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# Enhancing sustainable environmental management through indigenous pest and diseases control practices by *Ofada* rice growers in Ogun State, Nigeria

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**Sustainable indigenous agricultural development for smallholder farmers entails the values placed on the use of indigenous knowledge and methods that depend on such to maintain productivity and better output for the Nigerian teeming population. The study analyzed the different indigenous pests and diseases control methods used by '*ofada*' rice growers. Multi stage sampling technique was used in sampling 120 respondents and primary data were obtained using interview guide. Data were analyzed using descriptive statistics and Pearson's product moment correlation. The study reveals that majority of the growers were between 20 to 60 years old. Most were male, married and had 4 to 15 multi-generational household members from which 75% of the labor use on the farm was derived. Types of indigenous pest control methods used by '*ofada*' rice growers include the use of scare crows, traps, burning or slashing of debris/grass, removal of unwanted weeds, repeated tilling. Furthermore, 72.5% of the growers affirmed that most of the methods used were effective in helping to combat pests on their fields. Also, growers were of the view that some of the indigenous pest and diseases control methods were cost effective, agro ecologically friendly and less hazardous to human health. Some constraints identified were lack of proper documentation of indigenous pest control methods and that most farmers were unwilling to divulge some methods used. There existed significant relationships between the use of indigenous pest control method, age, occupational experience and educational status. It is recommended that immediate steps should be taken to collect, document and preserve the indigenous methods used by *ofada* rice growers in controlling pest.**

**Key words:** Knowledge, indigenous, local, modern, farmers, sustainability.

## INTRODUCTION

In Nigeria, rice especially '*ofada*' rice which is locally produced and processed is an important staple food crop both for rural and urban consumption. The major rice varieties grown in Nigeria are the local rice namely Gboko, Abakaliki, Mokwa and Ofada; while improved domestic varieties are Faro series, Nerica 8 and ITA series. Among these local rice varieties, Ofada rice is peculiar to South-west, Nigeria. Ofada rice is a generic name used to describe all rice produced and processed in the rice producing clusters of South west Nigeria. (Sowunmi et al., 2014). The short grain robust rice, believed to be OS6 and ITA 150 varieties, is named after Ofada, a small rural community in Obafemi-Owode Local Government Area of Ogun State. It is an unpolished short grain with red kernels which is not related to any other rice (IITA, 2007).

Both rice production and consumption in Nigeria have

vastly increased from 15.4 metric tons per year in the 1980s to 25.4 metric tons per year in recent years (Erenstein et al., 2003). Notwithstanding, the production increase was not in tandem with the consumption increase with rice imports making up for the shortfall. Domestic production of rice has not been able to meet the demand, leading to considerable imports which today stand at about 1,000,000 metric tons yearly (Akpokodje et al., 2001). According to the Federal Ministry of Agriculture and Rural Development (2012), US $2billion is being spent annually on rice importation.

Over 90% of Nigeria's agricultural output is by small-holder poor farmers who have, for centuries, sustained the national food supply through a considerable wealth of indigenous knowledge and practices. These smallholder farmers are often by-passed by developed agricultural innovations and modern pest control technologies which are not made available or not suitable to their agro-ecological, health, environmental and socio-economic conditions (Tijani et al., 2007; Talukder, 2006). Sometimes, these innovations many not even be culturally compatible with that of the locals because they are often times taken wholly from another environment with divergent cultural traits.

Chietry and Belbahri (2009) defined indigenous knowledge as the knowledge of the indigenous people inhabiting different geographical regions of the world with their own language, culture, tradition, belief, folklore, rites and rituals. These knowledge are derived from interactions with nature and natural resources in order to make decisions in solving day to day problems while managing the land and environmental resources for survival. In most cases, indigenous knowledge is also regarded as the social capital for the poor, their main asset to invest in the struggle for survival to produce food and provide shelter (World Bank, 1997).

Despite the fact that small-scale rural farmers have produced the bulk of staple food consumed in the country, made their own farm implements and conducted their own farming activities using their inherited indigenous knowledge, the role and contribution of indigenous methods and practices used for agricultural and food sustainability has not been fully developed and appreciated. Most efforts are focused on contemporary scientific knowledge systems which are rather expensive, hazardous to health, are not pre-tested to know its local adaptability and cannot be afforded by local farmers. Today, many indigenous methods and practices are at the risk of becoming extinct because of rapidly changing natural environments, modern methods and approaches, fast pace economic, political, and cultural changes on a global scale. Practices vanish, as they become inappropriate for new challenges or because they are adapted too slowly. However, many practices disappear only because of the intrusion of foreign technologies or development concepts that promise short-term gains or solutions to problems without being capable of sustaining them. The tragedy of the impending disappearance of indigenous knowledge is most obvious to those who have developed it and make a living through it. But the implication for others can be detrimental as well, when indigenous skills, technologies, artifacts, problem solving strategies and expertise are lost. Also the use of chemical insecticide/ pesticides has been dominating the plant protection techniques since 1950s. This approach has led to the neglect of alternative (indigenous knowledge) pest and disease management methods and has increased pest outbreak and diseases. In Nigeria, farmers' indigenous methods represents the largest single knowledge resource base yet to be significantly explored and utilized in agricultural development processes. It has also been noted that pest control techniques in Nigeria is becoming very expensive and cannot be easily afforded by the rural farmers and the low literacy level of rural farmers makes the handling of the advanced pest control methods result in the damage of their crops. In view of the above problems, this study was conducted to realize these objectives:

## Objectives of the study

The specific objectives of this study were to:

(1) Describe the socio-economic characteristics of the *'ofada'* rice growers;
(2) Describe types of indigenous methods used by *'ofada'*; rice growers to control pests and diseases;
(3) Investigate the effectiveness of indigenous pests control used by *'ofada'* rice growers the control of pests and diseases
(4) Ascertain the benefit derived from the use of indigenous pest and disease control methods and;
(5) Identify the constraints faced in the use of the indigenous methods by *'ofada'* rice growers.

## Hypothesis of the study

(1) There are no significant relationships between the selected socio-economic characteristics of *'ofada'* rice growers and the types of indigenous pest and diseases

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control methods used.

## METHODOLOGY

The study was conducted in Obafemi–Owode Local Government Area of Ogun State, Nigeria. Ogun State shares its boundaries in the West with the Republic of Benin, in the East with Ondo State, and in the North with Oyo State. Obafemi-Owode Local Government Area is made up of a land mass of 104,787.04 ha and has an estimated population of 230,000 with the major part used as agricultural land. The study area lies between latitudes 03° $6^1$ and 07°$3^1$, and longitudes 03°$2^1$ and 03°$8^1$east of Greenwich Meridian (NPC, 2006). The study area is endowed with a vast area of fertile land for the cultivation of arable crops such as '*ofada'* rice. The area is particularly regarded as the home of *'ofada'* rice and noted as the best in FADAMA farming in the State by OGADEP in 2005. '*Ofada'* rice derived its name from *FADAMA* which is a Hausa name for 'wetlands', and means '*Akuro*' or '*Abata*' in Yoruba language. These are low-lying flood plains with easily accessible shallow ground water.

Multistage sampling technique was adopted to select '*ofada'* rice growers for this study. Two clusters out of the five clusters of Obafemi Owode Local Government Area (LGA) (Owode and Oba) were purposively selected because they are the major '*ofada'* rice producing clusters in the LGA. From the selected clusters, 6 villages out of the 17 communities that produce '*ofada'* rice were randomly selected; these villages are *Ofada*, Owode, Onidundun, Egbeda, Ogbe-inu and Ogbe-ita. Twenty '*ofada'* rice growers from each village were selected, making a total of 120 farmers selected for the study. The list of farmers in each village was obtained at the office of the village block agricultural extension agents and Ogun State Association of '*ofada'* Rice Growers in Obafemi-Owode. Data were collected using interview guide and was analysed using frequency counts, percentages and Pearson Product Moment Correlation (PPMC).

## RESULTS AND DISCUSSION

Findings in Table 1 reveal that the average age of the respondents was 45 years. This is tending towards the declining productivity years of an individual. The implication of this is that unless young growers are injected into the use of indigenous pest control methods, the indigenous pass-on knowledge on pest control from generation to generation can collapse or truncate. This can result to little or no preservation and continuity of indigenous knowledge on pest control due to the death of older population of '*ofada'* rice growers in the area.

Most (79.2%) of the *'ofada'* rice growers were males, the reason for this might be because male farmers handled production aspect of *'ofada'* rice farming and the female were involved with harvesting and post-harvest activities. As indicated in Table 1, 87.5% of the *'ofada'* rice growers were married and few (2.5%) are widowed. Getting married is a social and cultural expectation apportioned to both male and female in the study area. This results into early reproduction of children that will keep the supply force for family labor.

Almost all (91.7%) of the *'ofada'* rice growers had 4 to 15 multi-generational household members of which 75% supply their labor as shown in Table 1. The implication of this is that the relatively large household size may likely enhance family labor supply, hence supporting the declining age capacities of *'ofada'* rice growers already advanced in age but this does not translate to better use of indigenous pest control on *'ofada'* rice fields. Though family labour, especially children are supplied minimally except during the holidays as most young people in the family are not interested in the drudgery associated with farming *'ofada'* rice.

With regards to their educational status, only 37.5% of *'ofada'* rice growers had formal education. This may have implication on documenting old and new indigenous pest control knowledge, can also result into loss, none accuracy, none transfer or dilution of knowledge to younger generation as it is orally passed from one generation to another without proper, formal record keeping and documentation.

The occupational year of experience of *'ofada'* rice growers was a mean of 20 years. The high level of occupational experience may explain why they are more knowledgeable and practiced indigenous pest control methods on their rice field. The study also revealed that the average farm size was 1.40 ha though majority (75.3%) of the respondents managed between 0.1 and 1.99 ha of farmland in close proximity to each other (Table 1). The implication of this is that, growers can share and apply indigenous pest control methods together on their *ofada* rice fields to avoid crossover of pests and other destructive insects between farms.

Table 2 shows some of the indigenous pests control methods used by '*ofada*' rice farmers in the study area. Findings indicate that burning and slashing of debris/ grass, removal of unwanted weeds, repeated tilling to turn the soil and expose pests to direct sunlight and use of scare crow and traps to catch errant pests were highly used by majority (100%) of *ofada* rice growers to control pests and diseases on their rice farms respectively. The table showed that rice growers recorded low use of locust bean effluent (87.5%), poultice of millet (76.7%) and digging of trenches round the rice fields (85.0). The low frequency of use of these methods may be due to the odious smell emanating from some of the methods and additional labour input required.

### Effectiveness of indigenous pest control methods used by *ofada* rice growers

Results in Table 3 indicates that majority (72.5%) of *Ofada* rice growers revealed that the indigenous pest control methods used were very effective, very few (8.3%) indicated that the indigenous pest control methods used were not effective. The high percentage recorded for very effective may be because many methods jointly used give a high degree of controlling pests and disease of paddy. It should be noted that '*ofada*' rice growers

**Table 1.** Socio-Economic characteristics of *Ofada* rice growers.

| Variable | Frequency | Percentage |
|---|---|---|
| **Age** | | |
| 20-29 | 20 | 16.7 |
| 30-39 | 35 | 29.2 |
| 40-49 | 30 | 25.0 |
| 50-59 | 20 | 16.7 |
| 60-69 | 10 | 08.3 |
| ≥70 | 05 | 04.2 |
| **Mean age 45 years** | | |
| | | |
| **Sex** | | |
| Male | 95 | 79.2 |
| Female | 25 | 20.8 |
| | | |
| **Educational status** | | |
| Informal | 75 | 62.5 |
| Formal | 45 | 37.5 |
| | | |
| **Marital status** | | |
| Single | 10 | 08.3 |
| Married | 105 | 87.5 |
| Divorced | 03 | 02.5 |
| Widowed | 02 | 01.7 |
| | | |
| **Household size** | | |
| 1-3 | 10 | 08.3 |
| 4-6 | 70 | 58.3 |
| 7-9 | 20 | 16.7 |
| 10-12 | 12 | 10.0 |
| 13-15 | 06 | 05.0 |
| ≥ 15 | 02 | 01.7 |
| | | |
| **Occupational experience (years) *Ofada* rice farming** | | |
| 1-5 | 08 | 06.7 |
| 6-10 | 40 | 33.3 |
| 11-15 | 38 | 31.7 |
| 16-20 | 18 | 15.0 |
| 21-25 | 12 | 10.0 |
| ≥25 | 04 | 03.3 |
| | | |
| **Farm size (hectares)** | | |
| 0.1-0.99 | 54 | 45.0 |
| 1.0-1.99 | 40 | 33.3 |
| 2.0-2.99 | 18 | 15.0 |
| 3.0-3.99 | 05 | 04.2 |
| >4.99 | 03 | 02.5 |
| | | |
| **Sources of labor** | | |
| Hired | 20 | 16.7 |
| Family | 90 | 75.0 |
| Family and hired | 10 | 08.3 |

Field survey (2011).

**Table 2.** Types of indigenous pest control methods used by *Ofada* rice growers.

| Method | Frequency of usage | | | | | |
|---|---|---|---|---|---|---|
| | Low | | Moderate | | High | |
| | Frequency | % | Frequency | % | Frequency | % |
| Locust bean effluent | 105 | 87.5 | 10 | 8.33 | 05 | 4.16 |
| Poultice of millet (fermented) | 92 | 76.7 | 20 | 16.7 | 08 | 6.70 |
| Burning of Paddy husk | - | - | 20 | 16.7 | 100 | 83.3 |
| Draining of rice field | - | | 40 | 33.3 | 80 | 66.7 |
| Integrating cassava (*manihot esculenta*) into the rice field | 20 | 16.7 | 90 | 75.0 | 10 | 8.33 |
| Burning or slashing of debris/grass | - | - | - | - | 120 | 100.0 |
| Removal of unwanted weeds | - | | - | | 120 | 100.0 |
| Mixed/rotation cultivation of rice with sparsely grown rice, legumes and vegetables | 10 | 8.33 | 70 | 58.3 | 40 | 33.3 |
| Repeated tilling | - | | - | - | 120 | 100.0 |
| Burning of husks with dry chilies | 18 | 15.0 | 80 | 66.7 | 22 | 18.3 |
| Use of scare crows | - | | - | - | 120 | 100.0 |
| Use of incantation and traditional herbal charms/lockets/talisman | 05 | 4.16 | 75 | 62.5 | 40 | 33.3 |
| Dry torch light batteries contents and used engine oil (black) | 20 | 16.7 | 80 | 66.7 | 20 | 16.7 |
| Traps | - | - | - | - | 120 | 100.0 |
| Land fallow | 45 | 37.5 | 40 | 33.3 | 35 | 29.2 |
| Digging of trenches round the rice field | 102 | 85.0 | 15 | 12.7 | 03 | 2.50 |

Field survey, 2011.

**Table 3.** Distribution of '*ofada*' rice growers assessment of the effectiveness of indigenous pests and diseases control methods

| Effectiveness | Frequency | Percentage |
|---|---|---|
| Not effective | 10 | 08.3 |
| Little effect | 23 | 19.2 |
| Very effective | 87 | 72.5 |

Field survey, 2011.

**Table 4.** Benefits derived by using indigenous pest and disease control methods.

| Benefits derived | Percentage* | Rank |
|---|---|---|
| Efficient use and cost effectiveness | 98 | 1st |
| Easy to use/handle | 98 | 1st |
| Agro-ecological/Environmental friendly/safe | 92 | 3rd |
| Less hazardous | 90 | 4th |
| Increase/improve productivity by replenishing the soil | 79 | 5th |
| Does not require formal education | 96 | 2nd |

explained that they at times combined methods for maximum effect.

## Benefits derived by using indigenous pest and disease control methods

Findings of the study as indicated in Table 4 revealed that most methods were considered cost effective (98%), easy to use/handle (98%) and they do not require formal education (96%) respectively. This may be because most methods require little or no money to practice and are mostly self-explanatory. Most methods, as explained by growers are environmental friendly (96%) because some methods replenished rice fields and are less hazardous (90%) since methods are not harmful to human beings. This is an indication that most of the respondents are comfortable using these methods and considered them

**Table 5.** Constraints Faced by *Ofada* Rice Growers in the Use of Indigenous Methods of Pests and Diseases Control.

| Constraint | Percentage* | Rank |
|---|---|---|
| Some methods are time consuming | 93 | 3rd |
| Custodian of indigenous methods knowledge unwilling to divulge information | 96 | 2nd |
| Lack of proper documentation | 99 | 1st |
| Most botanical crops/herbs used are going into extinction | 65 | 4th |
| Most methods less effective for large scale farming | 57 | 5th |

Field survey, 2011. * Multiple responses.

**Table 6.** Correlation result of the use of indigenous methods and some selected socio-economic characteristics of *ofada* rice farmers.

| Variable | R- value | Level of significant | Decisions |
|---|---|---|---|
| Age | 0.459 | 0.05 | Significant |
| Farming experience | 0.925* | 0.01 | Significant |
| Educational status | -0.812 | 0.05 | Significant |

Field survey, 2011.

beneficial.

### Constraints associated with the use of indigenous pest and disease control methods

Constraints faced by growers in the use of their indigenous pest and disease control methods were ranked in order of importance as shown in Table 5. Multiple responses were given for these and pooled into percentages. A major constraint indicated by the respondents was the lack of proper documentation (99%) of methods. The implication is that most methods can be lost or diluted since they are orally passed on; this makes authenticity of such methods doubtful for lack of accuracy. About 96% explained that custodians of some indigenous knowledge were unwilling to divulge such knowledge/information to people outside of their family. This may be because some of the methods such as use of incantations and charms seem unconventional because of their sources and should be guarded from outsiders. The implication of this is that some methods cannot be replicated by someone outside the family circle.

### Test of hypothesis

Table 6 shows that there exist significant relationships between the use of indigenous pest control methods and age ($r = 0.459$; $p<0.05$) and occupational farming experience ($r= 0.925$; $p<0.05$). The significant relationships that exist between age and use of indigenous pest control methods may be related to the role assumed by older farmers as custodians and preservers of indigenous knowledge and practices. Also, educational status ($r = -0.812$; $p<0.01$) has an inverse but negative relationships with use of indigenous methods This may be because young farmers tends to use improved technology for pest control as they acquire more formal education. In Nigeria, indigenous know how is not part of the agricultural curriculum, as such, such knowledge can be acquired through repeated association with older farmers who are custodians of such knowledge. Therefore the null hypothesis that there are no relationships between the use of indigenous pests control methods and some selected socio-economic characteristics of '*ofada'* rice farmers is rejected.

## CONCLUSION AND RECOMMENDATIONS

The study revealed that many small holder farmers continued to rely on indigenous pest control methods and the major constraint in using indigenous methods was the lack of proper documentation. The study recommends that:

(1) Research should be made on improving the use of indigenous methods for agriculture by integrating this knowledge with modern scientific technology.
(2) There is need to repackage indigenous methods to add value and make it more attractive to young farmers for use.
(3) There should be favorable symbiotic relationships between agricultural extension agents and the local custodians of indigenous methods of pest control to learn

from one another. This will help in documenting, preserving and possible transfer to other areas.
(4) Extension agents need to be well equipped with well packaged indigenous methods of pest control. This will help them to be more knowledgeable and possibly help in formal documentation and record keeping of such methods.
(5) Some of the herbs used in the preparation of indigenous methods of pest control should be domesticated in order to avoid their extinction due to deforestation and intense usage without re-planting.

## Conflict of Interest

The authors have not declared any conflict of interest.

### REFERENCES

Akpokodje G, Lancon F, Erenstein O (2001). Nigeria's Rice Economy. State of the Art Paper Presented at the NISER/WARDA. Nigerian Rice Economy Stakeholders Workshop, Ibadan 8-9 November, Bouake, West Africa Rice Development Association (WARDA).

Erenstein O, Frederic L, Akande SO, Titilola, SO, Akpokodje G, Ogundele OO (2003). Rice Production System in Nigeria: A Survey West Africa Rice Development Association (WARDA). Abidjan, Cote d'Ivoire. P 95.

Chietry GKN, Belbahri L (2009). Indigenous pest and disease management practices in traditional farming systems in north east India. A review: J. Plant Breed. Crop Sci. 1(3):028-038.

IITA & NCRI (2007). Definition of Ofada rice qualities through varietal identification and testing. pp. 6 -11.

Federal Ministry of Agriculture and Rural Development (2012). Agricultural Transformation Agenda: Repositioning Agriculture to drive Nigeria's Economy.

Talukder FA (2006). Plant Products as Potential Stored Product Insect Pest Management Agents. A Mini Review. Emir. J. Agric. Sci. 18(1):17-32.

Tijani AA, Adejobi AO, Agboola AF (2007). Factors Influencing the Adoption of Indigenous Pest Control Methods among Rural Development Program (RUDEP) Cocoa farmers in Osun State. Niger. J. Agric. Rural Dev. 2:123-156.

Sowunmi FAO, Omigie C, Daniel DT (2014). "Consumers' Perception on Ofada Rice in Ibadan North Local Government Area of Oyo State, Nigeria." J. Econ. Sustainab. Dev. 5.16): 78-85.

World Bank (1997). Knowledge and Skills for the Information Age. The First Meeting of the Mediterranean Development Forum; Mediterranean Development Forum. World Bank, Geneva.