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Rural Farmers Participatory Soil Quality Assessment in Ibiono Ibom Area, Akwa Ibom State, Nigeria.

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ABSTRACT

This study centered on rural farmers' participatory soil quality assessment in eight communities (Ibiaku Osuk, Ikot Usen, Use Ndon, Ikpa Ikot Uneke, Ibiaku Ikot Usan, Use Ikot Amama, Edem Uraua and Oko-Ita) of Ibiono Ibom Local Government Area of Akwa Ibom State. The approaches employed were on-farm and household interviews. The study was based on administration of questionnaires and focus group discussions. A total of sixty (60) farmers were involved in the study. The rural farmers in Ibiono Ibom area consider soil quality in relation to the following aspects: visual appearance (soil colour and organic matter), Ease of tillage operation (soil texture), land forms (slope, erosion threat, drainage) and History of the land (fallow period, past yield record and prevalent weed in the area). The farmers in Ibiono Ibom have three soil quality classes using colour as index. These classes are: *Obubid Isong* (black or dark soil) which is ranked to be the best in terms of productivity, *Idaidat Isong* (red or dark brown soil) and *Isong Mbat* (gray bleached, heavy and poorly drained). Based on texture, the soils were classified as; *Isong Mberi* (presence of high organic matter and very easy to till), *Isong ntan/ adan ntan* (soils high in sand content) which soil type is believed to be a bad soil because it does not have a good water retention capacity, leaching of nutrients easily occur and organic matter content is low, *Isong Mbat/Aduang Isong* (soils high in clay content and poorly drained) and *Ikon-eto* (hard soils, often characterized by the presence of stones and tree stumps). The ranking of soil properties as soil quality determinant in the area was of the descending order; Colour and Past Harvest record > Texture > Vegetation > Fallow period > Topography > Location > Ease of Tillage > Drainage.

INTRODUCTION

Rural farmers' perspective is a central paradigm in the management of soil quality for sustainable productivity. Soil quality is the capacity of the soil to function as a vital living system to sustain biological productivity, promote environmental quality, and maintain plants and animal health (Doran, 2002). Healthy soils comprise the integration of physical, chemical and biological components that requires holistic management approaches aimed at optimizing the multiple functions of soil (Doran and Parkin, 1994). Over the years, the indicators of soil quality commonly used are largely based on scientific methodologies. Local farmers' perception which is a rapid and less expensive tool in soil quality assessment has not been considered. Information on rural farmers' perception is lacking in Ibiono Ibom area and therefore, there is a pressing need for this study. Integration and harnessing knowledge from within and between scientific and local knowledge bars will enable communities to fully realize their capacity and become involved in monitoring and responding to the challenges of soil degradation (Reed et al., 2007). Regardless of the impacts of climate variables on soil degradation, farmers' view and knowledge of soil is a significant production factor (Winter, 1997). In-depth knowledge of soil processes by farmers reflects sound soil management and vice versa (Omari et al., 2018). Rural farmers' perception on soil quality can be assessed without any cost and based on observation without any laboratory analysis rather than conventional soil quality assessment which is very expensive and not generally acceptable and socially accessible in the rural society. Also, rural farmers find it very difficult to implement farming principles that they were not carried along during the development of such principles. Rural farmer's perception on soil quality will enable rural farmers in Ibiono Ibom Area to have hands on knowledge about the quality of soils in the area and will serve as a guide in choosing a particular land for specific crop(s). This information will also serve as a guide to other land users in the area. This study is aimed at evaluating the rural farmers' perception on soil quality in Ibiono Ibom Area which will help to increase crop yield output at the community level as well as increasing the bulk of knowledge on soil quality assessment.

MATERIALS AND METHOD

Site Description

The study was conducted in eight communities (Ibiaku Osuk, Ikot Usen, Use Ndon, Ikpa Ikot Uneke, Ibiaku Ikot Usan, Use Ikot Amama, Edem Uraua and Oko-Ita) of Ibiono Ibom Local Government Area of Akwa Ibom State, Nigeria, with its headquarters at Oko-Ita. Ibiono Ibom is bounded by Cross River State, Itu, Arochukwu (Abia State), Abak and Ini local government area. Ibiono Ibom occupies a land mass of 2761.76sq.km, with a total population of 385,145. It consists of 9 clans, 33 groups and 193 villages. It has coordinates; $5^0$14'0' N $7^0$53'0'E / 5.23333^{0}N 7.88333^{0}E. The average temperature of the area is 25^0C and the area witnesses two distinct seasons which are the dry and rainy seasons and has a number of rivers and tributaries flowing within its territory. The average humidity level of Ibiono Ibom is 85% while the wind speed is at an average of 10km/h. The main ethnic group of Ibiono Ibom is the Ibibio people, who speak a dialect of the Ibibio language. The land use pattern of the area is in this order; agricultural, residential, transport, commercial and residential. Mineral resources include deposits of various stones, clay, sand and crude oil. There are forest resources such as palm trees, rubber, timber and others. The dwellers are predominantly farmers, traders and craftsmen.

Data collection

The approaches employed were on-farm interview and household interview. Data for the study was based on interviews (through questionnaire administration) and focus group discussions. Questionnaires were administered randomly to 50 households in selected communities. The sample unit was the farm household with the head of the household or the person who takes farm management decisions as the respondent. Questionnaires comprised both demographic data and soil knowledge data collection. Information was gathered on age, gender, educational status, ethnic origin and participation in farmer groups during the administration of the questionnaires. Soil knowledge data was collected via semi-structured questions pertaining to perception of local soils, for instance, 'How would you describe a good/fertile soil? What do you consider in choosing a land for the cultivation of a particular crop? How do you improve and maintain the fertility of the soil on your farm? How and why do you assess your farm soil before planting? Do you practice bush burning? How do you manage/ control pests, diseases, weeds and erosion in your farm?

RESULT AND DISCUSSION

Rural Farmers' Soil Quality Perception in Ibiono Ibom Area

The farmers in Ibiono Ibom area consider soil quality in relation to the following aspects: visual appearance (soil colour and organic matter), Ease of tillage operation (soil texture), land forms (slope, erosion threat, drainage) and History of the land (fallow period, past yield record and prevalent weed in the area).

According to the people of Ibiono Ibom Area, a soil is considered to be a bad soil, if it does not have

good water retention capacity, high level of organic matter, ease of tillage operations, low erosion risk, dark coloration (sometimes) as well as high yield and productivity. The reverse is the case for a good and productive soil. The rural farmers noted that bad soils could contain high amount of organic matter which make them fertile but they are not productive due to its waterlogged nature and ability to release the nutrients to plants. A good soil may not be as fertile as the poorly drained soils but it has the ability to release nutrients for plants uptake. The features of these soils are summarized in the Table 1.1 below;

Table 1.1: The Rural Farmers Rating of Soils as Bad, Moderate and Good

Features	Bad Soil	Moderate Soil	Good Soil
Colour	Gray and white sand	Brown and red	Black
Texture	98% clay or sand	70 - 85 % sand	40 - 60% sand, 20 – 30% clay
Organic matter content	High	Moderately low	Very high
Drainage	Very poor	Moderately poor	Well drained
Ease of tillage	Very difficult	Slightly difficult	Easy to till
Crops	Cocoyam	Cassava and cocoyam.	Vegetables, cassava, cocoyam, yam, maize melon.
Fertility	Fertile	Slightly Fertile	Very Fertile
Productivity	Very low	Moderately low	High and Heavy high

Ranking of Rural Farmers' Soil Quality Determinants in Ibiono Ibom Area

Various properties employed by the rural farmers in the assessment of soil quality are presented in Table 1.2. The properties considered by the farmers in soil quality assessment were soil colour, soil texture, ease of tillage operations, past yield record, topography and fallow period, location of the farm, drainage and vegetation.

The farmers in Ibiono Ibom have three soil quality classes using colour as index. These classes are: *Obubid isong* (black or dark soil) which is ranked to be the best in terms of productivity, *Idaidat* isong (red or dark brown soil) and *Isong mbat* (gray bleached, heavy and poorly drained).

Based on texture, soil in Ibiono Ibom area are classified according to the rural farmers as; *Isong mberi* (soils that are characterized by the presence of high organic matter and very easy to till), *Isong ntan*/ *adan ntan* (soils high in sand content) which soil type is believed to be a bad soil because it does not have a good water retention capacity, leaching of nutrients easily occur and organic matter content is low, *Isong mbat*/ *aduang isong* (soils high in clay content or gley / poorly drained soil) and *Ikon-eto* (hard soils which are difficult or hard for tillage operation and often characterized by the presence of stones and tree stumps). Based on soil texture, *Isong mberi* is ranked the best in terms of productivity by the rural farmers.

In Ibiono Ibom area, the quality of soils for agricultural purposes is tied to organic matter which is mostly interpreted by the rural farmers in the prevailing colour of the soil within the locality. The ranking of soil properties as soil quality determinant in the area was of the descending order; Colour and Past Harvest record > Texture > Vegetation > Fallow period > Topography > Location > Ease of Tillage > Drainage.

This study's findings correspond to Desbiez *et al*, (2004) and Omari *et al. (*2018). According to their study, farmers' indigenous indicators of soil health comprised (i) Biological indicators: plants (other than cultivated crops) and soil fauna whose presence or growth indicates a healthy or non-healthy soil; (ii) Soil characteristic indicators: soil properties which signify the health status of soils; and (iii) Above ground plant vigor: crop or weed-growth characteristics and yield. Farmers' soil quality indicators according to this study are generally limited to visible and tactile properties of the soil such as color and tilt, similar to Dawoe *et al,* (2012) and Barrios *et al,* (2006) in southern Ghana and eastern Africa respectively.

Table 1.2 Ranking of Rural Farmers Soil Quality Determinants in Ibiono Ibom Area

Soil Properties	No. of farmers	Percentage of farmers (%)	Ranking of soil Properties
Soil colour	50/50	100	1st
Location	18/50	36	6th
Ease of tillage	15/50	30	7th
Past Harvest record	50/50	100	1st
Topography	20/50	40	5th
Fallow period	28/50	56	4th
Drainage / flooding	5/50	10	8th
Soil texture/Soil type	40/50	80	2nd
Vegetation	35/50	70	3rd

Rural farmers soil quality perspective and management of soils in Ibiono Ibom Area

Farmers in Ibiono Ibom area put the following management inputs in place while farming so as to maintain the quality of the soil in the area; fallowing, mixed cropping, application of organic manure/ mulching, crop rotation and making bars across the slopes.

Fallowing: In Ibiono Ibom area, most of the farmers do not apply inorganic fertilizers as they cannot afford it or/ and some believed that crops planted with inorganic fertilizers are not always sweet. Hence, the major way of improving and maintaining soil quality and fertility of soils in the area by the local farmers is by fallowing. The fallow period ranges from 2 to 7 years depending on the community and land ownership. Table 1.4 below, indicates the rural farmers' productivity rating based on fallow period.

Mixed cropping: Cultivation of cassava, maize and melon together on the same piece of farmland is a very common practice in the area. They believed that the melon will cover the soil surface to reduce evaporation and impact of sunlight on the soil surface as well as adding nutrient to the soil since it will be harvested before the cassava.

Application of Organic manure and Mulching: Since most farmers don't use inorganic fertilizer, they use organic fertilizers such as poultry dropping, manure from the goat pens, cattle dung as well as mulching waterleaves with Awolowo leaves and other mulching materials so as to improve and maintain the quality of the soils.

Bars across the slopes: Erosion which is considered to be one of the major threats of soil quality by the farmers especially on sloppy farmlands is controlled by the farmers by making cross bars across the slopes using weeds, sticks and soil material. The farmers believed that nutrients and soil losses through erosion are mitigated through this.

Table 1.3: Rural Farmers' Soil Quality Classification of Representative Farms in Ibiono Ibom Area

Sample Identity	Rural Farmers' Soil Quality Description	Soil Colour	Soil Texture	Drainage	Land Use	Rural Farmers' (Indigenous) Soil Quality Rating
Ikot Usen	*Obubid-Isong*	Very Dark gray	Loamy Sand	well drained	Cassava and Oil Palm Tree	1
Ikot Usen 2	*Idaidad-Isong*	Light brown/ red	Sandy loam	Moderately drained	Newly Harvested Farm	2
Ikot Usen 3	*Isong Mbat*	Dark gray	Sandy Clay Loam	Poorly drained	Fallowed Land	3
Ibiaku Osuk 1	*Obubid-Isong*	Very dark gray	Sandy loam	well drained	Newly Harvested Farm	2
Ibiaku Osuk 2	*Obubid-Isong*	Dark gray	Loamy Sand	Well drained	Cassava and Oil Palm Tree	2
Ibiaku Osuk 3	*Isong Mberi*	Black/ dark soil	Sandy loam	Perfectly drained	Fallowed Land	1
Edem Urua	*Isong Mberi*	Black/ dark soil	Loam	Perfectly drained	Cassava, melon and maize	1
Use Ikot Amama	*Idaided-Isong*	Light brown/ red	Loamy sand	Well drained	Cassava	2
Use Ikot Amama	*Isong Mbat*	Light gray	Clayey	Poorly drained	Cocoyam and water yam	1
Oko-Ita 1	*Obubid Isong*	Black	Sandy loam	Perfectly drained	Cassava, Melon, Waterleaf and Maize	1
Oko-Ita 2	*Obubid Isong*	Black	Sandy loam	Perfectly drained	Cassava and cocoyam	1
Ikpa Ikot Uneke	*Isong Mberi*	Black	Loam	Well drained	Cassava, Maize and Melon	1
Ekput	*Obubid Isong*	Dark gray	Sandy loam	Perfectly drained	Cassava	1

Soil Quality Rating: 1 = Good soil; 2 = Moderate soil; 3 = Bad soil (Collated Rural Farmer's Rating)

Table 1.4: Rural Farmers Productivity Rating Based on Fallow Periods

Fallow Period	No. of farmers	Percentage of farmers (%)	Productivity rating by rural farmers
No fallow	7/50	14	Low productive
1 year	19/50	38	Moderately productive
2- 4 years	22/50	44	Moderately/Very productive
5-7years	12/50	24	Very productive
More than 7 years	Nil	Nil	Nil

Figure 1: **On-farm interview and Discussions with some farmers in Ibiono Ibom Area**

Figure 2: **Household and focused group participatory soil quality assessment in Ibiono Ibom Area**

CONCLUSION

This study identified rural farmers' soil quality determinants and ranking in Ibiono Ibom area of Akwa Ibom state. It highlights the key points of farmers' perceived knowledge of soils management practices, and soil health indicators. The study findings reveal that farmers are equipped with some local knowledge that agrees with classical methodologies of identifying healthy soils. Furthermore, soil management among knowledge rural farmers is low. Hence it is recommended from this study that farmers should be sensitized through participatory approach training programs on management of site-specific on-farm resources. This will offer the opportunity to examine farmers 'indigenous knowledge for the subsequent integration with the scientific knowledge for sustainable soil management.

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REFERENCES

Barrios, E.; Herrera, R. and Valles, J.L. (1994) Tropical Floodplain Agroforestry Systems in Mid-Orinoco River basin, Venezuela. *Agrofor*. *Syst*., 28, 143–157.

Dawoe, E.K.; Quashie-Sam, J.; Isaac, M.E. and Oppong, S.K. (2012) Exploring Farmers' local Knowledge and Perceptions of Soil Fertility and Management in the Ashanti Region of Ghana. *Geoderma*, 179–180, 96–103.

Desbiez, A.; Matthews, R.; Tripathi, B.; Ellis-Jones, J. (2004) Perceptions and Assessment of Soil Fertility by Farmers in the Mid-hills of Nepal. *Agric. Ecosyst. Environ.*, 103, 191–206.

Doran, J. W. (2002). Soil Health and Global Sustainability: Translating Science into Practice. *Agriculture, Ecosystem and Environment,* 88(2): 119-127

Doran, J. W. and Parkin, T. (1994). Defining and Assessing Soil Quality. In Defining Soil Quality for a Sustainable Environment; Coleman, D.C., Bezdicek, D.F., Stewart, B.A.E., Eds.; *Soil Science Society of America*: Madison, WI, USA, Volume 35, pp. 3–21.

Reed, S. C.; Cleveland. C. C. and Townsend, A. R. (2007). Control over leaf litter and Soil Nitrogen Fixation in two lowland tropical rain forests. *Biotropica 39* , 585 - 592.

Omari, R. A, Bellingrath-Kimura, S. D., Addo, E. S., Oikawa, Y., and Fujii, Y. (Exploring Farmers' Indigenous Knowledge of Soil Quality and Fertility Management Practices in Selected Farming Communities of the Guinea Savannah Agro-Ecological Zone of Ghana). *Sustainability.*10, 1034.

Winter, M. (1997) New Policies and New Skills: Agricultural Change and Technology Transfer. *Sociol. Ruralis*, 37, 363–381.

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