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ANALYSIS OF TRAINING NEEDS OF AGRICULTURAL EXTENSION WORKERS ON AGROFORESTRY IN CROSS RIVER STATE, NIGERIA

EREMI, E. OHARA, HILDA C. ETA, EREMI T. OHARA AND EVEY M. HICHIEGERI

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ABSTRCT

This study examined the training needs of agricultural extension workers on agroforestry in Cross River State. The study was specifically aimed at ascertaining the types of agroforestry systems practiced in the state, determining extension workers' level of knowledge of the various agroforestry practices, determining the areas of training required by extension workers on agroforestry and ascertaining the challenges hampering extension workers' active involvement in agroforestry activities. The area of the study was Cross River State, and the study sample consisted of 66 purposively selected extension workers in the state. Data were obtained using a validated semi-structured questionnaire and analyzed using the mean, standard deviation, percentages and binary logistic regression. The results revealed that snail farming (ranked = 1st), shelter belt/windbreak (ranked = 2nd) and aquaforestry (ranked = 3rd) etc were some of the most popular agroforestry practices in the area. It was also observed that extension workers in the state were very conversant with taungya farming (66.7%), improved fallow/shifting cultivation (74.1%) and shelter belt/windbreak (70.4%) among other agroforestry practices, but not too conversant with alley cropping, aquaforestry and integrated taungya farming. The results further showed that extension workers needed training in various areas of agroforesy practices, including effective communication skills, technical knowledge/skills, ecosystem management, start-up procedures and processing operations, and policy formation etc. However, the study noted that extension workers faced funding, training, manpower shortages and lack of government support challenges among others in participating in agroforestry. The study recommended the provision of agroforesty training to extension workers, improved government funding of extension services and increase in monthly salaries and special allowances for extension workers among others.

KEYWORDS: Agroforestry, Extension workers, Needs, Training, Cross River State.

INTRODUCTION

The continuous global food crisis is putting an unprecedented pressure on conventional farming systems and tasking farmers' skills. With increasing natural disasters such as wild fires, floods, drought and climate change, coupled with human-induced environmental problems, predominantly pollution and forest degradation, the traditional farming and production systems and techniques have been consistently challenged to adapt in order to sustain an unbroken global food chain and security.

Widespread food shortages and pervasive poverty among "supposedly" farming populations have equally called to question the potency of present agricultural strategies adopted by farmers to maintain sustainable food supply, while ensuring that farmers maintain the highest standards of living (Idiku, Eremi, Ntui, Nwogu and Besong, 2019).

In recent times, serious efforts have been made to promote agrogorestry and organic farming as more viable alternatives to the well-known but persistently unreliable conventional farming approaches in order to increase food supplies and farmers' income, while

Eremi, E. Ohara, Department of Agricultural Extension and Rural Sociology, University of Calabar, Calabar, Cross River State, Nigeria
Hilda C. Eta, Department of Agricultural Extension and Rural Sociology, University of Calabar, Calabar, Nigeria.
Eremi T. Ohara, Department of Environmental Education, University of Calabar, Calabar, Nigeria.
Evey M. Hichiegeri, Department of Agricultural Extension and Rural Sociology, University of Calabar, Calabar, Cross River State, Nigeria

maintaining ecological balance and biodiversity (Eremi, Aya, Oga and Iyama, 2021). Agroforestry is a term that is used as a convenient portmanteau, encompassing a wide range of land managements in production set-up. According to Food and Agriculture Organization (FAO, 2019) agroforestry is a collective name for land-use systems and technologies where woody perennials (trees, shrubs, palms, bamboos etc) are deliberately used, on the same land-management units as agricultural crops and/or animals, in some form of spatial arrangement or temporal sequence. It is a production arrangement that fosters ecological and economic interactions between the different components. It is a dynamic, ecologically-based, natural resources management strategy, that through the integration of trees on farms and in the agricultural landscape, diversifies and sustains production for increased social, economic and environmental benefits for land users at all levels.

According to the United Sates Department of Agriculture (USDA, 2022) the central idea in agroforestry is putting the right tree, in the right place, for the right purpose, and are designed to achieve the following: protect soil, animals, crops, and homes from extreme weather; improve water quality, produce jobs and income, produce products (food, fiber, bioenergy, wood, floral and medicinal/botanical products etc), improve pollination habitat, trap snow and prevent it from piling in roads (living snow fences), provide habitat for wildlife, and create corridors for their travel, sequester carbon and reduce other greenhouse gases, mitigate odor and create beautiful places (USDA, 2022).

The importance of agroforestry to farmers, ranchers and woodland owners etc have equally gained global attraction. It is an important tool for healthy long-term agricultural production, providing opportunities for land owners – both large and small to diversify their production systems in order to enhance profitability and to mitigate risk, thereby, enhancing their environmental stewardship, and benefitting their communities. The systems is highly promising in terms of job creation and increased economic well-being of rural people, promoting the landscape set-ups that creates transition zones that help connect agriculture, people, and communities in a multi-functional and more sustainable landscape.

Agroforestry began to attract the attention of the international development and scientific community in the 1980s as a means for increasing and sustaining agricultural production in marginal lands and remote areas of the tropics that were not benefited by the Green Revolution (Ramachandran, 2014). Agroforestry is equally recognized worldwide as an integrated approach to sustainable land-use. It is estimated to be practice over 1 billion hectares in developing countries. It is believed to have higher potential to sequester carbon because of their perceived ability for greater capture and utilization of growth resources (light, nutrients and water) than single-species crops or pasture systems.

According to Eta, Eremi, Idiku, and Eta(2023) agroforestry is known to improve soil health and water-shed, which in turn increases the resilience of the land, enhance the internal utilization from resources which makes the enterprise more independent from expensive external inputs. The system equally has regenerative benefits such as climate mitigation through reduction in green house gas emissions such as methane through silvopasture. As a combination of agriculture and forestry, agroforestry tries to balance economic, nutritional and environmental needs to produce trees for timber and other commercial purpose; produce a diverse, adequate supply of nutritious foods both to meet global demand and to satisfy the needs of the producers themselves; and, to ensure the protection of the natural environment (World Agroforestry Society; 2023; Eremi *et al.,* 2021; Ghosh-Jerath, Kapoor, Ghosh, Singh, Downs and Fanzo, 2021).

Global food shortages, caused, very recently, by the Russian-Ukrain conflict which has affected grain value-chain worldwide, global armed conflicts and insurgencies particularly in Sub-Saharan Africa, poor government handling of agricultural interventions and a clear lack of policy direction as well as progressive farmers over-reliance on crude or traditional subsistent farming tools and techniques among others have continued to interrogate the sustainability of production systems worldwide. Farmers have been encouraged to diversify their farming ventures in order to improve food supply, boost their income and promote sustainable management of the environment. The responsibility to promote innovation among farmers has traditionally restes on agricultural extension workers who are tasked with educating or training farmers on production techniques (Eremi *et al.,* 2021; Aya and Eremi, 2016; and Asiabaka, 2002).

Cross River State, from the mangrove shores of Southern Zone, to the tropical rainforest belt of the Central, and the forest/Savannah ecology of the Northern Zone, is sufficienty blessed with agricultural lands, resources and great untapped potentials. The soil is ideal for the cultivation of different classes of food crops, great pastural strengths exist for livestock management and the forests are perfectly placed to support all kinds of farming combinations that promote biological diversity conservation.

However, despite the state being predominantly an agrarian state, food production and supply in the state has continued to cascade, in the face of rapidly rising inflation and pervasive poverty among particularly rural farming households. It is equally concerning that the agricultural production in the state represents a colossal betrayal of the enormous agricultural potentials of the state and called to question the role of extension services in building farmers capacities to enhance production. Very recently, the extension community has been tasked to educate and persuade farmers to diversify into more sustainable farming systems, with agroforestry at the core of these campaigns. However, extension workers can only give what they know and train

farmers to practice what they themselves have been adequately coached. The type and quality of training required and received by extension workers on agroforestry is emerging as an attractive and emotive area of research engagements. This study was therefore conceived to ascertain the training needs of extension workers on agroforestry.

OBJECTIVE OF THE STUDY

The general objective of this study was to analyze the training needs of agricultural extension workers on agroforestry in Cross River State. The specific objectives of the study were to;

i. ascertain the types of agroforestry systems practiced in Cross River State;
ii. determine the extent of extension workers' knowledge of the types of agroforestry systems in the state;
iii. determine the areas of training required by extension workers on agroforestry systems in the state; and
iv. examine the challenges affecting extension workers active involvement in agroforestry.

Research hypothesis

H_o: There is no significant relationship between the socio-economic characteristics of the respondents and their training needs on agroforestry.

Research methodology

Study area

The study was carried out in Cross River State, Nigeria, located in the South-South geopolitical zone of the country. The state falls within the tropical rainforest of Nigeria and is host to a large portion of the country's virgin forests. Its population stands approximately at 3.7 million, with a land mass of 20,156 square kilometers and a population density of 190 inhabitants per square kilometer. The study area geographically lies on Latitude $4^{o}34'$ 59.99″ N and Longitude $8^{o}24'$ 59.99″ E, with annual rainfall exceeding 3000mm and a mean temperature of 29^{o}C. The state encompasses the mangrove swamp in the south, tropical rainforest in the central and the savannah ecological zone in the Northern part, with diverse linguistic and cultural heritage.

Population and sample

The population of the study comprised all the agricultural extension workers in the Cross River State Agricultural Development Programme (ADP). The sample for the study consisted of 66 extension workers (which represent the entire population of extension workers in ADP). The study adopted a purposive sampling technique as only active extension cells with extension agents were considered.

Instrument for data collection

Data for the study were collected using a validated semi-structured questionnaire administered by the researchers.

Data analysis

Data obtained were analyzed using the mean, standard deviation, frequency count and percentage, as well as the binary logistic regression.

Results and discussion

Types of agroforestry systems in the area

Table 1: Distribution of Agroforestry Systems in the Area:

	Agroforestry systems	Mean	Std Deviation	Ranking
i.	Taungya farming (combining arable food crops with plantation trees)	2.00	0.801	4th
ii.	Integrated taungya and mixed farming	2.04	0.800	3rd
iii.	Improved fallow shifting cultivation	1.85	0.940	6th
iv.	Alley-cropping (hedgrown intercropping-agro-horticulture)	1.93	1.025	5th
v.	Silvo-pastoral farming (forest management with livestock husbandry) silvopasture	1.78	0.816	8th
vi.	Shelterbelts/windbreaks	2.09	0.996	2nd
vii.	Aquaforestry (fish pond/farming combined with trees)	2.04	1.009	3rd
viii.	Apiculture (apisilviculture – combing bee farming with forest management)	1.74	0.828	9th
ix.	Heliculture (snail farming)	2.15	0.920	1st
x.	Terrace cultivation	1.85	0.979	6th

Source: Field Survey, 2023

The result in Table 1 show the various types of agroforestry systems in Cross River State. The result revealed that a wide range of agroforestry practices exist in the area, and specifically, it was found that heliculture (snail farming) (ranked = 1st), shelterbelt/windbreaks (ranked = 2nd) and aquaforestry (a combination of fish farming with forest trees) (ranked = 3rd) were identified as the most commonly practiced agroforestry systems in the state. The study equally found that apiculture (bee farming (ranked = 9th), silvopasture (ranked = 8th) and terrace farming as well as improved fallow and shifting cultivation were the least practiced agroforestry systems in the area. These practices equally recorded means scores below the cut-off mean of 2.00 which indicates their less or marginal utilization in the state. Going by the results in Table 1, it could be seen that agroforestry practices are not well-spread in the state although there are marginal instances where farmers practice agroforestry without a deliberate well-thought out plan to implement agroforestry systems. These findings supports the views of USDA (2022), Jose (2009) and Kuyah and Nyaga (2016) that agroforestry practices are of various varieties although the extent of utilization varies from place to place. The lack of utilization of agroforestry practices in the area could be associated with either a lack of understanding of the economic, environmental and nutritional benefits of the system or a lack of training and support to practice agroforestry in the area. Extent of Extension Workers Knowledge of Agroforestry practices

Table 2: Distribution of Extension Workers according to their Knowledge of agroforestry practices in Cross River State

	Agroforestry systems	Mean	Std Deviation	Ranking
i.	Taungya farming (combining arable food crops with trees)			
	No	18	33.3	
	Yes	36	66.7	4th
ii.	Integrated taungya and mixed farming			
	No	36	66.7	
	Yes	18	33.3	
iii.	Improved fallow shifting cultivation			
	No	14	25.9	
	Yes	40	74.1	1st
iv.	Alley-cropping (hedgrown intercropping-agro-horticulture)			
	No	32	59.3	
	Yes	22	40.7	
v.	Silvo-pastoral farming (forestry management with livestock husbandry)			
	No	17	31.5	
	Yes	37	68.5	3rd
vi.	Shelterbelts/windbreaks			
	No	16	29.6	
	Yes	38	70.4	2nd
vii.	Aquaforestry (fish farming and forestry)			
	No	40	74.1	
	Yes	14	25.9	
viii.	Apiculture (apisilviculture or bee farming)			
	No	22	40.7	
	Yes	32	59.3	6th
ix.	Heliculture (snail farming)			
	No	30	55.6	
	Yes	24	44.4	
x.	Terrace cultivation			
	No	20	37.0	
	Yes	34	63.0	5th

Source: Field Survey, 2023

The results shown in Table 2 reveals that of the 10 agroforestry practices presented, the extension workers have knowledge of or were familiar with 6 of the practices in the state. Improved fallow/shifting cultivation was the most conversant among extension workers with a percentage of 74.1%, followed by shelterbelt/windbreaks (70.4%), alley farming (68.5%) and taungya faming (66.7%). Other agroforestry practices such as integrated taungya system, heliculture and aquaforestry etc. were not very popular among extension workers as a large proportion of them indicated that they only have limited knowledge of such practices. The result agrees with Baumer (1990) that agricultural extension agents have adequate knowledge of some types of agroforestry practices. The result is equally in line with Onabe (2016) who maintains that extension workers are familiar with apiculture and other agroforestry practices, including shelterbelt, windbreaks, fallow and shifting cultivation etc. The implication of this result is that extension agents in the state have great need for training, or at least exposure to agroforestry practices to enable them promote these practices among the farmers.

Training needs of extension workers on agroforestry

Table 3: Distribution of Extension Workers by areas of training needs on agroforestry

	Training Needs	Taungya farming (combining arable food crops with plantation trees)	Integrated taungya and mixed farming	Improved fallow shifting cultivation	Alley-cropping (hedgrown intercropping-agro-horticulture)	Silvo-pastoral farming (forest management with livestock	Shelterbelts/ windbreaks	Aquaforestry (fish pond/farming combined with trees)	Apiculture (apisilviculture – combing bee farming with forest management	Terrace cultivation	Heliculture (snail farming)
1.	Effective communication skills	63.0	24.1	11.1	1.9	0.0	0.0	0.0	0.0	0.0	0.0
2.	Facilities and infrastructure management	7.4	27.8	51.9	7.4	1.9	0.0	1.9	0.0	0.0	1.9
3.	Start-up procedures and investment	13.0	27.8	29.6	14.8	5.6	1.9	1.9	0.0	0.0	5.6
4.	Effective utilization of extension services in persuading and helping farmers	18.5	40.7	18.5	9.3	1.9	1.9	1.9	3.7	0.0	3.7
5.	Environmental conservation	18.5	22.2	27.8	5.6	11.1	5.6	1.9	3.7	0.0	3.7
6.	Technical knowledge and skills	20.4	35.2	22.2	3.7	5.6	3.7	1.9	3.7	0.0	3.7
7.	Design of policy framework and reforms to enhance government intervention	11.1	38.9	27.8	1.9	0.0	1.9	9.3	3.7	0.0	3.7
8.	Raw material extract and selective harvesting/exploitation	11.1	24.1	33.3	5.6	1.9	3.7	1.9	5.6	0.0	13.0
9.	Raising of three nurseries and planting	38.9	24.1	24.2	3.7	5.6	0.0	0.0	0.0	0.0	3.7
10.	Conservation practices and breeding	14.8	25.9	38.9	7.4	1.9	5.6	1.9	0.0	0.0	3.7
11.	Ecosystem management	14.8	29.6	24.1	9.3	13.0	1.9	5.6	0.0	0.0	1.9
12.	Animal nutrition, feed processing and nutrients management	21.1	35.2	24.1	0.0	1.9	0.0	0.0	9.3	0.0	5.6
13.	Field survey, tillage operations and routine management	18.5	46.3	18.5	3.7	1.9	1.9	1.9	1.9	0.0	5.6
14.	Marketing, handling and processing skills.	16.7	22.2	35.2	11.1	0.0	0.0	3.7	3.7	0.0	7.4

Source: Field Survey, 2023

Table 3 shows the various training needs of extension workers in different areas of agroforestry. Specifically, it was observed that 63% of the respondents required effective communication skills training on taungya farming, 51.9% of them needed facilities and infrastructure management training on improved fallow and shifting cultivation, while 40.7% of the respondents required effective utilization of extension services training to enable them persuade farmers to practice integrated taungya and mixed farming systems. The result equally revealed that 38.9% of the respondents needed training on conservation practices and breeding, 38.9% equally required training on policy formulation and reforms, while 35.2% of the extension workers needed training on terrace cultivation. Interestingly, none of the respondents required training on heliculture (snail farming) and this not necessarily because the respondent knew so much about snail rearing but probably because they perceived snail generally as something that is readily picked from the forest and rubbish bins, therefore, no special training is required to produce it. The implication of this study is that agricultural extension workers need a broad scope of multifaceted robust training in wide range of agroforestry practices. This training will enable them to in turn train the farmers who rely heavily on extension agents for improved technology. These findings corroborates those of Onabe (2016), Aya and Eremi (2015) and Ghosh-Jerath *et al.* (2021) who maintains that extension workers needs serious coaching in diverse areas of agroforestry to strengthen their capacities to help rural farmers adopt these practices. The level of help or education farmers will receive from extension agents on agroforestry systems depends on the quality of training received by the extension agents themselves. Therefore, it is importance that, given the important of agroforestry, that extension workers be well-grounded in the various agroforestry practices to enable them communicate these practices to farmers.

Challenges of Extension Workers involvement in Agroforestry Activities

Table 4: Distribution of extension workers according to the challenges of involvement in agroforestry activities in the area

	Variables	Mean	Std deviation	Ranking
.	Lack of adequate training on agroforestry	2.17	1.005	1st
.	Lack of understanding of agroforestry systems	1.87	0.870	5th
.	Lack of government clear policy on agroforestry	2.02	0.981	2nd
.	Poor appreciation of the benefits of agroforestry by farmers	1.80	0.833	8th
.	Lack of logistical support for extension workers	1.91	0.976	4th
.	Poor funding of extension services	1.76	0.775	11th
.	Inadequate extension workers	1.80	0.939	8th
.	Farmers' apathy towards agroforestry	1.81	0.933	7th
.	High incidences of poverty among farmers	1.80	0.833	8th
.	Lack of credit incentives to attract clientale	1.93	0.866	3rd
.	Lack of curricular provision for agroforestry contents in extension training programme	1.48	0.637	12th
.	Lack of government interest in extension and corruption	1.85	0.998	6th

Source: Field Survey, 2023

Results in Table 4 show that extension workers' involvement in agroforestry activities is hampered by several challenges. Specifically, it was found that lack of adequate training on agroforestry (ranked = 1st), lack of clear government policy on agroforestry (ranked = 2nd) and lack of credit incentives (ranked = 3rd) among others affected extension workers' involvement in agroforestry. This supports the perception that agroforestry as practiced in Africa, is largely a practice without a policy, and as Onabe *et al.* (2019) observes, extension workers are hampered by institutional failures, cultural values, social environment and economic variables in effectively delivering their mandate, including training farmers to go agroforestry. The implication of this results is that in the face of present challenges extension workers, no matter how noble the benefits of agroforestry are, may not be able to do much to help themselves and the farmers to promote agroforestry.

Hypothesis Test

HO_1: There is no significant relationship between the socio-economic characteristics of the respondents and their training needs on agroforestry.

Table 5: Summary of binary logistic regression analysis

		Score	Df	Sig.
Step 0 Variables	Sex (1)	.644	1	.422
	Age	.181	1	.671
	Marital status	.114	3	.990
	Marital status (1)	.015	1	.903
	Marital status (2)	.077	1	.781
	Marital status (3)	.050	1	.823
	Edu level	4.936	3	.177
	Edu level (1)	3.891	1	.049
	Edu level (2)	.659	1	.417
	Edu level (3)	.089	1	.766
	Major occup	3.776	2	.151
	Major occup (1)	2.452	1	.117
	Major occup (2)	.387	1	.534
	Household size	4.4.12	1	.036
	Land ownership (1)	.659	1	.417
	Land size	.918	3	.821
	Land size (1)	.423	1	.516
	Land size (2)	.420	1	.517
	Land size (3)	.317	1	.574
	Monthly income	7.097	1	.008
	Years as extension worker	4.935	1	.026

Residual chi-squares are not computer because of redundancies.

Source: Field Survey, 2023

The statistical significance of each of the variables is found in the sig. column of the table. From the results, it can be seen that educational (1), household size, monthly income and years of working as extension worker contributed significantly to the prediction of the model (educational level (1) P=0.049, household size – P=0.036, monthly income – P=0.008 and years of working as extension worker – P=0.026). These results suggests that extension workers with higher monthly income were more disposed to access the training perhaps because of their ability to pay for it, even as those with higher level of education were more favourably inclined towards agroforestry training. The implication of this is that some socio-economic characteristics of the extension workers underpinned their training on agroforestry. This is in line with Idiku *et al.* (2022) and Eremi *et al.* (2021) who found and reported an association between the training needs of extension agents and their socio-economic characteristics.

CONCLUSION AND RECOMMENDATIONS

Cross River State has enormous potentials for the robust development of agroforestry practices, but the level of penetration of agroforestry systems among farmers in the state is still very low. Many farmers have not received adequate training on the benefits of agroforestry and how to practice it. This is partly because the extension workers who are supposed to provide this training to the farmers are in urgent need of the training themselves among other several challenges facing extension service in the state, including lack of manpower, poor funding, low technical know-how or skills and lack of government support. Promoting agroforestry in the state therefore, calls for urgent actions, beginning with a review of the training services provided to extension agents and investing in the service to make it more viable in the state.

The study therefore, made the following key recommendations:

i. CRADP should specifically arrange an in service training programme for extension workers in the state on agroforestry and the training should be made compulsory.

ii. Subject matter specialists in the various fields of agroforestry should be engaged by the government to train extension agents who will in turn train the farmers.

iii. Government should introduce a special Extension Trust Fund, derived probably from 0.8% tax on all taxable income-generating activities in the state to enhance extension services.

iv. The monthly income of the extension workers and other incentives/allowances particularly for those in rural areas should be enhanced for better commitment.

v. Cross River State government should make it a deliberate state policy and intervention to promote agroforestry in the state.

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