

Performance Assessment of Land Enhancing Technologies: An Economic Analysis For Food Crop Farmers In Southwestern Nigeria.

By

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1. Introduction

One of life's major activities that guarantee the sustenance of livelihood is farming. Farming on the other hand has to be embarked upon on one of the nature's most wonderful endowment referred to as land. Land is the solid part of the earth's surface used for several other activities (Oni and Adegeye, 2001), but farming appears to be the most outstanding of these activities. Land is of course, not simply an economic commodity, just as labour is not. In areas where it is abundant, there seems to be a marked tendency for people to think of it only as a place where people live and as the ground where ancestors are buried: it has a sacred quality. It may indeed be the case in sparsely populated area, whether pastoral or agricultural, that land is not scarce and is thus not a true economic resource in the usual meaning of the term; and these conditions were probably the norm, says a century ago.

One of the most serious problems of the agrarian structure is the excessive reductions of agricultural productivity resulting from major degradation of soil fertility. According to Bamire and Manyong (2000), research efforts have revealed that the need for intensification of production, greater use of land-saving technologies, limited expansion into marginal land and provision for increasing multi-use pressures on land. The increasing rate of population growth from period to period in Nigeria and the consequent pressures from competing demands for land over time have resulted in cultivatable land being drawn from its traditional agricultural uses, with resultant reduction in the land-man ratio. This assertion had earlier been made by Ruthenberg, 1980; Adesimi, 1988). It was discovered that this reduces the average size of farm land and invariably leads to soil fertility depletion through continuous or intensive cropping along with short, unfertilized fallow. Fallow and shifting cultivation practices were traditionally used to replenish most of the nutrients removed by crops. Fallow periods have however shortened from between 15 and 20 years to between 0 and 5 years on the average in many places in Nigeria (Bamire and Manyong 2003, citing Jibowo and Adepetu, 1985; OSSADEP, 1996).

There is a dire need to therefore economically assess the performance of recently identified sustainable land enhancing technologies. Such technologies include the use of leguminous cover crops and appropriate fertilizer application. This will serve as a consistent lee-way for alternatives to maintain the potentials of the land resources under the various prevailing economic, social and political environment and land use system.

2. Methodology

Two sets of improved land management systems introduced by the Oyo State Agricultural Development program (ADP) to food crop farmers were investigated for their performances. These involve the adoption of land enhancing technologies that include (1) repeated leguminous cover crops and (2) appropriate fertilizer application. A participatory survey was conducted with one hundred and eighty (180) food crop farmers in five (5) differently scattered farming communities in the derived savanna

agro ecological belt of south western Nigeria. The sampled farmers were identified along with the type of the two land enhancing farming methods practiced. Thereafter an economic analysis of each method was carried out and the socio-economic and demographic factors, farm specific and intrinsic risk factors affecting the farmers' productivity were determined.

3. **Results and Discussion**

The five major farming communities where farmers separately adopted these two different land enhancing technologies essentially represent the agricultural development project (ADP) zones of the states of Oyo and Osun. The zones where the farming communities were selected are Ogbomoso, Oyo, Ibadan/Ibarapa, Iwo and Ilesa. Cash or annual crops grown include among others; cocoa, oil palm, cashew and mango. Food crops grown are yam, cassava, maize, guinea corn, rice, cowpea, melon, soybean, fruit and leafy vegetables such as okra, tomato, pepper; amaranthus etc. Backyard or free range livestock such as goat, sheep, and chicken are also raised.

The summary description of the socio-economic and farm characteristics of farmers (Table 1) shows that on the average, farmers who adopt the repeated leguminous cover crops (RLCC) in Ibadan/Ibarapa ADP zones seem to be more elderly with a mean age of 68.25. The average age with the least figure is under the Ogbomoso ADP zone for farmers adopting the appropriate fertilizer application (AFA). Results show that the sampled farmers who adopt the (AFA) in all the zones appear to have acquired some levels of at least primary education with those in Ilesa zone, probably attaining a bit of secondary education. That probably is a good reason for their preference of adopting the AFA technology, so that the understanding of this technology would not pose a problem. Farm sizes are also higher under the AFA method because more output is expected to cover the cost of fertilizer and its application. Annual farm incomes are higher under the RLCC method. Though farm sizes are smaller in RLCC than in AFA, the higher incomes under the RLCC are expected because there is intensive use of the land area, as multiple and intercropping are good benefit for the farmers under this technology type. This is also where the use of repeated leguminous cover crops comes into play to enhance soil fertility and to check degradation which is the bane of production in the study area. Leaching is also minimal in the RLCC whereas in AFA method, heavy rainfall leads to inadequate fertilizer uptake by crops as most of the doses are wasted away. There seems to be clear difference in the off-farm income realizable from the two technologies under all the zones. However, the RLCC in Ogbomoso zone yields the higher off-farm income whereas ironically, the lowest off-farm income was also realized from the RLCC in Ibadan/Ibarapa zone. Farming experience are lower for the AFA method because adequate fertilizer application are consistent with level of educational attainment. Number of crop grown is higher under the RLCC method for reason of mixed or multiple cropping. The cash or annual crops grown include mango and cashew mostly in Ogbomoso zone, Oyo, Ibadan/Ibarapa and Ilesa zones are known for cocoa and oil palm while the Iwo zone is known for oil palm and cashew. On the average, each of the zones produces at least two cash or annual crops. Farmers under the AFA method mostly patronize rural banks and cooperatives to finance the procurement of chemical fertilizer which is preferred on seasonal basis. Under the RLCC method, farmers like to patronize mostly the local contribution of saving method because there is always one crop or the other to grow at all seasons of the year. This method of finance is preferred because money for farming operation can be secured on short notice.

Results from the estimation of the efficiency of the different resources employed show that all the resources (variables) are not used to the point of economic

efficiency. While land, pesticides under the RLCC and pesticides under the AFA methods are over utilized; labour, land, planting materials and implements are underutilized under the two methods. A pair wise t-test was conducted to ascertain the difference in the mean efficiency for the two methods of RLCC and AFA. The null hypothesis of no significant difference in the mean economic efficiency of the two methods was accepted at a minimum probability level of 5%. However, the test of no significant relationship between the two methods is rejected also at a minimum of 5%. This implies that the seemingly equal mean economic efficiencies from the two technologies also confirm their relationship.

Under the RLCC, age, farm distance and farming experience are the factors which significantly affect resource productivity, while under the AFA method, farm distance and land size are significant in determining resource productivity.

4. Conclusion

The study shows that financial return realizable from both the RLCC and AFA are not the same. The combination of resources which produced these incomes possesses some similarities in their pattern of use in terms of efficiency of resource use. Resource and of course economic efficiency could be improved upon when the use of the RLCC is intensified and also when the use of AFA is timely. This however depends largely on the type of crop grown. In any case, the study confirms the near effectiveness of the functional ability of the hitherto world bank funded ADPs. This effectiveness can be made better with adequate incentives to both the agency and to the farming communities. This study concludes by making a reach out case to all small holder farmers who appear inaccessible by the ADPs' agents to incorporate them into the main scheme of better and improved farming and land enhancing technologies. This will enable a wider acceptability of these technologies and many more other ones that are suited for different farming communities

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Table 1: Selected socio-economic and farm characteristics of sampled farmers on the basis of land enhancing technology adopted

Farming community	1	2	3	4	5
	Ogbomoso	Oyo	Ibadan/Ibarapa	Iwo	Ilesa
1. Age (years)					
RLCC	65.45	59.74	68.25	52.32	59.87
AFA	42.25	51.15	47.38	50.05	45.45
2. Educ. of household head (yrs)					
RLCC	1.05	3.25	2.15	1.17	3.85
AFA	4.38	4.40	7.30	5.56	10.45
3. Household size (no)					
RLCC	7.25	5.05	8.65	6.06	7.13
AFA	3.00	2.75	5.13	3.08	4.00
4. Farm size (Total ha)					
RLCC	1.65	0.75	0.45	0.85	1.09
AFA	3.55	1.60	2.10	2.27	3.85
5. Annual farm Income (N)					
RLCC	404,005	529,145	505,945	415,007	512,645
AFA	325,109	399,875	424,300	315,992	465,115
6. Annual off-farm income (N)					
RLCC	67,507	39,385	25,774	44,443	38,117
AFA	37,987	56,100	28,565	31,235	65,200
7. Farming experience (years)					
RLCC	42.35	39.73	59.25	32.11	51.01
AFA	14.29	30.21	30.35	29.33	30.20
8. Food crops grown (no)					
RLCC	5.26	6.56	8.00	7.22	7.17
AFA	4.10	4.28	6.00	5.50	6.69
9. Cash (annual) crop grown (no)					
RLCC	2.00	2.00	2.00	2.00	2.00
AFA	2.00	2.00	2.00	2.00	2.00
10. Source of farm finance					
RLCC	rural bank/crop/local contribution	cooperative	coop/local contribution	coop/local contribution	rural bank/coop
AFA	rural bank/crop	rural bank/coop	rural bank/coop	rural bank/coop	rural bank/coop

Source: Survey Data, 2000

1. RLCC = Repeated leguminous cover crop; AFA = Appropriate fertilizer application
2. ₦ = Naira (Nigerian currency), at the time of this research, the Naira was exchanging for .0056 Euro
3. Figures in table are mean values

Table 2: Resource use efficiencies for the two technologies factors affecting farmers productivity

Resource (variables)	Efficiency of technology type	
	RLCC	AFA
X ₁ (rent on land)	1.0075	0.9925
X ₂ (labour)	0.9016	0.9878
X ₃ (planting materials)	0.8995	0.9002
X ₄ (implements)	0.9913	0.9245
X ₅ (pesticides)	1.5770	1.8900
Factors (variables)	Productivity significance of factor of technology type	
Z ₁ (Age)	S**	NS
Z ₂ (farm distance)	S*	S**
Z ₃ (experience)	S**	NS
Z ₄ (farmer's perception about risk factors)	NS	NS
Z ₅ (land size)	NS	S**

Source: Estimated from survey Data, 2005

S = Significant; NS = Not significant; * Sig. at 1%; ** Sig. at

1. H⁰: Relationship between economic efficiency of RLCC and AFA not significant
2. H₀: Differences in the mean economic efficiencies of the two technology types is not significant