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Full Length Research Paper

Cost analysis of on-farm adaptive research (OFAR) as a strategy for Hevea technology transfer in the rubber belt of Nigeria

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The study is a cost analysis of on-farm adaptive research (OFAR) as a strategy for technology transfer in Hevea plantation establishment in the rubber belt of Nigeria. Data were collected on 99 rubber contact farmers in both traditional and marginal rubber growing states of Nigeria in 2007/2008 planting season and were analyzed using descriptive statistics. Empirical results of the analysis revealed that majority of the respondents (98.99%) cultivated between 1 and 4.99 hectares with a mean farm size of 0.82 hectares. Also, 74.75% of the contact farmers were from the traditional rubber belt of Nigeria. The cost analysis per hectare revealed high subsidy on rendering of technical services (71.42% or ₦ 12,596.39) by Federal Government while 28.58% (₦3, 600.00) was borne by contact farmers. Technical services rendered include marking out, lining out, holing and planting. Evaluation of cost of OFAR trials on the basis of rubber growing ecology revealed that it is more costly to establish one hectare in the marginal areas than in the traditional rubber belt. There is therefore the need for decentralization of the production of planting materials within economic radius of the farmers by collaborating with the Agricultural Development Programmes (ADPs) of the States and Rubber Research Institute of Nigeria in the training of personnel to reduce the cost of rendering technical services to the farmers.

Key words: Hevea, plantation, on-farm adaptive research (OFAR), technology, rubber belt, descriptive statistics.

INTRODUCTION

Natural rubber tree belongs to the family of latex producing plant called *Euphorbiaceae.* The rubber tree is of the genus *Hevea* of which eleven species have been documented. Among these species, *Hevea brasiliensis* Muell Arg is the major source of natural rubber. This is as a result of superior latex yield over other species of *Hevea*. Natural rubber was introduced into Nigeria in 1895 from the Wick ham collection of 1876. Transition period between 1876 and 1895 was the era of planting at Kew Botanical Gardens in England and Asia. The earliest plantation in Nigeria was planted in 1903 and by 1925 single estates of about 1000 hectares was planted. The early plantations were raised from unselected seeds with latex yield of 300 to 400 kg/ha/yr. Genetic improvement of *H. brasiliensis* commenced in Nigeria in 1960s following the establishment of Rubber Research Station (RRS) in 1961 and became the Rubber Research Institute of Nigeria in 1973 with the mandate of genetic improvement of natural rubber and other latex producing plants of economic importance. Germplasm collection for the purpose of genetic improvement started in 1960s with the importation of primary and improved hybrid clones from Malaysia and Sri - Lanka. Among the collections are the RRIM series, RRIC series, PB series, GT1 and so on. Some clones of Indonesian origin such as PR and Tjir series and IAN series of Brazil were part of the collection from Malaysia and Sri- Lanka. To date, twenty-four high latex yielding clones have been developed in Nigeria. These clones have latex yield of 2000 to 3500 kg/ha/yr (Omokhafe and Nasiru, 2004).

Natural rubber was ranked as the fourth most valuable agricultural export commodity in Nigeria after cocoa, groundnut and palm kernel, with 92% of natural rubber production exported, making rubber essentially a foreign

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exchange earner for the national economy. Natural rubber is a dependable source of raw material for local industries; it also provides employment opportunities for farmers, tappers, manufactures and other personnel in marketing. Natural rubber has diversity of uses. Latex and coagula are important in automobile industries for the manufacture of tyres and tubes. Latex is useful in the manufacture of surgical gloves while the rubber seeds are processed into rubber seed oil and alkyd resins for industrial uses. Furthermore, rubber is environmentally friendly and helps to protect the soil from soil erosion (Abolagba and Giroh, 2006). Nigeria has 247,100 hectares of land under rubber cultivation and majority of these hectares are owned by small-scale farmers (Aigbekaen et al., 2000; Delabarre and Serier, 2000).

Agriculture has witnessed scientific revolution that makes the process of technical change much more knowledge intensive and calls for transforming farmers through education and other capacity building activities that are catalysts in technology adoption. On-farm adaptive research (OFAR) has been recognized as one of the vehicles for technology delivery among farmers. Government introduced a wide range of programmes such as (Agricultural Development Programmes (ADPs) and supported by the National Agricultural Research Projects (NARP), Research-Extension-Farmers-Input Linkage Systems (REFILS).The multi state Agricultural Development Projects (MSADP) also characterized the T&V (training and visit) extension approach to encourage farmers in technology adoption (World Bank, 2004). Lead or contact farmers are often used with a view that through them technology could trickle down to other farmers. Okwu and Ejembi (2005) stressed the need for availability of necessary physical facilities and infrastructures (classroom, demonstration plots, equipment teaching aids in enhancing adoption process of farmers. The contribution of OFAR activities as they enhance natural rubber plantation establishment is yet to be investigated. This study was therefore undertaken to examine cost of OFAR as strategy for technology transfer as it affects natural rubber production.

MATERIALS AND METHODS

Rubber contact farmers 99 engaged for OFAR trials during 2007/ 2008 planting season were used for this study. Seventy four and twenty five of the respondents were drawn from the traditional rubber and the marginal areas of Southern Kaduna, Kaduna State and Taraba State respectively. Data on hectares cultivated and associated costs such as fuelling, allowances for staff engaged in OFAR trials and cost for purchase and lifting of planting materials were collected and analyzed using descriptive statistics.

RESULTS AND DISCUSSION

Table 1 shows the distribution of contact farmers on the basis of hectares cultivated and the rubber growing ecology of the country. Majority of the respondents (98.99%) cultivated between 1 and 4.99 hectares of land. Out of this number, 45.78% are classified as medium scale producers while the balance of 54.21% is small scale with a mean farm size of 0.82 hectares. Studies on the production of natural rubber in Nigeria revealed that production is mainly by smallholder plantation owners which were reported to account for 70% while the balance was by estates. Also, 74.75% of the contact farmers are from the traditional rubber belt of Nigeria. The traditional rubber comprised of Edo, Delta, Abia, Ogun, Akwa Ibom, Rivers and Cross River States. Production of natural rubber has spread to the marginal areas of Kaduna and Taraba States in Northern Nigeria recently sequel to the introduction of the Presidential Initiative on Natural Rubber in 2006 by the Federal Government of Nigeria (Giroh et al., 2008).

Table 1. Distribution based on hectares and production zone of respondents.

Variable	Frequency	Percentage
Hectares (range)		
≤ 1.00	88	88.89
1.1 to 4.99	10	10.10
> 5	1	1.01
Rubber belt		
Traditional rubber belt	74	74.74
Nontraditional rubber belt	25	25.25

Source: Field survey, 2009.

Socio-economic characteristics of respondents

Table 2 shows the socio economic variables of the farmers. From the table, majority (55.32%) is aged 35 to 50 years with a mean age of 47 years. They are active and their productivity is expected to increase. Studies conducted by Windapo (2002) indicated that farmers in their mid ages constituted the bulk of contact farmers. This implies that other farmers can equally learn from them thereby enhancing the adoption of rubber production technologies. Contact farmers are educated and education has been found to be a catalyst in farmers' adoption and productivity. Furthermore, 82.98% of the respondents cultivated between ≤ 2.44 and 7.99 hectares with a mean holding of 7.09 hectares. Similarly farmers had a mean experience of 9 years in rubber farming with majority of them (53.21%) having between 5 and 10 years experience in the rubber farming enterprise. Rubber farmers are characterized by large family sizes with a mean family size of 9 people, a repository of labour for production activities.

Table 3 is the cost analysis per hectare and per farmer. The cost on hectare basis was higher than per farmer.

Table 2. Distribution based on socio- economic characteristics (N= 99).

Variable	Frequency	Percentage
	Age	
Less than 35	12	12.12
35 – 50	62	62.62
51 and above	25	25.25
	Education	
Primary	35	35.35
Secondary	53	53.53
OND	7	7.07
HND/B.Sc	4	4.04
	Household size	
≤ 5	23	23.23
6 – 10	57	57.57
> 10	19	19.19
	Experience (years)	
≤ 5	38	38.38
6 –10	19	19.19
> 11	42	42.42
	Occupation	
Farming	67	67.68
Business	6	6.06
Civil servants	21	21.21
Pensioner	4	4.04
Lecturing	1	1.01

Source: Field survey, 2009.

Table 3. Average costs associated with establishing OFAR trials per hectare and per farmer.

Variable/ item	Hectare (₦)	Farmer (₦)
Fuel	3,734.47	3,065.66
Allowances (Day trip)	1,146.91	941.51
Duty tour allowance	7,715.02	6,333.33
Cost of establishment	12,596.39	10,340.50

Source: Data analysis 2009.

Table 4. Average costs associated with establishing OFAR trials on the basis of rubber belt.

Variable/ item	Traditional rubber belt hectare(₦)	Non traditional rubber belt hectare (₦)
Fuel	1,279.98	7,580.54
Allowances(Day trip)	1,878.83	---------
Duty tour allowance	--------	19,804.17
Cost of establishment	3,158.82	27,384.71

Source: Data analysis, 2009.

For instance, the presidential initiative on natural rubber provided high level subsidy on planting which cost ₦5.00/ stump. The required budded stump per hectare is 450 and will cost a contact farmer to the tune of ₦3, 600.00 including lifting cost. This translated to 28.58% of the cost of establishment while 71.42% (₦ 12,596.39) is the subsidy on technical services to the farmers to encourage adoption. Technical services rendered include marking out, lining out, holing and planting. This technical service is a kin to method demonstration that offered the farmers the opportunity to learn by doing thereby stimulating interest and propelled them to adopt innovations. Okwoche et al. (2007) stressed the need for method demonstration as a catalyst in technology adoption by farmers.

Evaluation of cost of OFAR trials on the basis of rubber growing ecology revealed that it is more costly for the marginal areas than in the traditional rubber belt (Table 4). This is as a result of the fact that the Institute main station is very far. The implication for this is that seedlings meant for plantation establishment are liable to shock and germination failure as a result transporting them to long distances. This therefore calls for urgent decentralization of the production of planting materials within economic radius of the farmers for ease of operation and a cost reduction measures. The Agricultural Development Programmes (ADPs) in the states could collaborate with the Institute in the areas of training nursery operators and budders for seedling production.

Conclusion

The study examined cost of establishing OFAR as a strategy for technology transfer among rubber contact farmers in the rubber belt of Nigeria. Cost of establishment was highly subsidized in rendering of technical services to the farmers and was higher in the non traditional rubber belt of Nigeria.

RECOMMENDATION

Based on the findings of this study, there is the need for decentralization of the production of planting materials within economic radius of the farmers by collaborating with the ADPs and the Institute in the training of personnel to reduce the cost of rendering technical services to the farmers.

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