

Gender Perceptions on Constraints Affecting Agroforestry Practices in Akwa Ibom State, Nigeria

¹I.A. Akpabio, ¹B.B. Esu and ²M.O. Adedire

¹Department of Agricultural Economics and Extension, University of Uyo,
P.M.B 1017, Uyo, Akwa Ibom State, Nigeria

²Department of Forestry and Wildlife Management, University of Agriculture, Abeokuta, Nigeria

Abstract: The study identified major and significant constraints hindering the utilization of agroforestry practices (AFPs) in the farming systems of small-scale arable crop farmers in Akwa Ibom State of Nigeria. Responses were derived from 125 randomly selected respondents. All the 15 identified constraints were perceived as major deterrents to the utilization of AFPs in the study area. Slight perceptual gender differences were however observed with the male and female respondents respectively perceiving lack of technical know-how and lack of incentives as highest ranked constraints. Multiple regression analysis revealed lack of interest, communal conflicts, insect/pest infestation, small size of arable land and length of time before benefits are realized; as significant deterrents to the level of utilization of AFPs. Recommendations have been proffered in this light.

Key words: Agroforestry, Akwa Ibom state, constraints, gender, Nigeria

INTRODUCTION

Land is a finite resource and is increasingly under pressure for alternative uses. Apart from other uses, agriculture, forestry and urban development remain the 3 major uses to which land is subjected (Evans, 1992). Their uses have however been unplanned and uncoordinated resulting into environmental stresses and invariably degradation (Unanaonwi and Bada, 2004). The limited nature of land has led to competition between agriculture and forestry, resulting in nutrient depletion and ultimate land degradation. Attempts to resuscitate land and hence promote yield with the use of chemical fertilizers has resulted to soil toxicity and environmental pollution. It therefore becomes imperative to introduce a system that would boost crop yield without damage to the ecosystem and general environment.

Agroforestry has been adopted and widely promoted as a sustainability enhancing practice that combines the best attributes of agriculture and forestry and which would fulfill the needs of the local population (Bene *et al.*, 1977). It is a key component to preventing and reversing land degradation and providing robust livelihood options for the rural poor. Combe and Budwoski (1979) asserted that forest trees, crops and domestic animals may be combined either simultaneously or staggered in time and

space and that the goal is to optimize per unit area of production, while at the same time respecting the principle of sustained yield. Adedire (2005) surmised that trees and shrubs chosen for agroforestry should have distinctive extrinsic properties that allow them to enrich the soil and help reclaim degraded land, control weeds, stabilize water sheds, protect diversity and protect the growth of crops. Such trees according to Adedire (2005) should also have intrinsic values of providing valuable by-products like nuts, fruits, medicine, oil, resins, mulch, fodder, fuelwood and timber.

The various advantages of agroforestry system and products are well documented (Udo, 2001; Stoian and Donovan, 2007). It is however pertinent to note that agroforestry was officially adopted as part of a mix of participatory forestry management activities which engaged public attention because of the recognition (Schreckenber and Luttrell, 2007), that the very location of many of the world's poorest people in and around forests, implies an important role for forests in poverty alleviation. This emphasis became more pronounced, according to Stoian and Donovan (2007) with the recognition that forests could contribute to 3 of the Millennium Development Goals (MDGs)-Eradication of extreme poverty and hunger (MDG-1), promotion of gender equality and empowering of women (MDG-3) and ensure environmental sustainability (MDG-7).

Regardless of the numerous advantages believed to accrue to general forestry and agroforestry practices, Schreckenber and Luttrell (2007) revealed the growing concern that agroforestry practices may have been increasingly promoted on the basis of unsubstantiated assumptions about its likely benefits and virtues. In the same vein, Ros-Tonen and Wiersum (2007) caution against becoming overly optimistic about the roles forestry and agroforestry play in contributing to poverty alleviation. This is because whilst, forestry can deliver, It often does not. In Nigeria and especially in Akwa Ibom State, there has been very little information on the demerits of agroforestry. Much effort has been concentrated on espousing the positive impacts of agroforestry practices. The undiscerning but interested observer may be lured into the false belief that no serious constraint derives from the use nor militates against adoption and utilization of agroforestry practices. It is against this background that this study was conceived, to identify constraints militating against adoption and utilization of agroforestry practices in the study area. However, taking cognizance of the necessity to incorporate local peoples' perspectives into research endeavours, in order to ease the process of adoption of innovations (German *et al.*, 2005; Probst and Hagman, 2003), it became pertinent to seek the views of small scale local agroforestry practitioners on the issue at hand. Also, against the background of the prevalent gender division of labour for crops and tasks in agricultural production in the study area (Lahai *et al.*, 2000; Akpabio, 2005) and the necessity to mainstream the findings of this study, it became necessary to disaggregate the responses of male and female respondents with reference to the issue at hand. In essence, the specific objectives of the study included: Identification of major constraints affecting agroforestry practices in the study area and determination of significant constraints affecting utilization of agroforestry practices in the study area.

MATERIALS AND METHODS

The sample frame for the study comprised all the small scale farmers involved in the agroforestry project of the Forestry Department of the Akwa Ibom State Ministry of Environment. All the 5 Local Government Areas (LGAs) specifically targeted for the Agroforestry project (Oruk-Anam, Urue-offong Oruko, Itu, Ikot Abasi and Esit Eket) were purposefully selected for the study. A simple random sampling procedure was also utilized to select 25 farmers from each of the LGAs under consideration. This gave a total number of 125 respondents that were sampled for the study.

Interviews and a set of pre-tested structured questionnaires were used to collect information from respondents. Collated data were analysed with the aid of descriptive and inferential statistical tools. Interviews and a set of pre-tested structured questionnaires were used to collect information from respondents. Collated data were analysed with the aid of descriptive and inferential statistical tools. Interviews and a set of pre-tested structured questionnaires were used to collect information from respondents. Collated data were analysed with the aid of descriptive and inferential statistical tools.

In order to evaluate the constraints affecting utilization of agroforestry practices, a list of 15 constraints was drawn up through focus group discussions and a literature search. Respondents responded positively or negatively, with regard to the effect of each constraint on their agroforestry practices. A yes scored 2 points and a no, one point, yielding total and mean perception scores for each perceived constraint. Constraints with a mean score of 1.5 or above were regarded as major constraints, while those with mean scores of 1.4 or below were regarded as minor constraints. Regression analysis was thereafter utilized to ascertain significant constraints affecting utilization of agroforestry practices in the study area.

RESULTS AND DISCUSSION

Perceptions on constraints affecting agroforestry practices: Table 1 shows that respondents' perceived all the identified 15 constraints as major in nature. The highest ranked major constraints were perceived as: Lack of technical know-how ($\bar{x} = 1.82$; rank = 1), lack of incentives ($\bar{x} = 1.82$; rank = 1) and high cost of land lease/rent ($\bar{x} = 1.77$; rank = 3). The least ranked major constraints were: Insect pest infestation ($\bar{x} = 1.53$; rank = 15), problem of communal conflict ($\bar{x} = 1.55$; rank = 14) and lack of improved seedlings ($\bar{x} = 1.59$; rank = 13).

On a disaggregated basis (Table 2) the male perceived the highest ranked major constraints as lack of technical know-how ($\bar{x} = 1.88$), length of period required to reap benefits ($\bar{x} = 1.82$) and lack of incentives ($\bar{x} = 1.78$). For the female respondents, lack of incentives ($\bar{x} = 1.84$), high cost of leasing/renting land ($\bar{x} = 1.77$) and lack of money to fully engage in the practice ($\bar{x} = 1.76$) were the highest ranked major constraints. The 2 groups were in agreement with the least ranked major constraint, which they jointly perceived as insect pest infestation. There was however a major discrepancy in perception between the gender groupings. This was in regard to length of time required to reap benefits (item 11) which was ranked second (2nd) by male respondents and 14th

Table 1: Perceptions of constraints affecting the utilization of agroforestry practices in Akwa Ibom State, Nigeria

Items	Male Gender (n = 50)		Female Gender (n = 75)		Total (General) (n = 125)		Remarks
	Mean	Rank	Mean	Rank	Mean	Rank	
Lack of improved seedlings	1.54	13	1.63	10	1.59	13	MC
Insect pest infestation	1.52	15	1.53	14	1.53	15	MC
Forest trees shade crops from growing well	1.72*	5	1.56	12	1.64	9	MC
Lack of access to land	1.56	12	1.71	6	1.63	11	MC
Small land size	1.58	11	1.67	8	1.63	11	MC
High cost of land lease/rent	1.76	4	1.77	2	1.77	3	MC
Additional labour required	1.70	7	1.71	6	1.70	6	MC
Lack of interest in agroforestry	1.72	5	1.73	5	1.73	4	MC
High cost of establishment	1.64*	10	1.63	10	1.64	9	MC
Lack of money to establish a practice	1.70	7	1.76	3	1.73	4	MC
Long time required to reap benefit	1.82*	2	1.53	14	1.68	8	MC
Lack of technical know-how	1.88*	1	1.75	4	1.82	1	MC
Lack of incentives	1.78*	3	1.84	1	1.80	2	MC
Lack of awareness	1.70*	7	1.67	8	1.69	7	MC
Problem of communal conflict	1.54	13	1.55	13	1.55	14	MC

* = Higher male mean scores; MC= Major constraint

Table 2: Disaggregated responses on highest and lowest ranked major constraints

Male	Female	Total	Remark
Lack of technical know-how (\bar{x} = 1.88)	Lack of incentives (\bar{x} = 1.84)	Lack of technical know-how (\bar{x} = 1.82)	1
Lack of time required to reap benefits (\bar{x} = 1.82)	High cost of land lease/rent (\bar{x} = 1.77)	Lack of incentives (\bar{x} = 1.82)	2
Lack of incentives (\bar{x} = 1.78)	Lack of money to establish a practice (\bar{x} = 1.76)	High cost of land lease/rent (\bar{x} = 1.77)	3
Insect pest infestation (\bar{x} = 1.52)	Insect pest infestation (\bar{x} = 1.53)	Insect pest infestation (\bar{x} = 1.55)	15
Lack of improved seeds (\bar{x} = 1.54)	Length of time required to reap benefits (\bar{x} = 1.53)	Problem of communal conflict (\bar{x} = 1.55)	14
Problem of communalConflict (\bar{x} = 1.55)	Problem of communal conflict (\bar{x} = 1.53)	Lack of improved seedlings	13

Source: Extracted from Table 1

by female respondents. Different reasons have been adduced for this trend. The usually landless female respondents' were happy with the expected short term benefits derivable from the secure tenure and hassles-free operations arising from the pseudo-ownership of government (Forestry Directorate) provided land, on which they could plant important arable crops of their choice (at least until forest trees mature).

On the other hand, male respondents who are the main economic trees crops farmers in the study area were more concerned with the length of time required for planted forest trees crops (which in their innermost thoughts do not even produce tangible benefits like fruits etc) to mature. They were decidedly not interested in non-easily measurable advantages like: prevention of soil erosion/provision of windbreaks/soil fertility conservation, etc. Although quite necessary in the study area, these environmental protection measures were not regarded as deserving of any immediate paramount attention. Against this background, Reed (2007) asserted that benefits of preventive technologies are often long term and it may be difficult for farmers to predict cost of non-adoption.

Table 1 also shows that male respondents generally allocated higher mean scores (depicting higher level of agreement) than the female, to 5 constraints, inclusive of which were the 3 highest ranked major constraints. Others were lack of awareness of agroforestry innovations (item 14; rank = 7) and forest trees shade arable crops from growing well (item 3, rank = 5). On the other hand, female respondents allocated higher mean scores (than the male) to 10 constraints.

The issue of lack of technical know-how which is generally regarded as the highest ranked major constraint seems to be confined mainly to the male respondents. This is because female respondents accorded this constraint, a distant fourth position ranking. Findings however revealed that respondents are not actually trained in the intricacies of agroforestry practices like, trees/shrubs nursery establishment, seed pre-treatment and tree pruning activities. On the contrary, participants are mainly utilized as unskilled labour and merely instructed on activities relating only to fixing seedlings into the soil. It is obvious that the people may not have the technical knowledge to establish agroforestry practices on personal (private) plots. Larssen and

Agarwala Rogers (1997) had cautioned again this trend and admonished that understanding an innovation is a pre-requisite to effective adaptation, as adaptation without the appropriate knowledge can result in technologies that are ineffective, inefficient and sometimes counter productive.

With reference to lack of incentives, findings revealed that, apart from provision of arable plots of land and seedlings of forest trees, no other assistance is offered to respondents. In essence, the government does not render any assistance to farmers' with regard to provision of improved inputs and other services, related to extension, financial assistance and marketing outlets for the arable crops, which are the farmers' major production objective. Pannell (1999) asserted that farmers' adoption of innovative farming systems is based (among others) on the perception that the innovation promotes the farmer's objectives. The non-challant-attitude of the Forestry Directorate to the farmers' interests may result in farmers having the perception that the objective of the government is to utilize them as labourers in order to develop forest plantations, after which they would be ejected from such landholdings. This may eventually affect their commitment to the planting, tendering and securing of forest trees on their leased plots. Against this background, Reed (2007) admonished that agroforestry technologies that build on and incrementally improve existing land use systems are likely to be more compatible than technologies that replace these systems. The Forestry Directorate must not be perceived as attempting to replace the existing farming system in the study area.

Lack of incentives may also be the reason behind female respondents' perception of lack of money to establish a practice as the third highest ranking major constraint. Female respondents opined that even if they were to introduce agroforestry practices on their farm plots, they would need financial/material assistance to see them through the gestation period. It is obvious that the farmers would need to be encouraged to form cooperatives in order to aid them draw down financial/material assistance from available NGOs and other governmental organizations.

The issue of high cost of land lease/rent is attributed to the antics of officials of the Forestry Directorate, who are alleged to give out (the usually free) government land to the elites and non-farmers in the community. These individuals invariably re-lease the land portions, at a fee to the landless but desperate, real farmers in the area.

Significant major constraints affecting level of utilization of agroforestry practices: Multiple regression analysis was utilized to determine the relationship of constraints (independent variables) to the level of

agroforestry practices (dependent variable). Table 3 shows that 6 constraints made significant contributions to level of utilization of agroforestry practices in the study area. These were: Lack of interest in agroforestry ($B = 1.358$; $p < 0.05$), communal conflicts ($B = 1.136$; $p < 0.05$), insect/pest infestation on arable crops ($B = 1.598$; $p < 0.05$); small size of arable land ($B = -1.069$; $p < 0.05$) high cost of renting or leasing plots of land ($B = 1.252$; $p < 0.05$) and long time span before benefits are realized ($B = 0.883$; $p < 0.05$). The revelation that agroforestry practitioners are not really interested in the activity, is a major challenge in the quest to spread innovations on agroforestry. Pannell (1999) attributed this challenge to the farmers' inability to assess the profitability of agroforestry innovations, in relation to current practices and other alternatives. This trend (lack of interest) is unfortunately not limited only to the farmers.

Current and Scheer (1995) asserted that even policy makers are not informed about the benefits of agroforestry. Garrett and Buck (1997) attributed this trend to the fact that agroforestry is not generally recognized as a science or a distinct practice and hence is rarely featured in development strategies. In the study area, agroforestry activities were formerly, officially remembered only during the one-day events marking the annual tree planting campaign activities of the federal and state governments and these activities were limited to only the national and state capitals. The event has however not been observed in the last 2 years. Understanding an innovation is a prerequisite to effective adaptation and hence the FAO (2005) and Strong and Jacobson (2006) advised that all relevant stakeholders need effective communication (information and training (for farmers)) on agroforestry, relative to other agricultural activities.

With regard to communal conflicts, it is pertinent to note that many forestry lands were formerly communal holdings which were acquired by the government and eventually abandoned many years back. During the period of abandonment, the original landowners re-possessed their holdings on the premise that government did not pay compensation on acquired plots of land. Problems arose when government re-awakened interest in these holdings and forcibly dislodged the settlers. Dislodged settlers are also usually prepared to ensure that government investments on such holdings do not yield expected dividends. There are also reported cases of government organs forcefully appropriating disputed land holdings between 2 contending communities and allocating such for forest plantation. It is obvious that when such holdings are apportioned to members of contending groups for purposes of agroforestry practice, investments arising thereof may be vandalized.

Table 3: Relationship of constraints with level of utilization of agroforestry practices

Variables	Male coefficient	t-value (B)	Female coefficient	t-value (B)	Total coefficient	t-value (B)
Constant	3.477	60.270	3.384	47.061	34.684	14.409
Lack of improved seedings	9.220	1.130	-7.970	-1.354	0.146	0.286
Insect pest infestation	-2.280	-0.427	1.144	0.248	-1.598	-2.287**
Forest trees shade crops from growing well	-4.810	-1.051	1.357	0.299	0.249	0.449
Lack of access to land	8.681	0.945	1.043	0.214	0.398	0.652
Small land size	-8.970	-1.546	-0.302	-0.520	-1.069	-2.123**
High cost of land lease/rent	7.585	0.112	-7.990	-1.150	-1.252	-2.122**
Additional labour required	3.653	0.788	-6.470	-0.980	0.629	1.119
Lack of interest in agroforestry	-8.740	-1.798	-5.140	-0.760	-1.358	-2.836***
High cost of establishment	-8.690	-1.430	-3.790	-0.567	0.723	1.088
Lack of money to establish a practice	-3.850	-0.488	5.265	0.875	-0.443	-0.716
Longtime required to reap benefits	3.955	0.684	-2.450	-0.337	0.883	1.709*
Lack of technical know-how	2.917	0.370	-1.030	-1.520	0.148	0.234
Lack of incentives	-0.144	-1.763	2.403	0.313	-0.943	-0.147
Lack of awareness	-2.570	-0.036	-2.120	-0.350	-0.968	-1.549
Problems of communal conflict	-2.650	-0.605	6.403	1.366	1.136	2.728***

R-value = 0.543; F-value = 3.077***; * = <1%, ** = <5%, *** = <10%

Issues pertaining to small size of land holdings, security of holdings and high cost of land rental/lease have been highlighted by Johnson and Delgado (2003); FAO (2005) and Nkamalu and Manyong (2005). Dove (1991) explained the issue of small land holdings in terms of opportunity cost of land, for other more pressing issues, especially for small land holders. In other words, land may be available but its small size may necessitate its being utilized to cultivate crops of perceived immediate benefits than forest trees. It is also well known that leased/rented land holdings cannot be utilized to cultivate permanent tree crops even if farmers possess the cost of rental.

Reed (2007) views the constraint regarding long time span before benefits are realized from agroforestry practices, in terms of lower costs incurred from natural forest extraction-in comparison to costs incurred in the establishment of an agroforestry practice. In the same vein, Snapp *et al.* (1998) explained that the relative advantage of agroforestry practices is considerably reduced when considered in terms of the slow growth rate of most tree crops and the concomitant considerably lengthened time span over which benefits are realized.

CONCLUSION AND RECOMMENDATIONS

Respondents perceived all the 15 identified constraints as major impediments to adoption and utilization of agroforestry practices in Akwa Ibom State, Nigeria. The 3 highest ranked constraints were: Lack of technical know-how, lack of incentives and high cost of land lease/rental. Slight difference were however observed in gender perceptions. While the male perceived lack of technical know-how as the highest ranked constraint, the females perceived lack of incentives as the most serious impediment to adoption of agroforestry practices. Regression analysis, revealed 6 major constraints as significant impediments to the level of utilization of

agroforestry practices in the study area. These were: lack of interest in agroforestry, communal conflicts, insect/pest infestation, small size of arable land high cost of plot rent/lease and long period of time before benefits are realized from agroforestry practices.

It has become necessary to take steps to ameliorate the various impediments to the utilization of agroforestry practices in the study area. Against this background, the following recommendations seem pertinent:

- Sustained education and environmental awareness campaign on the importance of agroforestry to environmental conservation and poverty alleviation should be embarked upon. Against this background, it is advocated that the Forestry Extension Service should be re-oriented and integrated into the Unified Agricultural Extension Service (UAES) which has more personnel and a wider coverage area. This is because forestry activities cannot be treated in isolation from other agricultural activities. The UAES should be provided with logistic support to help expand the coverage area of their enlightenment activities into little explored areas, like, markets and churches. Efforts should also be focused on the insertion of jingles on the electronic media and on the publication and distribution of relevant literature on different aspects of agroforestry practices. This latter procedure is targeted at the educated/enlightened segment of the society, including retired civil servants, who have the time and may have the resources to embark on such activities.
- Agroforestry practitioners should be exposed to training programmes on the practical intricacies of agroforestry, including nursery establishment, seed pre-treatment and tree pruning activities, among very many others. This will enable them to acquire the skills to embark on independent agroforestry activities on personal plots of land.

- To increase interest in agroforestry practices, the following measures are recommended:
 - Integration of the various species of the Citrus genus (oranges) mango, avocado pear and dwarf coconut varieties of crops, into disseminated agroforestry crops. These can stimulate the establishment of cottage industries to produce jam and fruit drinks.
 - Introduction of familiar indigenous multi-purpose trees into the farming system. Recommended trees include *Acacia auriculiformis* (Acacia), *Newbouldia laevis* (Itumo-Ibibio) and *Pentaclethra macrophylla* (African oil bean) among very many others.
 - Introduction of non-wood forest resources like mushroom, honey, snails, medicinal herbs etc, into agroforestry practices.
- Incentives should be provided to agroforestry farmers with particular reference to arable crop production. These may include grants and credit facilities, improved inputs, linkage to assured markets and motorable route for easy evacuation of farm produce.
- Agroforestry practitioners should be assisted/encouraged to form formal groups/cooperatives which could enable them to benefit from the economies of large scale production and help them access and exert pressure on various beneficial institutions (research, extension, credit infrastructure provision etc.) and ultimately draw down government/NGO interventions, to better their lot.
- Abandoned government acquired forestry lands should be put into use by apportioning parcels of land to interested indigenes of adjoining communities. These individuals should be accorded security of tenure and latitude to cultivate favourite annual crops, in combination with (mainly) economic trees, provided by the forestry directorate and who also provide a form of extension and supervisory activities, to ensure sustenance of the trees crops.

REFERENCES

- Adedire, M.O., 2005. The role of agroforestry in enhancing food security through organic fertilizers. In: *Organic Agriculture for Sustainable Food Security*. Pub. Proc. 1st National Conf. Organic Agric. Olasantan, F.O., I.O.O. Aiyelaabe, I. Olowe and B.B. Philips (Eds.). Held at the University of Agriculture, Abeokuta, Nigeria, pp: 83-86.
- Akpabio, I.A., 2005. Human Agriculture: Social Themes in Agricultural Development. Abaam Pub., Uyo, pp: 106-122.
- Bene, J.G., H.W. Beall and A.A. Cote, 1977. *Trees, food and people: Land Management in the Tropics*. Ottawa, IDRC
- Combe, J. and G., Budwoski, 1979. Classification of agroforestry techniques In: *Procs on Agroforestry Systems in Costa Rica*. Latin America, pp: 9.
- Current, D. and S. Scherr, 1995. Farmers costs and benefits from agroforestry and farm forestry projects in Central America and the Carribeans. Implications for policy. *Agroforestry Systems*, 30: 87-103 .
- Dove, M.R., 1991. Forester's beliefs about farmers: An agenda for social science research in social forestry. EAPI working paper No. 28, October. East-West Environmental and Policy Institute.
- Evans, H.J., 1992. *Plantation Forestry*. In: *The Tropics*. 2nd Edn. Clarendon Press, Oxford, pp: 300.
- Food and Agricultural Organization (FAO), 2005. Realizing the economic benefits of agroforestry: Experiences, lessons and challenges. In: *State of the World's Forests, 2004*. ftp: //ftp.fao.org/docrep/fao/007/y5574e/y5574e09.pdf
- Garrett, H.E.G. and L., Buck, 1997. Agroforestry practice and policy in the USA. *For. Ecol. Manage.*, 91: 5-15.
- German, I.A., B. Kidane and K. Mekonnen, 2005. Watershed management to counter farming system decline towards a demand driven system oriented research agenda. *Agricultural Research and Extension Network (AGREN)*, No.145, pp: 11.
- Johnson, J.E. and O.J. Delgado, 2003. Farmers' perception on agroforestry opportunities and constraints in Cape Verde. *Small Scale For. Econ. Manage. Policy*, 2 (3): 343-355.
- Nkamelu, G.B. and V.M. Manyong, 2005. Factors affecting adoption of agroforestry practices by farmers in Cameroon. *Small Scale For. J.*, 2 (2): 135-148.
- Lahai, B.A.N., P. Goldey and G. E. Jones, 2000. The gender of extension agents and farmers' access to and participation in Agricultural Extension in Nigeria. *J. Agric. Edu. Exten.*, 6 (4): 223-233.
- Larssen, J.K. and R. Agarwala-Rogers, 1997. Re-invention of innovative ideas: Modified? Adopted? None of the above? *Evaluation*, 4: 136-140.
- Pamell, D.J., 1999. Social and economic challenges in the development of complex farming systems. *Agrofor. Syst.*, 38: 177-193.
- Probst, K. and J. Hagmann, 2003. Understanding participatory research in the context of natural resources management: Paradigms, approaches and typologies *Agricultural Research and Extension Network (AGREN)*, Paper No. 130 ODI, London, pp: 15.

- Ros-Tonen, M.A.F. and K.F. Wiersum, 2007. Forest-based poverty alleviation and the Millennium Development Goals. *ETFRN News 47/48: Forests and the MDGs*. http://www.etfrn.org/ETFRN/newsletter/news_4748/n147_Oip_07.htm.
- Reed, M.S., 2007. Participatory technology development for agroforestry extension: An innovation-decision approach. *Afr. J. Agric. Res.*, 2 (8): 334-341.
- Schreckenberg, K. and C. Luttrell, 2007. What contribution does participatory forest management make to the achievement of the Millennium Development Goals? *ETFRN News 47/48: Forests and the MDGs* http://www.etfrn.org/ETFRN/newsletter/news_4748/n147_Oip_201.htm.
- Snapp, S.S., P.L. Mafongoya and S. Waddington, 1998. Organic matter technologies for integrated nutrient management in smallholder cropping system of Southern Africa. *Agric. Ecosyst. Environ.*, 71: 185-200.
- Stoian, D. and J. Donovan, 2007. Development of small and medium forest enterprises for poverty reduction *ETFRN news 47/48: Forests and the MDGs*. http://www.etfrn.org/ETFRN/newsletters/news4748/n147_Oip_09htm. Accessed 30/09/07.
- Strong, N. and M.G. Jacobson, 2006. A case for consumer driven extension programming: Agroforestry adoption potential in Pennsylvania. *Agrofores. Syst.*, 68: 43-52.
- Udo, E.S., 2001. The position of forestry in Akwa Ibom State. In: *Forestry and Sustainable Environment*. Pub. Procs. 1st workshop of the Forestry Association of Nigeria, Akwa Ibom State Branch, E.S. Udoh (Ed.). FAN/UNDP/AKSMOE/Dept. Forestry and Wildlife, University of Uyo, pp: 31-43.
- Unanaonwi, O.E. and S.O. Bada 2004. Adoption of agroforestry system in Ayepe and Ayibode Communities of Osun and Oyo States, Nigeria. *J. For.*, 34 (1 and 2): 118-124.