Original Research Article

Resource Productivity under Yam Based Crop Mixture in Crude and Non-Crude Oil Producing Communities of Imo State, Nigeria

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Abstract

A study on resource productivity under yam based crop mixture (YBCM) in crude and non-crude oil communities was conducted in Imo State, Nigeria. The study assessed food crops' outputs, evaluated costs and returns, and determined the allocative efficiency of resource use under YBCM system in crude and non-crude oil producing communities. Stratified random sampling technique was adopted in selection of respondents. Primary data were obtained using a set of questionnaire on 50 YBCM farmers each from crude and non-crude oil communities. Data were analyzed using percentages, gross margin and net profit analysis, multiple regressions, t-values, and gross returns/total costs ratio. Output levels of the food crop components in YBCM system in non-crude oil producing communities were statistically and significantly higher than those of the crude oil producing communities. This agreed with results of studies that showed reduction effects of gas flaring on food crop yields in the areas. There was higher profitability in YBCM enterprise in non-crude oil producing communities than in crude oil producing communities. However, the two critical resources in farming, land and labour, the YBCM farmers in crude oil producing communities allocated these resources better than the YBCM farmers in non-crude oil producing communities. Based on the study findings the Federal and State Governments, and other oil industry stakeholders should formulate appropriate policies, programmes and conduct detailed ecological research studies that will lead to higher farm output by YBCM farmers in crude oil producing areas.

Keywords: allocative; crop; effects; efficiency; farming; flaring; gas; profitability; system; yields.

INTRODUCTION

Food is one of the basic necessities of all human beings. This makes food crops production fundamental to sustenance of life and the bedrock of economic development, especially in the provision of adequate and nutritious food that is so vital for human and industrial raw materials development (Nwosu, 2008). Production of arable crops is achieved through two main based crop mixture systems namely yam based crop mixture and cassava based crop mixture systems (IMO ADP, 2000).

Yam based crop mixture (YBCM) is one of the two common crop mixture systems practised in crude and non-crude oil producing communities of Imo state, Nigeria. YBCM composed of yam, maize and melon with yam as based crop. Yam, the based crop of YBCM, is an important food crop in Imo state and Nigeria in general. Nigeria is the main producer of yam in the world with about 71% of the world output (FAO, 2002). Besides, available data shows that yam is one of Nigeria leading root crops (FAO, 1999). The crops in YBCM are arable crops which are food crops planted and harvested at maturity within one production cycle or season. However, crop mixture is a viable strategy for spreading the risks of crop failure and labour demands for critical operations of sowing, weeding and harvesting (Eze et al., 2009).

In order to achieve optimum productivity level, resources must be available and whatever quantities of available resources must be used efficiently under favourable agro ecological conditions to maximize returns. The favourable agro-ecological conditions are altered by human activities such as crude oil exploitation. Crude oil is a naturally occurring liquid hydrocarbon of organic origin, dark in colour and occupying the interstices of permeable rocks such as limestone sealed in a below the earth's crust (Akwiwu et al., 2002). The long process of exploring the oil, prospecting, drilling, refining and transportation consist crude oil exploitation (Omuta, 1985). These activities often give rise to pollution. Okoli (2006) reported that pollution due oil exploitation is caused by gas flaring, pipeline leakage, oil water dump and oil spills. They have deleterious consequences on the agro-ecosystem that in turn adversely affects food crops productivity (Ukaegbu and Okeke, 1987; Olemeforo, 1994; 2000; Ezedike, 2000; Pernar et al., 2006; Alam et al., 2010). Besides, Opukri and Ibaba (2008) also observed that oil related environmental problems such as oil spillages, gas flaring, among others, have diminished the productivity of oil producing communities. Nigerian Environmental Study Team (NEST) (1991) observed that the Niger Delta region is the largest wetland area in Nigeria. As a result of oil exploitation in the region, which

Imo State is one, vast tracts of agricultural land have been rendered unproductive. The inhabitants of the area, who are mainly farm families, have become impoverished despite oil companies agricultural developmental activities in the State (Nwosu, 2008). It is therefore necessary to assess food crops' outputs, evaluate costs and returns, and determine the allocative of resource use under yam based crop mixture system in crude and non-crude producing communities of Imo State, Nigeria.

MATERIALS AND METHODS

Study Area

The study was conducted in Imo State in the southeastern part of Nigeria. The location was purposively chosen because it is one of nine oil producing oil states in the Niger Delta Region of Nigeria. Hence, Imo State has both crude and non-crude oil producing communities. Imo State is made up of twenty seven Local Government Areas (LGAs) with Ohaji/Egbema and Oguta LGAs as the crude oil producing areas.

The state is located between latitudes 4°45'N and 6°17'N and longitudes 6° 35'E and 8°9'E (Imo State Government, 1993). Imo State has a land area of 7,480 km² with a population of 3,934,899 and population density of 526 km² (NPC, 2006). The agro climate is typical of the tropics. The rainy season covers a period of about seven months April – October) with two weeks dry spell in August. The remaining months of November – March are dry season accompanied by the cool and dry harmattan wind which occurs around the months of December to February (Ugwu and Lekwa, 1988). The annual rainfall of Imo State is between 2000 mm and 2500 mm with the southern areas receiving a little more in the northern areas (FDALR, 1985). The annual temperature of the state is between 26 °C and 28 °C, with mean daily maximum and minimum rarely below 27 °C and 18 °C, respectively. The relative humidity ranges from 70 to 80 per cent. However, in the crude oil producing communities of Imo State, acid rain and very high temperature range commonly experienced due to crude oil exploitation activities in the area (Nwosu, 2008).

Imo State has a tropical rainforest, which has been turned to secondary vegetation following human activities. Flat to undulating land covers 60 per cent of the land area and is well drained, but the remaining areas are of hydromorphic soil (30%) and alluvial land (10%) which suffers from permanent or periodic flooding (Ugwu and Lekwa, 1988 and Beak/UniLag Consults/Geomatics, 1996).

The main food crops grown in the state are yam, cassava, maize, rice and cocoyam, while the major vegetables are melon, okra, fluted pumpkin and waterleaf. On small-holder plots, these crops are usually grown in mixtures of at least

two simultaneous crops. The common crop combinations are cassava with maize and melon, and yams with maize and melon.

Sampling procedure

The study was specifically concentrated in the two crude oil producing LGAs namely, Ohaji/Egbema and Oguta and other non-crude oil producing LGAs, namely, Owerri-West and Ngor-Okpala. The selection of these areas was purposive in that Ohaji/Egbema and Oguta LGAs are the only crude oil producing areas while Owerri-West and Ngor-Okpala are in the same agro ecological zone with the crude oil producing areas of the state.

Stratified random sampling technique was adopted in selection of respondents since respondents were drawn from yam based crop mixture farmers in the crude oil and non-crude oil producing communities. In the four selected crude and non-crude oil producing LGAs 25 yam based crop mixture farmers in each LGA with 5 respondents from each of the five communities in each of the selected LGAs. Hence, the total sample size for the study was 100 respondents. The sample frames from which respondents were randomly selected were lists of names of YBCM farmers of Imo State Agricultural Development Project (IMO ADP) contact farmers in crude and non-crude oil producing communities.

Cross sectional data were collected for the study with aid of detailed questionnaire administered to the selected YBCM farmers in the crude and non-crude oil producing communities. The data collected were those related to inputs and outputs as well as their prices. They also include size of land, labour, capital, price of labour, quantities of outputs and prices of outputs.

Method of data analysis

Data collected for the output levels were analyzed using descriptive statistics while costs and returns was actualized using Gross Margin and net Return analysis. The gross margin analysis and net profit were used as specified below.

$$GM = P_i Q_i - P_j X_j$$

Where:

Gm = Gross margin,

P_i = Unit price of output,

Q_i = Quantity of each output,

P_j = Unit price of each input, and

X_j = Quantity of each input.

Net returns = GM – TFC,

GM as defined above,

TFC = Total Fixed Cost derived by depreciating fixed assets.

Returns from production were based on three crops (yam, maize and melon) that constituted the crop mixture

in each farm. The average was used in the computation of this analysis. The productivity of various resources and resource use efficiency of YBCM system were derived from regression analysis. The implicit production response function model was expressed according to Oladunni (1996) thus,

$$Y = f(X_1, X_2, X_3, X_4, X_5, e);$$

Where:

Y = Value of output (₦),

X_1 = Labour per farm (₦),

X_2 = Value of fertilizer (₦),

X_3 = Value of other production inputs like seed yam, agro-chemicals and other miscellaneous expenses (₦),

X_4 = Depreciation expenses (₦),

X_5 = Size of cultivate farm land (ha), and

e = error term.

Four functional forms of equation namely linear, exponential, double- log and semi- log were tried for each data set and the best fit was taken as the lead equation. Allocative efficiency was determined by equating the marginal value product (MVP) of the i^{th} input to its price or marginal factor cost (MFC); that is, $MVPx_i = PX_i$ or $Py f_i = PX_i$.

Where:

$MVPx_{i(1=1,2,\dots,5)}$ = Marginal value product of the i^{th} input,

$Fi = dy/dx_i$ = Marginal physical product (MPP) of the i^{th} input and

Py = Unit output price.

For all the resources measured in physical units, the allocative efficiency index, W_{ij} , for each farmer type was give:

Where i is a particular resource, j is the farmer type and

all other variables are as defined above. The equation above is translated to: $MVPx_i = Py f_i = W_{ij}$ for resources measured in monetary term.

The maximum allocative efficiency for a particular group of farmers is confirmed with respect to a given resource if $W_{ij} = 1$. The resource is over-utilized if W_{ij} and under-utilized if $W_{ij} < 1$. The two groups of YBCM farmers would have equal allocative efficiency if $W_{ij1} = W_{ij2}$. Furthermore, to ascertain the level to which a particular resource should be increased or decreased from current level of use in order to achieve maximum allocative efficiency the following formula was used:

$$K_{ij} = (1 - W_{ij}) 100;$$

Where K_{ij} is the percentage by which the level of use of a particular resource should be increased or decreased to achieve the objective of maximum allocative efficiency.

RESULTS AND DISCUSSION

Output Levels of Yam Based Crop Mixture Farmers

In Table 1, output levels of three major food crops in yam based crop mixture (YBCM) system for crude oil and non-crude oil producing communities are shown. YBCM system composed of yam as the main crop in association with maize and melon (egusi).

The results in Table 1 show that in YBCM system in the crude oil producing communities, the average outputs of yam, maize and melon per hectare were 7,386,557 kg, 1,785.376 kg and 166.570 kg, respectively. In the non-crude oil producing communities the average outputs of yam, maize and melon per in YBCM system were 12,198.996 kg, 2547.333 kg and 267.591 kg, respectively. The YBCM

Table 1. Output Levels of Yam Based Crop Farmers in Crude and Non-Crude Producing Communities

Yam Based Crop Mixture	Crude Oil Producing Communities Average Food Crop Output Kg/ha	Non-Crude Oil Producing Communities Average Food Crop Output Kg/ha	Output Difference	% Output Difference
Yam	7,384.557	12,198.996	4,814.439	39.47
Maize	1,785.376	2,547.333	761.957	29.91
Melon	166.570	267.591	101.021	37.75
t-test:				
YBCM				
Yam: t-calculated = 8.45; t-tabulated at 5% and 1% levels of probability = 1.66 and 2.37, respectively.				
Maize: t-calculated = 7.82; t-tabulated at 5% and 1% levels of probability = 1.66 and 2.37, respectively.				
Melon: t-calculated = 9.00; t-tabulated at 5% and 1% levels of probability = 1.66 and 2.37, respectively.				

farmers in non-crude oil producing communities therefore recorded higher outputs in all crop components in YBCM system than the YBCM farmers in crude oil producing communities. The output differences were 4,814.439 kg (39.47%), 761.957 kg (29.91%) and 101.021 kg (37.75%) for yam, maize and melon, respectively (Table 1). The differences in these outputs were also highly significant in favour of YBCM farmers in non-crude oil producing communities since the t-calculated values were greater than t-tabulated at the 1% level of probability (Table 1). The results agreed with the *a priori* expectation that the levels of output of food crops in crude oil producing area would be lower due to gas flaring and effects of crude oil exploitation activities in the area. Furthermore, these results on output levels of food crops in both areas were in agreement with results on agronomic investigations of Ukaegbu and Okeke (1987), Olemeforo (1994 and 2000) and Ezedike (2000).

Costs and Returns of YBCM Enterprise

Tables 2a and 2b show the gross returns, total variable costs, gross margin, total fixed costs, total costs and net returns for hectare of yam based crop mixture (YBCM) enterprise in crude oil and non-crude oil producing areas, respectively. The total production cost of one hectare of YBCM in crude oil and non-crude oil producing areas were ₦620, 098.56 and ₦568, 579.99, respectively (Tables 2a and 2b). In crude oil producing area, seed yams constituted

the major cost component (73.54%) of the total production costs in YBCM enterprise followed by fertilizer (9.16%) and labour (5.60%) (Table 2c). Nevertheless, the variable costs and fixed costs accounted for 90.12% and 9.88% of the total costs, respectively. The interest (91.97%) and land rent (5.12%) constituted the main components of the fixed costs (Table 2c).

A similar trend was also observed in YBCM enterprise in non-crude oil producing area with seed yams (76.36%), and fertilizer (8.40%) and labour (3.34%) (Table 2c). However, the percentage of the variable costs and fixed costs that constituted the total costs were 89.87% and 10.13%, respectively with the interest (91.28%) and rent (3.83%) constituting the major components of fixed cost. This observed difference in percentage of fixed costs between both areas might be attributed to continuous reduction of arable lands in crude oil producing areas due to the effects of crude oil exploitation which also might be responsible for high land rent in crude oil producing communities.

The gross returns/ total costs ratios of YBCM enterprise in crude oil and non- crude oil producing communities were 1.08: 1 and 1.55: 1, respectively. These implied that in crude oil producing areas, one naira spent in YBCM enterprise resulted into 8 kobo as profit while in non-crude oil producing areas, one naira yielded 55 kobo as profit. The 47 kobo profit difference could be attributed to effects of crude oil exploitation activities in crude oil producing communities. These effects resulted principally from oil spillage that reduced the fertility of most arable lands

Table 2a. Enterprise Budget for One Hectare of Yam Based Crop Mixture (YBCM) Enterprise in Crude Oil Producing Communities

Item	Unit	Unit Price ₦	Quantity	Value ₦
Receipts				
Yam	kg	66.80	7,384.557	493,288.41
Maize	kg	81.04	1,784.376	144,686.87
Melon	kg	182.14	166.570	30,339.06
Gross Returns (A)				668,314.34
Operating Inputs				
Seed Yam	no.	45.60	10,000	456,000.00
Maize seeds	kg	193.58	30	5,807.40
Melon seeds	kg	217.97	25	5,449.25
Fertilizer	50kg bag	3,550.00	16	56,800.00
Labour	₦			34,748.85
Total Variable Costs (B)				558,804.85
Gross Margins (A-B)				109,509.49
Fixed Costs				
Depreciation expenses				1,779.98
Land rent				3,141.13
Interest				56,372.60
Total Fixed Costs (C)				61,293.71
Total Costs (C+B)				620,098.56
Net Returns				48,215.78
Gross returns/Total costs ratio: 1.08:1				

Table 2b. Enterprise Budget for One Hectare of Yam Based Crop Mixture (YBCM) Enterprise in Non-Crude Oil Producing Communities

Item	Unit	Unit Price ₦	Quantity	Value ₦
Receipts				
Yam	kg	66.80	7,384.557	493,288.41
Receipts:				
Yam	kg	56.46	12,198.996	688,775.31
Maize	kg	58.60	2,547.333	149,273.71
Melon	kg	164.12	267.591	43,917.03
Gross Returns (A)				881,966.05
Operating Inputs				
Seed Yam	no	43.42	10,000	434,186.26
Maize seeds	kg	131.92	30	3,951.60
Melon seeds	kg	241.09	25	6,027.25
Fertilizer	50kg bag	2,985.82	16	47,773.12
Labour	N			19,016.50
Total Variable Costs (B)				
Gross Margin (A-B)				
Fixed Cost:				
Depreciation expenses				3,731.56
Land rent				2,204.64
Interest				51,689.09
Total Fixed Costs(C)				57,625.26
Total Costs(C+B)				568,579.99
Net Returns				313,386.06
Gross returns/Total cost ratio:	1.55:1			

Table 2c. Comparative Analysis of Production Costs Components for One Hectare of Yam Based Crop Mixture (YBCM) Enterprise in Crude and Non-Crude Oil Producing Communities (N/ha)

Ite	Seed Yam	Maize	Melon Seed	Fertilizer Seed	Labour	Depreciation	Land Expenses	Interest Rent	Total
Crude Oil Producing Communities	45,000.00 (73.54%)	5,807.40 (0.94%)	5,449.25 (0.88%)	56,800.00 (9.16%)	34,748.00 (5.60%)	1,779.98 (0.29%)	3,141.13 (0.51%)	56,372.60 (9.09%)	620,098.56 (100%)
Non-Crude Oil Producing Communities	434,186.00 (76.36%)	3,951.60 (0.69%)	6,027.25 (1.06%)	47,773.12 (8.40%)	19,016.50 (3.34%)	3,731.53 (0.66%)	2,204.64 (0.39%)	51,689.09 (9.09)	568,579.99 (100%)

and gas flaring which reduced yield of food crops in the area (Odu, 1983; Ukaegbu and Okeke, 1987; Olemeforo, 2000; Ezedike, 2000; Pernar et al., 2006).

Allocative Efficiency of Resource Use

Following statistical and econometric reasons, the exponential function was chosen as the lead equation for the YBCM farmers in crude oil producing areas (Table 3), while the double-log function was chosen for the non-crude oil producing areas (Table 4).

Table 5 contains the geometric means of outputs and inputs for the YBCM farmers in crude oil and non-crude oil producing areas. These means were taken together with the coefficients from the lead equations in Tables 3 and 4

for the computation of the marginal value products (MVP) and, subsequently, the allocative efficiency indices from equation given in the data analysis of research methodology. The MVP for YBCM farmers in crude oil producing areas, given the lead equation as exponential function, was $MVP_{xi} = a_i \bar{Y}$, where a_i was the coefficient of each independent variable (input) and $\bar{Y}$ the geometric mean of the output. The MVP for the YBCM farmers in non-crude oil producing areas, given lead equation as double-log function, was $MVP_{xi} = a_i (\bar{Y} / \bar{X})$, where a_i was the coefficient of each input $\bar{Y}$, the geometric mean of output and $\bar{X}$ the geometric mean for each input.

Table 5 shows that none of the YBCM farmer groups achieved absolute allocative efficiency in the use of any YBCM production resource. On the whole, the YBCM farmers in

Table 3. Estimated Production Functions for YBCM Farmers in Crude Producing Communities

Variables	Exponential	Linear	Double-Log	Semi-log
Intercept	12.37144295*** (53.06)	-105686.441 (-0.51)	-0.6235 (-0.19)	-15520920.92*** (-4.57)
Labour	0.00375438** (2.37)	3627.876*** (2.58)	0.0537 (0.54)	96378.74 (0.84)
Fertilizer	0.00001456 (1.48)	2.812 (0.32)	0.9682*** (3.11)	1162392.15*** (3.63)
Seeds/Plant- ing materials	0.00000085*** (4.34)	0.659*** (3.81)	0.2870*** (3.74)	162102.09** (2.06)
Farmland	-0.29619112 (-0.85)	123395.978 (6.40)	-0.1084 (-0.64)	-294164.96 (-1.62)
Capital	-0.00006327*** (-3.50)	15.637 (0.98)	-0.0674 (-0.96)	140577.02** (1.98)
R ²	0.8334	0.8309	0.8210	0.7566
R ²	0.8180	0.8152	0.8044	0.7341
F-ratio	44.01	43.25	40.36	27.35

() t-statistic computed *** Statistically significant at 1%; ** Statistically significant at 5%.

Table 4. Estimated Production Functions for YBCM Farmers in Non- Crude Producing Communities

Variables	Double-log	Exponential	Linear	Semi-log
Intercept	21.6979** (2.13)	13.13882698*** (104.87)	-237235.734 (-0.82)	32240256.73 (1.12)
Labour	0.2702 (0.76)	0.00159860 (0.25)	3694.538 (0.25)	1167296.31 (1.16)
Fertilizer	0.7887 (-0.80)	-0.00000650 (-0.58)	-36.475 (-1.41)	-2898681.16 (-1.04)
Seeds/Planting material	-0.2155 (-0.76)	-0.00000025 (-0.77)	-0.575 (-0.77)	-814930.84 (-1.02)
Farmland	1.5224 (1.53)	-0.88266897** (1.82)	2691753.253** (2.40)	3695172.97 (1.31)
Capital	0.2710*** (3.13)	0.00000360 (0.82)	8.725 (0.86)	720030.65*** (2.94)
R ²	0.8360	0.7715	0.6844	0.6617
R ²	0.8208	0.7503	0.6552	0.6304
F-ratio	44.86	29.71	19.08	17.21

() t-statistic computed *** Statistically significant at 1%; ** Statistically significant at 5%.

crude oil producing areas achieved better allocative efficiency than YBCM farmers in non-crude oil producing areas in the use of labour, seeds/planting materials and farmland, while those in non-crude oil producing areas performed better in the use of fertilizer and capital. The farmers in the crude oil producing areas over-utilized fertilizer, seeds/planting materials, farmland and capital, but under-utilized labour. Those in non-crude oil producing areas over-utilized fertilizer, seeds/planting materials and capital, but under-utilized labour and farmland. Therefore, to achieve absolute allocative efficiency in YBCM production and hence maximum profit, policies and programmes that would enable YBCM farmers in crude oil producing areas to increase their use of labour by 269.73% and reduce the use of fertilizer, seeds/planting materials, farmland and capital by 99.67%, 99.85%, 92.42% and 96.44%, respectively, should be put in

place. For YBCM farmers in non-crude oil producing areas, policies and programmes that would enable them to reduce their use of fertilizer, seeds/planting materials and capital by 99.60%, 99.91% and 57.01%, respectively, and increase the use of labour and farmland by 922.01% and 45,900%, respectively, should also be put in place.

Elasticity of Production

The elasticity of production shows the change in output relative to a unit change in input. Returns-to-scale were derived through the summation of the elasticities of production (E_p) for the various resources. For YBCM farmers in crude oil producing areas, given the lead equation as exponential function, elasticity of production (E_p) was aix_i .

Table 5. Allocative Efficiency Indices for the YBCM Farmers in Crude and Non-Crude Oil Producing Communities

YBCM Farmer	Crude Oil Producing Areas	Non-crude Oil Producing Areas
Geometric means of inputs & output:		
Output (₦)	803,480.00	1,486,700.00
Labour (Mandays)	48.37	74.08
Fertilizer (₦)	65,303.00	97,999.00
Seeds/planting materials (N)	511,690.00	893,250.00
Farmland (ha)	1.07	2.23
Capital (₦)	2,214.40	7,288.00
Labour	3,016.57	5,472.60
Fertilizer	11.70	11.97
Seeds/planting materials	0.68	0.36
Farmland	237.98	1,014,956.09
Capital	50.84	538.61
Marginal factor cost:		
Labour	815.88	530.58
Fertilizer	3,550.00	2,985.82
Seeds/planting materials	457.15	416.43
Farmland	3,141.13	2,204.64
Capital	1,395.96	1,252.85
Allocative efficiency indices (W_{ij}):		
Labour	3.6973	10.2201
Fertilizer	0.0033	0.0040
Seeds/planting materials	0.0015	0.0009
Farmland	0.0758	460.3727
Capital	0.0364	0.4299
Required change in W_{ij} (K_{ij}):		
Labour	-2.6973	-9.2201
Fertilizer	0.9967	0.9960
Seeds/planting materials	0.9985	0.9991
Farmland	0.9242	-459.0000
Capital	0.9644	0.5701

Table 6. Elasticity of Production of YBCM Farmers in Crude and non-Crude Oil Producing Communities (E_p)

Variable	Crude Oil Producing Areas YBCM Farmers	Non-crude Oil Producing Areas YBCM farmers
Labour	0.1816	0.2702
Fertilizer	0.9508	-0.7887
Seeds/planting material	0.4349	-0.2155
Farmland	-0.3169	1.5224
Capital	-0.1401	0.2710
ΣE_p	1.1103	1.0594

With the double-log function as lead equation for YBCM farmers in non-crude oil producing areas, the regression coefficients were the direct elasticities of production.

Table 6 shows that none of the YBCM groups of farmers was operating at constant returns to scale. YBCM farmers in both areas operated at increasing returns to scale, suggesting that they were operating in stage one of the production function, which is an irrational stage.

However, the YBCM farmers in non-crude oil producing areas were closer to constant returns to scale than those in crude oil producing areas. The overall implication of these results was that YBCM farmers in crude oil producing areas

had to employ more resources than YBCM farmers in non-crude oil producing areas before they can improve on their productivity. This suggests that productive resources in the crude oil producing areas are gradually diminishing pushing farmers in the area to employ more resources than their counterparts in non-oil producing communities.

CONCLUSION AND RECOMMENDATIONS

Based on findings the output level of food crop components of YBCM system, namely yam, maize and melon, in non-

crude oil producing communities were significantly higher than those of crude oil producing communities. This implies that gas flaring and other effects of crude oil exploitation activities negatively affect food crops' output levels under YBCM system. Besides YBCM enterprises in both areas were marginally profitable but the level of profitability was much higher in non-crude oil producing communities than in crude oil producing communities.

With respect to two critical resources in farming, land and labour, YBCM farmers in crude oil producing communities allocated those resources better than YBCM farmers in non-crude oil producing communities. The results of the coefficient of returns to scale for the YBCM farmers in both crude and non-crude oil communities implied that YBCM farmers in both areas could improve their productivity by employing more resources with the levels being more in the case of YBCM farmers in crude oil producing communities than in non-crude oil producing communities.

Based on study observations and findings the following policy recommendations were made: Federal and State Governments should enforce the laws banning the use of gas flaring as means of crude oil exploitation by oil companies because of its detrimental effects on ecosystems and food crop production. Alternatively governments should introduce policies on use of gas flaring as means of crude oil exploitation by oil companies should proffer mitigations that cushion its detrimental effects on the ecological systems of the crude oil producing communities. Governments should impose stiff penalties on oil companies that allow occurrence of oil spillage in their concessional areas due its adverse effects on the ecosystem. Besides multidisciplinary researches on ecological agronomical changes in crude oil communities should be carried out by experts.

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Received: September 4, 2013

Accepted after revisions: March 17, 2014

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