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## SOIL MANAGEMENT TECHNIQUES UTILIZED BY SMALL SCALE FARMERS IN AKWA-IBOM STATE, NIGERIA

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### **Abstract**

*The aim of this study was to identify the Soil Management Techniques (SMTs) utilized by Small scale Farmers in Akwa Ibom State, Nigeria; to improve on the fertility status of intensively cultivated soils. Responses from a randomly chosen sample of farmers and extension agents revealed that, apart from naturally occurring bush fallows, farmers in the study area hardly utilize any SMT on a sustained basis. However, farmers occasionally apply SMT's like crop residues, intercropping and chemical fertilizers on their farms. This trend does not augur well for intensive food production in the state. The implications of these are examined.*

### **1. Introduction**

Food is a basic necessity for man's continued existence. Man therefore has to produce enough food for sustenance and survival.

Man's food depends primarily on crop plants. Crop plants depend on the soil because, adequate supply of nutrients enhance crop yield. The soil however does not contain a never-ending supply of nutrients (Komolafe et al, 1980). Therefore, the maintenance of soil fertility constitutes a major problem.

According to Ewer and Hall (1978), loss of nutrient materials from an area still covered by natural vegetation is minimal. Heavy soil nutrient losses ultimately occur due to constant crop production on the same portion of farm land. Table 1 below indicates the amount of nutrients removed from land when crops are harvested.

Table 1: Nutrients removed from land when crops are harvested at the indicated yield.

S/No	Crop	Yield (Kgha <sup>-1</sup> )	Nutrients (Kgha <sup>-1</sup> )			
			Nitrogen	Phosphorus	Potassium	Calcium
1.	Maize (grains)	1,000	15	3	3	0.2
2.	Rice (grains)	1,000	12	3	4	1
3.	Groundnut (Kernel and shells)	700	27	2	4	1
4.	Cassava (fresh tubers)	10,000	22	3	50	4
5.	Yam (Fresh tubers)	10,000	34	3	35	1
6.	Banana (Fruits)	10,000	22	4	60	1
7.	Cocoa (Beans)	500	12	3	10	?

Source: (Ewer and Hall, 1978) - adapted from Nye and Greenland.

The table portrays the fact that it is virtually impossible to maintain crop production without adding nutrients to the soil.

Various methods and techniques exist for soil maintenance and improvement of soil fertility. These methods include: crop rotation, use of farmyard manure, green manures, humus, compost, liming, chemical fertilizers, cover crops and shade trees. Other methods and techniques are: minimum tillage, zero tillage, slash and burn, use of light equipment, multiple cropping, mulching and Agro-forestry etc (Akinsanmi, 1975; Komolafe et al, 1980; Agbamu, 1993). Pretty (1996) however observes that all soil management practices may serve to either conserve existing on-farm resources, introduce new elements into the farming system or induce favourable changes in several components of the farming system.

In spite of the availability of the afore-listed soil management technologies food production levels in Nigeria, and Akwa Ibom State in particular, is still low. Akwa Ibom State still imports some of its basic food items e.g garri, yam, rice and plantain, amongst others; from neighbouring States. It is important that efforts be geared towards enhancing the soil fertility status in the area. This study was therefore primarily aimed at identifying the prevalent soil management techniques utilized by small scale food crop farmers in Akwa Ibom State. Ultimately, the research would sensitise agricultural experts towards areas of focus in their attempts to produce appropriate soil management technologies to suit the peculiar terrain of the state.

As an objective, the study attempts to identify the problems of soil management in Akwa Ibom State based on a null hypothesis that there was no significant difference in the ranking of frequently utilized soil management methods by farmers and extension agents in Akwa Ibom State.

## 2. Study Area and Methods of Study

The study area is Akwa Ibom State, which has a population of 2.53 million (1991 Census) and a land mass of 8,412km<sup>2</sup> (roughly 0.87% of Nigeria's land mass). The population density varies between 285-400 persons per km<sup>2</sup>. Invariably the small land mass is under intense pressure for competing demands, a situation which has adversely affected agricultural production. There is traditionally a preponderance of small scale farmers that continually engage in intensive cultivation on the same plots of land. In 1998, a category of 75 farmers were randomly selected from an assemblage of farmers present at two separate field demonstration days organised by the Akwa Ibom Agricultural Development Programme (AKADEP). Twenty field level extension agents were also selected from among the extension agents present at the two field days.

Data was generated through interviews and structured questionnaires. This was thereafter analysed with the aid of frequencies distribution, percentages and mean scores, while

Spearman-Rho Correlation Coefficient was utilised to test the hypothesis.

### 3. Presentation of Results

#### 3.1 Socio-Economic Characteristics of Respondents

Seventy-one percent of the farmers were between the 21-40 years age group. About 80 percent of the farmers had acquired not less than a secondary level of education. Eighty-one percent who were full-time farmers, had acquired between 1-10 years farming experience on farm sizes ranging from 2 to 4 acres (approx 0.8 to 1.6 ha). The farmers however had no access to credit facilities and claimed to receive extension advice at least once a month.

The extension agents were all educated; 65 percent were males while 35% were females. Official experience acquired, spanned between 2 to 5 years.

#### 3.2 Regularity of Use of Soil Management Techniques

To determine the regularity of use of soil management techniques (SMTs) a total of 10 common SMT's were identified, after interaction with farmers and extension agents. The respondents were requested to indicate the regularity or otherwise, of their utilization of each SMT. This was done with the aid of a 3-point likert continuum consisting of "Not at all" (1 point), sometimes (2 points); and regularly, (3 points). A total attitude score was thereafter computed for each SMT after which a mean score was computed for each SMT, using a cut off point of 2.50. Thus an SMT with a mean score of 2.50 or above, was considered a "regularly utilized" SMT, while an SMT with a mean score less than 2.50 was regarded as "not regularly utilized".

Ranking for the most important SMT's was finally done in a decreasing order of importance, with the highest scoring SMT assigned the lowest rank. The result is as shown in table 2 below:

Table 2: Means, attitude scores and ranking of regularly used soil management techniques by farmers in Akwa Ibom State (n = 75).

S/N	(A) Techniques	(B) Not At all	(C) Sometimes	(D) Regularly	(E) Attitude Score	(F) Mean Score	(G) Rank
I	Use of crop Residue	9(12)	36(48)	30(40)	171	2.28	1
II	Organic Manures	16(21.3)	30(42.7)	27(36.0)	161	2.15	7
III	Animal dung	20(26.7)	30(40)	25(33.3)	155	2.07	8
IV	Leguminous Crops	6(8)	48(64)	21(28)	165	2.2	4
V	Use of Ash	30(40)	10(13.3)	35(46.)	155	2.07	8
VI	Bush Fallow	5(6.7)	52(69.3)	18(24.0)	163	2.17	5
VII	Crop Rotation	5(6.7)	52(69.3)	18(24.0)	163	2.17	5
VIII	Chemical Fertilizers	6(8.0)	46(61.3)	23(30.7)	167	2.23	3
IX	Inter Cropping (Maize, Melon and Cassava)	3(4)	48(64)	34(32)	171	2.28	1
X	Alley Cropping	64(85.3)	10(13.3)	1(1.3)	87	1.16	10

(Percentages in Parentheses)

Source: Field Survey (1998)

Table 3: Means, Attitude Scores and Ranking of Regularly Used soil management Techniques by Extension Agents in Akwa Ibom State (n - 20).

S/N	(A) Techniques	(B) Not At all	(C) Sometimes	(D) Regularly	(E) Attitude Score	(F) Mean Score	(G) Rank
I	Use of crop Residue	6(30)	8(40)	6(30)	40	2.0	3
II	Organic Manures	6(30)	9(45)	5(25)	39	1.95	5
III	Animal dung	6(30)	10(50)	4(20)	38	1.9	6
IV	Leguminous Crops	6(30)	10(50)	4(20)	38	1.9	6
V	Use of Ash	13(65)	6(30)	1(5)	28	1.4	10
VI	Bush Fallow	3(15)	5(25)	12(60)	49	2.45	1
VII	Crop Rotation	8(40)	8(40)	4(20)	36	1.8	8
VIII	Chemical Fertilizers	4(20)	12(60)	4(20)	40	2	3
IX	Inter Cropping (Maize, Melon and Cassava)	4(20)	7(35)	9(45)	45	2.25	2
X	Alley Cropping	10(50)	6(30)	4(20)	34	1.7	9

(Percentages in Parentheses)

Source: Field Survey (1998)

Table 2 reveals that no SMT recorded a high regularity of use (see Column D) by farmers in the study area. The mean score distribution also confirms this assertion, as none of the SMT's scored up to the cut-off point of 2.5. However, the three SMT's with the highest attitude scores were:

(i) Use of crop residue (Attitude score (A.S) = 171)

(ii) Intercropping (A.S = 171)

(iii) Use of chemical fertilizer (A.S = 167)

Conversely, the SMT's with the least attitude scores were:

- (i) Alley cropping (A.S = 87) and
- (ii) Use of animal dung (A.S. = 155) and
- (iii) Use of ash (A.S = 155).

Table 3 reveals that the agents perceived only one SMT (Bush fallow) as being regularly utilized by farmers in the study area. This assertion was confirmed by a mean score of approximately 2.5 for "bush fallow". However, the four SMT's with the highest attitude scores were:

- (I) Bush fallow (A.S = 49)
- (II) Intercropping (A.S = 45)
- (III) Use of crop residue (A.S = 40) and
- (IV) Use of fertilizer (A.S. = 40).

Conversely, the three least utilized SMT's were:

- (I) Use of Ash (A.S = 20)
- (II) Alley cropping (A.S = 34 and
- (III) Crop rotation (A.S = 36).

### 3.3 Test of Significant Difference in the Ranking of Frequently Utilized Soil Management Techniques

Table 4: Table for Spearman's Rho Correlation (from tables 2 and 3)

D	-2	2	2	-2	4	-3	0	-1	1
D <sup>2</sup>	4	4	4	4	16	9	0	1	1

The Spearman Rho-Rank Correlation Coefficient was determined by the use of the formulae

$$r_s = 1 - \frac{6\sum D^2}{n(n^2 - 1)}$$

Where D = Difference between ranks of two variables x and y  
 n = No of observations

From the above equation therefore

$$r_s = 1 - \frac{6 \times 47}{10(10^2 - 1)} = 1 - \frac{282}{900}$$

$$= 1 - 0.28 = 0.72$$

The high value of correlation coefficient of 0.72 indicates that there is a high relationship between the ranking of farmers and extension agents on the frequently utilised SMT. This also suggests that farmers and extension agents agree that soil management techniques are rarely utilized by farmers in the study area.

### 4. Discussion and Conclusion

The results of this study shows that apart from bush fallow, which is only practicable in areas where there is surplus land for all socio-economic and demographic pursuits, no other SMT is utilised, on a sustained basis, in the study area. SMT's like "use of crop residue", "Intercropping", and Chemical Fertilizers; are however, sometimes applied by these farmers, on their farm plots. The fact that farmers hardly utilise crop rotation as an SMT may be predicated on the fact that cassava which is the major crop is not easily substituted by another crop. The farmers thus prefer to intercrop cassava with maize and melon, rather than rotate these crops. The low scores attributed to use of "ash" indicates that either the farmers hardly resort to bush burning or that they may not be aware of the soil improvement property of ash. Non-utilization of organic manures which involve composting, as an SMT, may be due to the cumbersome and tasking nature of the technique. While Alley cropping is observed only on farm plots operated by the forestry department, the use of animal dung is not feasible in an area of low livestock population density, like the study area.

Before the advent of chemical fertilizers, farmers in Akwa Ibom State maintained their farm lands through natural bush fallow. However, with the present scarcity and high cost of chemical

fertilizers indications are that farmers have abandoned the idea of either improving or maintaining their farm lands. This attitude, coupled with a more intensive use of the fast depleting stock of arable land, has resulted in the inability of farmers to meet the food demands of Akwa Ibom State. It is recommended that:

(a) Extension agents and agencies embark on a massive enlightenment programme to sensitise farmers on the need to utilise soil management techniques for improved crop yields, as well as practically demonstrate to the farmers, a more efficient means of producing, as well as, utilizing recommended soil management techniques.

(b) Agricultural research institutes in conjunction with subject matter specialists of the Akwa Ibom Agricultural Development Programme (AKADEP) need to intensify efforts to invent less cumbersome soil management techniques. To achieve this objective, research should aim to identify indigenous SMT's, simplified for use by the farmers.

## 5. References

- Agbamu, J. U. 1993: "Analysis of Farmers Characteristics Associated with Adoption of soil Management Innovations in Ikorodu Local Government Area of Lagos State" in *The Nigeria Journal of Rural Extension and Development* Vol. 1 (2 and 3) 57-67.
- Akinsanmi, O. 1975: *Certificate Agricultural Science* Longman Publishers, London.
- Ewer, D. W. and J. B. Hall 1978: *Ecological Biology 2* Longman Publishers, Lond.
- Komolafe, M. F., A. A. Adegbola; L. A. Are and T. I. Ashaye 1980: *Agricultural Science for West African Schools and Colleges* (2nd edn). O. U. P.; London.
- Pretty, J. N. 1995: *Regenerating Agriculture: Policies and Practices for Sustainability and Self-Reliance* Earthscan Publications Ltd; London.
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