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# Farming Practices, Soil Nutrient Condition and Crop Yield in Ihuo Community, Ahoada East Local Government Area, Rivers State

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**Abstract:** This study was designed to examine the traditional farming practice of slash and burn and soils in the Ihuo community in Ahoada East Local Government Area of Rivers State. To achieve this feat, issues of concern were raised to ascertain the prevalent farming practice in the area, determine the soil condition of slash and burn traditional farms in the area using soil physical parameters and macro-nutrients. Determine the soil conditions of an unfarmed forest in the area using soil physical parameters and macronutrients. The study further examined differences in the soil conditions of the slash and burned traditional farms and the untouched forest in the area and evaluated the people's view of crop production using the slash and burn traditional farming practices over the years. The study found that slash and burn standard farming practice is a significant practice adopted by rural farmers for land preparation before planting. The study also showed that nutrient values and soil conditions vary between the burnt farmland and the untouched forest. Crop yield was found to be affected by slash and burn traditional farming practices. The study recommended the discouragement of slash and burn conventional farming practices and the adoption of alley farming, and the need for enlightenment programs to enhance sustainable farming techniques at all levels to achieve food security.

**Keywords:** Farming practices, soil nutrient, crop yield, soil conditions, slash & burn.

## **Introduction**

Farming technique and its effect on soil nutrients attract attention globally, hence becoming more ideal for biogeography and geomorphological studies. Agriculture as an occupation is basically for growing crops, animal husbandry and humanity depend on it for nutritional needs and survival. Diverse land management and farming techniques evolved to satisfy the dietary needs of the world's teeming population.

Farming across the globe has been identified as an old occupation that generates income and food supply for families and nations. Although very important for human existence, this practice had been carried out in different forms many centuries ago. These various forms have all been done to increase productivity to meet human needs. However, most times this has not been the case (Barbar, 2018).

It is a general perception that traditional farming practices, irrespective of the farming type start with clearing the forest and then burning the cleared forest, which assumes first adopting the slash and burns pattern. This traditional farming practice, among others like bush fallow, garden farming, alley farming, has been a common practice of farmers in the South-Eastern part of Nigeria with little knowledge of its detrimental effects on the vegetation and soil condition (Chukwu-Okeah, 2016). Today, deforestation that arises from different traditional farming techniques has resulted in forest and biodiversity loss. It severely degrades local and regional ecosystems, resulting in soil nutrient loss and reduced crop yield.

Adama (2003) noted that many farming methods have contributed to the degradation of the natural resource base of land and vegetation over the years.

In a bid to expand production, farmers increase the land space and therefore create a new form of land through the process of slash and burn method with less attention on the management of organic matter, which is a significant factor for adequate soil condition to enhance crop production (Tanzito, Ibanda, Talaguma, & Lusanga 2020).

The traditional farming practice of slash and burn is a common farming method practiced in different rural areas by many farmers, especially in the humid region. Shifting cultivation is practiced as field rotation by sharing and burning another plot of land after the current plot has lost its fruitfulness. The purposes behind utilizing fire as a land clearing

strategy are that fire are exceptionally modest and intend to openness and the board of new ranches, expansion of wood powder (supplements), improvement of the client structure, decrease in weed and free – redevelopment and diminished event of nuisances and sicknesses (Ketterings et al., 1999).

Both adverse and beneficial outcomes have been accounted for on burning exercises of soils and harvest creation. Albeit a few investigations have stated that burning exercises increases accessibility to plants crop yield (Nigussie and Kissi, 2011), burning of biomass for ordinary land readiness strategies, have a net negative effect on soil properties just as on earth (Pantami et al, 2010; Nigussie and Kissi, 2011). Matthew (2014) also noted that the rate of bush burning in Nigeria and Rivers State in particular for agricultural purpose is very alarming. Bush burning enhances erosion owing to the fact that it removes the soil protective covering It has been responsible for the movement of wild animals from one locality to another, because the cover available for their breeding and protection have been destroyed. Humus that makes phosphate available is destroyed and nitrogen in grass is completely lost to air by burning (Roy, Finck, Blair and Tandon (2006)

Hence, it becomes obvious that to ensure good and effective farming techniques, soil quality, enhanced crop yield, an efficient and effective land management system is grasped (Kumawat, Yadav, Samadharmam and Rashmi, 2020).

### **Materials and Methods**

The study was carried out in Ihuo community in Ahoada East Local Government Areas of Rivers State. Ahoada East Local Government Area is located on 5<sup>04</sup>'13" N and 6<sup>038</sup>'34.9" E. It has a total population of 166,324 (NPC, 2006). Ahoada East Local Government Area shares boundary with Ahoada West, Emohua, Ogba/Egbema/Ndoni Local Government Areas. The people are predominantly farmers.

Ahoada East Local Government Area is endowed with abundant sunshine by virtue of its geographical location near the equator. Hence, the sun is vertically overhead for most port of the year. Daylight hours are longer because of the long solar radiation. However, the amount of solar radiation received at the surface is a function of cloud cover, vegetation and harmanttan. The seasonal march of the temperature over the region is an interesting one. The months of February, March and April record the highest temperature, then gradually

slopes down through May, June and more deeply in July and August. Again temperature rises through September, October and November. The peaking of temperature is reduced in the months of November and December because of the influence of the harmattan. The mean daily maximum temperature in the region is 30°C. The dry season months of February, March and April record the highest mean daily maximum temperature. The soil in the area is mainly silt-clay with interaction of sand and gravel while the vegetation is a combination of mangrove swamp forest and rain forest. The area is unique; it falls within the coastal belt by low-lying coastal plains that structurally belong to the sedimentary formations of the recent Niger Delta. Generally, the land surface slopes gently, in a NW-SE direction. The landform on which Ahoada East is located conforms to a horse-shoe like spin projecting into low lying swamp.

The study used the cross-sectional design of research. The choice of the cross sectional design of research is that like the descriptive research, it describes situations, attitudes, views and behaviours of individuals or a group of persons just the way they are. The aim here is purposely to gather information completely and accurately. The quasi experimental research design was adopted, basically due to absence of a control but tries to explain that data were collected through an experimental process (Ahiakwo, 2003).

Data for the study were collected from two main sources. Direct contact information was collected as the primary data source and the works of other scholars and writers from published and unpublished materials that were adequately referenced and acknowledged served as the secondary data source.

The collection of data for any study is a crucial stage of the research and must be given utmost attention to ensure the data collected is valid. The procedure adopted for data collection in this research is questionnaires and field soil collection and analysis. The questionnaire adopted for this study was used to answer research questions 1 and 5 which were to ascertain the prevalent farming practice in the study community and the people's view of crop production using the slash and burn traditional farming practices over the years.

Furthermore, to provide answers to objective 2, 3 and 4, soil samples were taken from the un-burnt forest and the slash and burn farms. The soils samples were taken in line with

standard operating procedures and sent for laboratory analysis to investigate the soil conditions with specifics on nutrients such as Nitrogen, phosphorus, Potassium, soil porosity and Total Organic Compound (TOC).

Data generated by the research were presented in tabula form, but this was done on the basis of the study objective. The purpose was to ensure that the study objectives were achieved.

The following hypotheses were tested in line with the stated study objectives which are;

1.The soil nutrient conditions of a slash and burn traditional farmland and that of an untouched forest do not differ. This was tested with the aid of the two-way student t-test.

2.The slash and burn traditional farming practice does not influence crop yield in Ihuo Community. This was also tested with the aid of the Chi-Square analytical tool.

Table 1, shows that a total of 58 respondents are male and they account for 51.3% of the total population, 55 respondents are female which also accounts for 48.7% of the study population.

In terms of respondents age, the age polarized more around the ages of 18-45 with a total of 63 respondents which accounts for 55.7% of the study population, 37 respondents are in age bracket of 45-65 and 13 respondents are in the case of above 60 years.

The marital status of respondents showed that 38 respondents who account for 33.6% of the study population are married, 66 respondents are single, and 13 respondents are widowed. This section was wrapped up with the concerns of education, and it was discovered that 32 respondents in the study have no form of education, 54 respondents had primary education, 27 respondents had secondary education and there was no case of tertiary education.

## Result and Discussions

The primary economic activity of the people was ascertained as part of the issues the study expects to address in line with that, 77 respondents strongly agreed that farming in Ihuo is a major primary economic activity, 13 respondents agreed, 11 respondents strongly disagreed while 12 respondents disagreed with respect to the above.

**Table 1: Socio Demographic Attributes of Respondents**

| Response                         | Frequency  | Percentage % |
|----------------------------------|------------|--------------|
| Male                             | 58         | 51.3         |
| Female                           | 55         | 48.7         |
| <b>Total</b>                     | <b>113</b> | <b>100</b>   |
| <b>Age in Years</b>              |            |              |
| 18-45                            | 63         | 55.7         |
| 46-65                            | 37         | 32.7         |
| > 65                             | 13         | 11.5         |
| <b>Total</b>                     | <b>113</b> | <b>100</b>   |
| <b>Marital Status</b>            |            |              |
| Single                           | 38         | 33.6         |
| Married                          | 66         | 58.4         |
| Widowed                          | 9          | 7.9          |
| <b>Total</b>                     | <b>113</b> | <b>100</b>   |
| <b>Educational Qualification</b> |            |              |
| None                             | 32         | 28.3         |
| Primary                          | 54         | 47.8         |
| Secondary                        | 27         | 23.8         |
| Tertiary                         | 0          | 0            |
| <b>Total</b>                     | <b>113</b> | <b>100</b>   |

**Table 2: Farming as a Major Primary Economic Activity in the Locally**

| Response           | Frequency  | Percentage % |
|--------------------|------------|--------------|
| Strong Agreed      | 77         | 68.1         |
| Agreed             | 13         | 11.5         |
| Strongly Disagreed | 11         | 9.7          |
| Disagreed          | 12         | 10.6         |
| <b>Total</b>       | <b>113</b> | <b>100</b>   |

**Table 3: Farmland preparation done basically by slash and burn**

| Response           | Frequency  | Percentage % |
|--------------------|------------|--------------|
| Strong Agreed      | 62         | 54.9         |
| Agreed             | 45         | 39.8         |
| Strongly Disagreed | 2          | 1.8          |
| Disagreed          | 4          | 3.5          |
| <b>Total</b>       | <b>113</b> | <b>100</b>   |

The study also tried to examine whether farmland preparation is being done through slash and burn traditional farming practice. Table 3 shows that 62 respondents strongly agreed that farmland preparation is been done through slash and burn traditional farming practice, 45 respondents agreed, 2 respondents strongly disagreed while 4 respondents disagreed that farmland preparation is done through slash and burn traditional farming practice.

**Table 4: Mixed cropping as the most prevalent farming system**

| Response           | Frequency  | Percentage % |
|--------------------|------------|--------------|
| Strong Agreed      | 71         | 62.8         |
| Agreed             | 19         | 16.8         |
| Strongly Disagreed | 16         | 14.2         |
| Disagreed          | 7          | 6.2          |
| <b>Total</b>       | <b>113</b> | <b>100</b>   |

On the aspect of prevalent farming method, 71 respondents strongly agreed that mixed cropping is the most prevalent farming system in the community, 19 respondents agreed, 16 respondents strongly disagreed while 7 respondents disagreed.

**5: Soil Laboratory result for the Traditional slash and Burn Farmland**

| <b>Soil Parameters</b> | <b>Volume</b> |
|------------------------|---------------|
| Porosity (%)           | 41.320        |
| Potassium (K) (mg/kg)  | 0.009         |
| Phosphorus (P) (mg/kg) | 0.106         |
| Nitrogen (N)           | 0.015         |

Soil laboratory analysis for the traditional slash and burn farmland report shows that porosity level of the soil of the slash and burn traditional farm land had a value of 41.320%, potassium content in the soil is 0.009mg/kg, phosphorus has a value of 0.106mg/kg and Nitrogen content in the soil recorded 0.015mg/kg.

**Table 6: Soil Laboratory result for the Unfarmed Forest**

| <b>Soil Parameters</b> | <b>Volume</b> |
|------------------------|---------------|
| Porosity (%)           | 30.660        |
| Potassium (K) (mg/kg)  | 0.016         |
| Phosphorus (P) (mg/kg) | 0.321         |
| Nitrogen (N)           | 0.027         |

Soil laboratory analysis for the unfarmed forest report shows that porosity level of the soil of the unfarmed forest had a value of 30.660%, potassium content in the soil is 0.016mg/kg, phosphorus has a value of 0.321mg/kg and Nitrogen content in the soil recorded 0.027mg/kg. This is as shown in the table above.

**Table 7: Soil Laboratory result for the Traditional slash and Burn Farmland**

| <b>Soil Parameters</b> | <b>Unfarmed Forest</b> | <b>Slash and Burn Farmland</b> | <b>Variation</b> |
|------------------------|------------------------|--------------------------------|------------------|
| Porosity (%)           | 41.320                 | 33.115                         | 8.205            |
| Potassium (K) (mg/kg)  | 0.016                  | 0.009                          | 0.007            |
| Phosphorus (P) (mg/kg) | 0.321                  | 0.106                          | 0.215            |
| Nitrogen (N)           | 0.027                  | 0.015                          | 0.012            |



The table above shows variation of the traditional slash and burn farm land and the unfarmed forest. It shows that porosity level of the traditional slash and burn farm is 41.320% as against the unfarmed forest which accounts for 33.115% with a variation of 8.205%. This shows that when the soil is heated porosity level increases thereby creating more pore spaces due to the absence of colloids which usually bind the particles together.

Potassium volume in the soils of the traditional slash and farmland has a value of 0.009 while that of the unfarmed forest has a value of 0.016mg/kg with a variation of 0.007mg/kg.

Phosphorus on the other hand has a value of 0.321 mg/kg from the unfarmed forest land while the traditional slash and farmland has a value of 0.106mg/kg. Furthermore, Nitrogen value as shown observed that for the traditional slash and farmland the value was 0.015 mg/kg while that of the unfarmed forest land accounted for 0.027 mg/kg.

**Table 8: Crop Yield has been high with the slash and burn traditional farming practice**

| Response           | Frequency  | Percentage % |
|--------------------|------------|--------------|
| Strong Agreed      | 62         | 54.8         |
| Agreed             | 29         | 25.6         |
| Strongly Disagreed | 16         | 14.2         |
| Disagreed          | 6          | 5.3          |
| <b>Total</b>       | <b>113</b> | <b>100</b>   |

This study concerns of crop yield with respect to the slash and burn traditional farming practice discovered that 62 respondents which accounts for 54.8% of the study population strongly agreed, 29 respondents which accounts for 25.6% agreed, 16 respondents which accounts for 14.2% of the study population strongly disagreed while 6 respondents which accounts for 5.3% of the study population disagreed.

**Table 9: Slash and Burn Farming Practice Affects Farm Productivity**

| <b>Response</b>    | <b>Frequency</b> | <b>Percentage %</b> |
|--------------------|------------------|---------------------|
| Strong Agreed      | 57               | 50.4                |
| Agreed             | 31               | 27.4                |
| Strongly Disagreed | 14               | 12.3                |
| Disagreed          | 11               | 9.7                 |
| <b>Total</b>       | <b>113</b>       | <b>100</b>          |

On this issue of slash and burn traditional farming practice affecting farm productivity, it was discovered that 57 respondents which accounts for 50.4% of the study population strongly agreed, 31 respondents which accounts for 27.4% agreed, 14 respondents which accounts for 12.3% of the study population strongly disagreed while 11 respondents which accounts for 9.7% of the study population disagreed.

**Table 10: State of Crop Yield in Recent Times**

| <b>Response</b> | <b>Frequency</b> | <b>Percentage %</b> |
|-----------------|------------------|---------------------|
| Low             | 68               | 60.2                |
| Moderate        | 31               | 27.4                |
| High            | 14               | 12.4                |
| <b>Total</b>    | <b>113</b>       | <b>100</b>          |

On the state of crop yield in recent times, it was discovered that 68 respondents which accounts for 60.2% of the study population stated that it is low, 31 respondents which accounts for 27.4% stated that it is moderate while 14 respondents which accounts for 12.4% of the study population stated that it is high.

**Table 11: Contributors to Poor Crop Yield in the Area**

| Response                      | Frequency  | Percentage % |
|-------------------------------|------------|--------------|
| Farming practice              | 56         | 49.6         |
| Oil Pollution                 | 29         | 25.7         |
| Crude farming methods         | 167        | 15.0         |
| Non use of improved seedlings | 11         | 9.7          |
| <b>Total</b>                  | <b>113</b> | <b>100</b>   |

On the issue of contributors to poor crop yield in the area, it was discovered that 56 respondents which accounts for 49.6% of the study population identified farming practice as a contributor to poor crop yield in the area, 29 respondents which accounts for 25.7% stated that oil pollution is responsible for poor crop yield in the area, 17 respondents which accounts for 15.0% of the study population stated that it is the use of crude farming implements while 11 respondents which accounts for 9.7% of the population stated that non use of improved seedlings by the farmers in the area is responsible for the poor crop yield in the area in recent times.

### **Conclusion**

It is an obvious fact that the provision of food depends on the overall fertile nature of the soils which by implication means that if man must continue to exist then the adoption of practices targeted at enhancing the quality of our soils must be adopted. The World Food and Agricultural Organisation is of the view that supportive farming by all and sundry which aid food supply and food security at all levels, but the challenge is, with a dwindling soil quality how can food supply be assured. This study therefore concludes that the adoption of techniques that enhance soil quality should be an issue of great attention if we must meet the food need of the society at large.

### **Recommendations**

A critical look at the study discoveries have shown that the challenge if allowed to linger will have detrimental effects on man, so therefore the study puts up the following as means of resolving the identified issues of contention;

1. The use of improved seedling should be encouraged amongst farmers to encouraged high yield and food supply.
2. Slash and burn traditional farming practice should be discouraged in its entirety and alley farming encouraged instead.
3. Enlightenment programmes of farming techniques and its attending benefits and dangers should be encouraged by Government at all levels to achieve food security.

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