeria. *Nigeria Journal of Crop Science*, 2(1), 9-13.
14. Ekwe, K. C., & Nwachukwu, I. (2006). Influence of household factors on the utilization of improved garri processing technology in Southeastern Nigeria. *Journal of Agricultural Extension*, 9, 134-141.
15. Ofuoku, A. U., Egho, E. O., & Enujeke, E. C. (2008). Integrated pest management (IPM) adoption among farmers in the central agro-ecological zone of Delta State, Nigeria. *African Journal of Agricultural Research*, 3(12), 852-856. Available online at <http://www.academicjournals.org/AJAR>
16. Apeh, C. C. (2018). Farmers' perception of the health effects of agrochemicals in Southeast Nigeria. *Journal of Health and Pollution*, 8(19). <https://doi.org/10.5696/2156-9614-8.19.180901>