Short Communications

FARMERS' PERCEPTION OF ALLEY FARMING TECHNOLOGY IN DELTA STATE, NIGERIA

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Abstract

Alley farming is an agroforesty system in which food or forage crops are grown in the "alleys" between hedgerows of trees and shrubs. It is designed to be a sustainable alternative to traditional bush-fallow systems (shifting cultivation). It is a low-input, improved bush-fallow system that can be sustained even under conditions of land scarcity. This study examined the perception of farmers regarding alley farming. The study was carried out in Ndokwa East Local Government Area (LGA) of Delta State, Nigeria. A simple random sampling technique was applied in the selection of respondents. A sample size of 90 crop farmers participated in the study. Both descriptive and inferential statistics were used in analyzing the data generated by the study. Results of the study show that the farmers were favourably disposed to alley farming. However, they had some reservations about the high capital and labour requirements and land tenure security associated with alley farming. The study concludes that the favourable perception held by the farmers is an indication of their willingness to accept alley farming. It therefore recommends that farmers who are willing to establish alley farms should be encouraged by giving them incentives in the form of farm credit, farm implements, farming inputs, provision of labour and allocation of farm land.

Key words: alley farming, agroforestry, perception, Delta State, Nigeria

INTRODUCTION

Traditional agricultural production in sub-Saharan Africa is characterized by bush-fallow systems (shifting cultivation) wherein farmers use bush fallows to restore soil fertility. In this system, short cropping periods alternate with long fallow periods. Carter (1995) noted that rapid population growth and land-use pressure have led to a drastic reduction of fallow durations to below the minimum required for the systems sustainability and in some areas, fallow periods have simply disappeared, without the provision of alternative management techniques. This has resulted in increasing degradation of farmland and declining crop yields.

Since the 1970s, the International Institute of Tropical Agriculture (IITA) Ibadan, Nigeria has researched various options for sustaining crop production. Investigation initially involved the introduction and evaluation of the potential of integrating woody species with food crops as a land-use system for managing fragile soils. The encouraging results of these trials led to the development of alley farming in the early 1980s as one agroforestry system with great promise for sustainability of small-scale farming systems (Kang, 1991).

Alley farming is an agroforestry system in which food or forage crops are grown in the "alleys" between hedgerows of trees or shrubs. The trees or shrubs are established in hedgerows usually 4-meters apart (Whitttome, 1994). The trees are periodically pruned and managed during the cropping phase to prevent shading of the companion crops. The prunings of foliage and young stems are incorporated into the soil as green manure or used as mulch. Some portions of the tree foliage can be harvested and fed to livestock.

Alley farming is designed to be a sustainable alternative to traditional bush fallow systems (shifting cultivation). It is a low input, improved bush-fallow system that can be sustained even under conditions of land scarcity (Kang, 1993). It offers opportunity to reduce deforestation and land degradation. The woody hedgerow component of the alley farming system helps in soil protection, nutrient recycling, weed suppression and provision of staking materials and fire wood. Results of on-station and on-farm trials have shown consistently that alley farm-

ing is efficient in reducing soil erosion, improving soil organic matter and nutrient status, and sustaining crop yield under continuous cropping (Kang et al., 1995).

Effort to promote alley farming research and development in tropical Africa was initiated through the Alley Farming Network for Tropical Africa (AFNETA), a collaborative project of three inter-national agricultural research centres, namely: International Institute of Tropical Agriculture (IITA); the then International Livestock Centre for Africa now International Livestock Research Institute (ILRI), and the International Centre for Research in Agroforestry (ICRAF). After several years of on-station study, these institutions started on-farm research to undertake adaptive research in actual farm conditions. It was anticipated that on-farm research would provide a basis for wider diffusion of the technology and its subsequent adoption by farmers. It has however been observed that the technology has been less widely and rapidly adopted by farmers than anticipated in Africa. Whittone (1994) reported them even amongst farmers who have tried alley farming, the majority abandoned it after several years.

According to Adesina et al. (2000), the major reasons for abandoning the technology after initial adoption are technical and management related. These include excessive volunteer seeds that lead to the emergence of hard-to-clear bush, high labour demands; non-adaptability of trees, nonconductive property rights, notably rights over ownership of land and trees, long times involved in both hedgerow establishment and returns from adoption, above-and below-ground competition between crops and trees for light, water and nutrients and lack of knowledge of alley farming management.

The low adoption of alley farming technology has also been attributed to the neglect of socioeconomic considerations which has resulted in targeting of introduction of the technology into localities with lower prospects of adoption in several parts of West Africa (Whittome et al., 1995). The neglect of farmers' particular needs, poorer performance of alley farming on farm than on-station and the perception held by farmers regarding the technology have also been identified as factors that hinder the adoption of the technology (Atta-Krah and Francis, 1987; Carter, 1995).

This study examined farmers' perception of alley farming technology. This is because the perception held by farmers regarding a particular agricultural innovation has been known to influence their adoption of that innovation. The specific objectives of the study include to: (a) ascertain farmers' knowledge of alley farming technology; (b) ascertain farmers' perception of the technology; and (c) determine the difference in perception of the technology among small, medium and large-scale farmers.

MATERIALS AND METHODS

This study was carried out in Ndokwa East Local Government Area (LGA) of Delta State, Nigeria. The area is characterized by sloping farmlands and fertile sub-soils. These characteristics favour alley farming technology. Crop farmers in the LGA formed the population from which sample for the study was drawn. Six extension cells were randomly selected out of the eight cells in the LGA. From each of the selected cells, fifteen farmers in contact with extension were randomly selected using the list provided by extension agents covering the selected cells. This sampling procedure gave a total of ninety farmers who served as respondents of the study. Structured interview schedule was used for data collection. Content validation of the research instrument was carried out. The instrument was pilot tested before administration to test for reliability.

To ascertain farmers' knowledge of alley farming technology, a knowledge test was conducted by asking ten questions about the technology. A maximum of 1 point was awarded for a correct answer to each question and 0 point for a wrong answer. For the purpose of the study, respondents were categorized into 3 groups on the basis of their knowledge score as follows: (a) Low knowledge (for those with 0–3 points); (b) Moderate knowledge (for those with 4–7 points), and (c) High knowledge (for those with 8–10 points).

In order to obtain quantitative measure of respondents' perception of alley farming technology, rating scales with a pool of positive and negative statements regarding alley farming technology were framed. Respondents were then requested to indicate their level of agreement or disagreements with the statements. A 4-point, Likert types scale with values of strongly agree = 4; agree = 3; disagree = 2 and strongly disagree = 1 was used to ascertain their responses. The mean of the responses values which is 2.50 was taken as the cut off point to select statements which were perceived favourably by the respondents. For all the positive statements, a mean score of $\geq$ 2.50 depicts favourable perception. The scoring of the negative statements were reversed. Thus, a mean score of $\geq$ 2.50 also implies a favourable statement.

Descriptive and inferential statistics were used to analyze data generated by the study. Descriptive statistics such as mean scores, percentage and frequency count were used to summarize data. Analysis of variance (ANOVA) was used to determine the difference in perception among categories of farmers. For the purpose of the study, farmers were categories into small, medium and large scale on the basis of farm size. The alpha level for a significance difference was established a priori at 0.5.

RESULTS AND DISCUSSION

Farmers' knowledge of alley farming technology

Data in Table 1 show that 29% of the farmers had high knowledge, while 58% had moderate knowledge. The remaining 13% of the farmers had low knowledge. In other words, majority of the farmers comprising 87% demonstrated a moderate to high knowledge about alley farming technology. This level of knowledge exhibited by the farmers could be a good base for the diffusion and adoption of the technology. Lack of knowledge of alley farming management has been identified as one of the reasons for abandoning the technology after its adoption (Adesina et al., 2000).

Tab. 1: Distribution of respondents according to their knowledge of alley farming technology (n = 90)

Knowledge level	Frequency	Percentage
High knowledge	26	29
Moderate knowledge	52	58
Low knowledge	12	13
Total	90	100

Farmers' perception of alley farming technology

Data in Table 2 show the mean scores and standard deviations of farmers' perception of alley farming technology. Results show that out of 12 statements investigated, farmers perceived 8 statements in favour of alley farming technology. These include statements 1, 2, 4, 5, 6, 9, 11 and 12 out of these statements, 6 were positive statements, while 2 were negative statements. The remaining 4 statements that were not favourably perceived by the farmers were all negative statements. These include statement 3, 7, 8 and 10. The farmers recognised the importance of alley farming technology by disagreeing with the statements that trees and shrubs used in alley farming harbour pests and disease and that alley farming technology is for large-scale farmers only.

Entries in Table 2 further show that the farmers were favourably disposed to statements that alley farming technology is economically profitable, increases land-use efficiency, improves soil fertility, recycles nutrients, suppresses weeds and serves as a source of staking materials and firewood. However, the farmers did not favour statements relating to the fact that alley farming is capital and labour intensive, provides limited early returns on investment and that alley farming is limited by land ownership.

These issues contained in those statements that the farmers did not favour are very critical to the success of alley farming technology. Alley farming is labour and capital intensive, hence its practice may be limited in areas where labour is scarce and expensive and where farmers lack operational capital. Maintenance work such as hedgerow pruning and the weeding of volunteer hedgerow seedlings which are carried out regularly in al-

Tab. 2: Mean scores and standard deviations of farmers' perception of alley farming technology (n = 90)

	Statements	Mean score	Standard deviations	Remarks	PC
1	Alley farming is economically profitable	3.70	0.70	A	F
2	Alley farming increases land-use efficiency	3.60	0.70	A	F
3*	Alley farming is capital intensive	2.40	1.1	A	NF
4*	Most trees and shrubs species used in alley farming harbour pests and diseases	3.40	0.8	D	F
5	Alley farming improves and maintains soil fertility through the incorporation of the pruning of foliage and young stems into the soil	3.30	0.9	A	F
6	Alley farming increase organic matter content of the soil through litter from trees and shrubs	3.50	0.8	A	F
7*	Alley farming is labour intensive	2.30	1.1	A	NF
8*	Alley farming provides limited early returns on investment	2.40	1.1	A	NF
9	Alley farming helps to recycle nutrients and suppresses weeds	3.60	0.9	A	F
10*	Alley farming is limited by land ownership	2.20	1.1	A	NF
11	Alley farming is a source of staking materials and firewood	3.20	1.0	A	F
12*	Alley farming is for large-scale farmers only	3.5	0.8	D	F
	Cut-off point	2.50			

* = negative statement; A = agree; D = disagree; F = favourable; NF = not favourable PC = perception condition

ley farmers make enormous demand on the farmers' time and finance. Alley farming also has the disadvantage of providing limited early returns of investments. Farmers usually have to wait for 3–4 years before increased yields due to soil improvement are obtained.

Security of land tenure is very necessary for farmers to establish alley farms. According to Fliegel (1984), the relationship of the farmer to land, as owner, tenant or labourer, sets limits on the range of production options that are either possible or desirable. Agbamu (2006) also reported that a few farmers who operate as tenants in Oyo State of Nigeria could not be free to take decision on acceptance of alley farming because only their landlords can decide on cultivation of tree crops on the farmland.

Differences in perception of alley farming technology among small, medium and large-scale farmers

Differences in perception of alley farming among, small, medium and large-scale farmers are presented in Table 3. Results show that there were significant differences in the mean scores of the three categories of farmers for the following two statements. Most trees and shrubs species used in alley farming harbour pests and diseases (F = 1.0) and alley farming is limited by land ownership (F = 1.0). The significant areas of difference among the farmers indicated key issues for consideration in the promotion of alley farming technology.

A closer look at the two statements where the farmers had significant differences showed that the mean scores of the large-scale farmers were highest indicating that they had a more favourable perception regarding those statement. This is expected as most of the large-scale farmers may be landlords who are more favourably disposed to adopting alley farming. Data in Table 3 further reveal that there were no significant differences in the perception of the farmers in the remaining 10 statements. This suggests that the general perceptions of small, medium and large-scale farmers regarding alley farming technology were the same.

CONCLUSION

This study examined the perception of farmers towards alley farming technology as a sustainable alternative to the traditional bush-fallow systems (shifting cultivation) in Delta State, Nigeria. Results show that the farmers had moderate to high knowledge regarding alley farming technology. Generally, the farmers had a favourable perception towards alley farming technology. Major areas in which the farmers favour include that alley farming is economically profitable, increases land-use efficiency,

Tab. 3: Analysis of differences in perception of alley farming technology among small, medium and large-scale farmers

	Statements	Small-scale farmers (n = 44)	Medium-scale farmers (n = 36)	Large-scale farmers (n =10)	F-value	Remarks
1	Alley farming is economically profitable	3.9	3.5	3.4	0.1	NS
2	Alley farming increase land-use efficiency	3.7	3.6	3.5	0.4	NS
3*	Alley farming is capital intensive	3.4	3.2	3.6	0.2	NS
4*	Most trees and shrubs species used in alley farming harbour pests and diseases	1.5	2.3	2.6	1.0	NS
5	Alley farming improves and maintains soil fertility through the incorporation of the prunings of foliage and young stems into the soil	3.1	3.3	3.2	0.5	S
6	Alley farming increase organic matter content of the soil through letter from trees and shrubs	3.8	3.4	3.2	0.1	NS
7*	Alley farming is labour intensive	1.9	2.3	2.4	1.0	S
8*	Alley farming provides limited early returns on investment	3.7	3.2	3.2	0.1	NS
9	Alley farming helps to recycles nutrients and suppresses needs	3.3	3.2	3.4	0.1	NS
10*.	Alley farming is limited by lands ownership	3.2	3.1	3.1	0.9	NS
11	Alley farming is a source of staking materials and firewood	3.8	3.4	3.6	0.2	NS
12*	Alley farming is for large-scale farmers only	2.8	3.1	3.7	0.8	NS

* = negative statement; S = significant; NS = not significant

improves and maintains soil fertility, increases organic matter content of the soil, recycles soil nutrients and serves as a source of staking material and firewood. The farmers however did not favour the fact that alley farming is capital and labour intensive and requires security of land tenure for its successful operation.

There were discrepancies in the perceptions held by small, medium and large-scale farmers in 2 statements out of the 12 statements used to investigate their perceptions, however, the overall difference in their perception was not significant. The favourable perception held by the farmers towards alley farming technology is an indication that they are willing to adopt the technology. An important feature of alley farming adoption is incentives. According to Leach and Marslan (1994); Versteeg and Koudokpon (1993) and Whittane (1994), incentives to farmers who have established alley farms have taken the form of: seed of improved crop varieties; free fertilizer; food aid; farm implements; labour (in the case of on-farm trials) livestock (goat), and free vaccinations for goats.

Literature indicates that where farmers have established alley farms, they have usually been offered some form of encouragement to do so, this study therefore recommends that farmers who are willing to establish alley farms in Delta State, Nigeria should be given necessary incentives by the government to enable them overcome the problems of land ownership, high capital, and labour demand that are usually associated with alley farming. Such incentives could be in form of farm credit, farm implements, farming inputs, provision of labour and allocation of farm land.

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