Enhancing Natural Rubber (*Hevea brasiliensis*) Technology Transfer through On-Farm Adaptive Research (OFAR) and Farmers Field days in the Rubber Belt of Nigeria

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Abstract

Enhancing natural rubber (Hevea brasiliensis Muell Arg) through On-Farm Adaptive Research (OFAR) and farmers Field days in the rubber belt of Nigeria was studied by selecting 146 contact rubber farmers through a simple random sampling technique. Data collected were analyzed using descriptive and inferential statistics (Chi – square). Results indicate that all of the farmers were literate and had one form of formal education or the other. Majority of farmers (82.98%) cultivated between ≤ 2.4 to 7.99 with a mean of 2.50 hectares. Farmers' awareness on technology transfer methods was high. Rubber intercropping combinations were with cassava (27.3%); maize (27.3%), plantain (23.2%), cowpea and yam (27.3%). Rubber Research Institute of Nigeria (RRIN) and Agricultural Development Programme (ADP) were indicated by 36.9% and 17.1% respectively as sources of awareness on technology transfer activities. Chi- square analysis reveals that awareness (χ^2 =23.08), attendance at farmers' field days (χ^2= 28.09), education (χ^2=29.6), OFAR activities (χ^2=5.6) and farm size (χ^2=4.07) were statistically significant with the adoption of improved farm practices. It is thus recommended that technology transfer activities be sustained through increased funding of research and the resuscitation of the presidential initiative on natural rubber production to enhance natural rubber technology adoption by rubber farmers.

Keywords: Rubber belt, capacity building, contact farmers, Technology transfer

INTRODUCTION

Natural rubber tree belongs to the family of latex producing plant called *Euphorbiaceae.* The rubber tree is one 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*. The early plantations were raised from unselected seeds with latex yield of 300 – 400 kg/ha/yr. Genetic improvement of *Hevea 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. The improvements resulted in the breeding of high yielding clones of rubber with latex yield of 2000 – 3500 kg/ha/yr in Nigeria (Omokhafe & Nasiru, 2004). Other improved practices such as the introduction of intercropping and mini-livestock integration in immature and mature rubber plantation were made and aimed at value addition at the downstream sector of the industry.

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. Capacity is the ability of people, organization and society as a whole to manage their affairs to achieve set goals. The existence of capacity is indicated by functional presence of a combination of most of the following; viable institution, financial and

material resources and skilled human resources (Giroh *et al.,* 2007). Capacity building for agriculture may be required for individual activity, nongovernmental group activities and institutional and policy actors. The major benefit of capacity building for farmers is improved performance brought about by increasing the farmers' potentials in terms of resources (skills, finance, technology, management) networks and linkages. Capacity building of farmers helps enhance wasteful resource allocation, improved access to extension services (World Bank, 2004). World Bank support to Federal Government of Nigeria for capacity in agricultural extension in 1970s led to establishment of Agricultural Development Programmes (ADPs), supported by the National Agricultural Research Projects (NARP) and Research-Extension-Farmers-Input Linkage Systems (REFILS). The multi stage Agricultural Development Projects (MSADP) also characterized the Train and Visit (T&V) extension approach (World Bank, 2004). Training is firmly rooted in the level of technological complexities that characterized agriculture. The need for training for capacity development subsumes a deficit situation in the knowledge, status and skill level of the practicing farmers as well as the availability of appropriate applicable information, the utilization of which will correct the problem situation. An effort to achieve the objectives of capacity building can best be judged in terms of acceptance of the information on the improved practice and adoption or utilization by the farmers.

On Farm Adaptive Research (OFAR) and field days have been recognized as one of the vehicles for technology delivery among farmers. Lead or contact farmers are often used with a view that through them technology could trickle down to other farmers. Okwu and Ejembi (2005) stress 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 and field days activities as they enhance natural rubber technology transfer is yet to be investigated. This study was therefore undertaken to examine OFAR and Field days as strategy for technology transfer as it affects natural rubber production.

Materials andmethods

Data on 150 rubber contact farmers were collected with the aid of interview schedule. The respondents were drawn from the traditional rubber growing and the marginal areas of Southern Kaduna, Kaduna State and Taraba State, respectively. Out of this sample, 146 (109 from the traditional rubber belt and 37 from marginal areas of Southern Kaduna, Kaduna State) were returned and used for analysis. Data collected were analyzed using descriptive statistics and Chi – square test statistics at 5% probability level. Yates correction factor was used in the computation of variables in the Chi – square analysis (Giroh *etal.,* 2007).

RESULTS AND DISCUSSION

Socio-economic characteristics of respondents and rubber growing ecology

Data in Table 1 shows that majority (55.48 %) were 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. All (100.0) of the contact farmers were educated as they had one form of education or the other. 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 2.50 hectares. Out of this number, 45.78% were classified as medium scale producers while the balance of 54.2% was small scale with a mean farm size of 1. 2 ha. 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. Similarly, farmers had a mean experience of 9 years in rubber farming with majority of them (53.42%) having between 5 and 10 years experience in rubber production . Rubber farmers are characterized by large family sizes with a mean family size of 9 people, a repository of labour for production activities.

Also, 74.6 % and 25.3% of the contact farmers were from the traditional rubber belt and marginal areas of Nigeria. The traditional rubber comprised of Edo, Delta, Abia, Ogun, Akwa Ibom, Rivers and Cross River States. The introduction of the Presidential Initiative on Natural Rubber in 2006 by the Federal Government of Nigeria was the propelling factor for the introduction and production of natural rubber in the marginal areas of Kaduna and Taraba States in Northern Nigeria (Giroh *et al.,* 2008).

Table 1: Socio-economic characteristics and rubber ecology distribution of respondents

Variable	Frequency	Percentage
Age (years)		
≤ 35	19	13.01
35 – 50	81	55.48
51 and above	46	31.51
Education		
Primary	46	31.51
Secondary	62	42.47
OND	22	15.07
HND/B.Sc	16	10.95
Household size		
≤ 5	34	23.29
6 – 10	87	59.58
> 10	25	17.12
Experience (years)		
≤ 5	59	40.41
6 –10	19	13.01
> 11	68	46.58
Farm size (hectares)		
≤ 2.4	81	55.48
2.5 – 4.99	28	19.18
5.0 – 7.99	12	8.22
> 8	25	17.12
Occupation		
Farming	71	48.63
Business	19	13.01
Civil servants	40	27.39
Pensioner	12	8.22
Lecturing	4	2.73
Rubber growing ecology		
Traditional rubber belt	109	74.66
Non-traditional rubber belt	37	25.34

Awareness on technology transfer activities and influence of some selected variables on improved farm practices

The awareness on technology transfer activities and their sources is presented in Table 2. The awareness was high and a positive signal that could trigger interest among respondents. On the basis of the sources of awareness, it reveals that Rubber Research Institute of Nigeria (RRIN) was the major source of awareness (36.9%) followed by ADP (17.1%) and tree crops unit (TCU) (13.0%).

Adoption of intercrop combination

The adoption of intercropping was high (Table 3). Immature rubber plantations were intercropped with cassava (27.3%); maize (27.3%), plantain (23.2%), cowpea and yam (27.3%). This would lead to efficient utilization of labour and land. Farmers derive maximum economic benefits from this combination in the forms of yields and income from the sales of the crops while they wait for the plantations to mature for tapping. Researches in many rubber-producing countries have advocated for the use of farming systems to encourage smallholders to sustain production. Multiple cropping have also been found to increase rubber girths and with no negative effects on immature plantation in many rubber producing countries of the world (Esekhade *et al.,* 1996; Rodrigo *et al.,* 2001).

Table 2: Distribution based on technology transfer activities and sources of awareness

Variable	Frequency	Percentage
Technology transfer activities		
Demonstration plots	121	82.87
OFAR	75	51.36
Training workshop	118	80.85
Agricultural shows	118	80.85
Farmers field days	146	100.00
Sources of awareness		
Min of Agric &Nat. Resources	12	8.22
Rubber Research Institute of Nigeria (RRIN)	54	36.98
Agricultural Development Program (ADP)	25	17.12
Michelin	9	6.16
Tree Crops Units(TCU)	6	4.11
Friends / Relatives	19	13.01
Newspaper	9	6.16
Radio/ Television	9	6.16

Table 3: Distribution of respondents by adoption of intercrop combination

Variable	Frequency	Percentage
Intercrop combination		
Rubber + cowpea	12	8.22
Rubber + melon	36	24.66
Rubber + cassava	40	27.39
Rubber + maize	40	27.39
Rubber + plantain	34	23.29
Rubber + pineapple	19	13.01
Rubber + yam	40	27.39

Farmers' selected personal characteristics and adoption of improved practices

Chi–square test for relationship between selected variables and implementation of improved practices revealed that awareness (χ^2 =23.08), attendance at farmers' field days (χ^2= 28.09), education (χ^2=29.6), OFAR activities (χ^2=5.6) and farm size (χ^2=4.07) werestatistically significant with the adoption of improved farm practices displayed during the field days (Table 4). Attending field days by farmers and observing method demonstration offered the farmers the opportunity to learn by doing thereby stimulating interest and propelled them to adopt innovations displayed. The result is in conformity with earlier works conducted by Okwoche *et al.*(2007). Farm size and education are critical in innovation adoption by farmers.

Table 4: Chi – square test of relationship between selected variables and implementation of improved practices

Variable	Df	χ^2 Cal	Remarks
Attendance at field days			
Awareness	1	28.09	Significant
Education	1	23.08	Significant
Farm size	1	29.68	Significant
On farm adaptive	2	4.07	Significant
research(OFAR)	1	5.67	Significant

CONCLUSION AND RECOMMENDATION

The study examined enhancing natural rubber technology transfer through OFAR and farmers field days in the rubber belt of Nigeria. Adoption of intercropping was high among contact farmers. Rubber Research Institute of Nigeria dominated sources of information on awareness on technology delivery mechanisms. Field days attendance, education, farm size and awareness and OFAR have significant effects on adoption of improved practices. Technology transfer methods should be sustained through increased funding of research by the Federal Government of Nigeria. There is also the need for the resuscitation of the presidential initiative on natural rubber to boost rubber production in Nigeria. Farmers are encouraged to form cooperative societies to enable them benefit from credit facilities from commercial banks and the Nigerian Agricultural Cooperative and Rural Development Bank (NACRDB).

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