FACTORS DRIVING THE INTENSITY AND RATE OF COOKING BANANA ADOPTION IN NIGERIA

J. LEMCHI, M. TSHIUNZA AND A. TENKOUANO

ABSTRACT

The International Institute of tropical Agriculture introduced cooking banana into south east Nigeria in the late 1980s from Asia through the INIBAP Transit Centre as an interim measure in combating the incidence of black sigatoka disease on plantain. The study examined the extent of adoption of the crop in the area, about a decade after its introduction. Data were collected from 285 randomly selected farmers in about 76 of the villages where the crop was introduced, using a structured questionnaire. Data analyses utilised descriptive statistical tools while econometric models were used in identifying forces that have influenced the adoption process. Results showed that 55% of farmers have more cooking banana mats than they initially planted, giving a 55% adoption level. The intensity of adoption ranges from one mat to 599 mats with a mean of 23 mats, while the average annual increase in the number of mats is 6. Considering the relative "newness" of the crop in the country, the above adoption figures are considered high. Among the factors that have strongly influenced the extent and rate of adoption are farmers' household size, level of educational attainment, primary occupation, extension education and training, market opportunities, cropping experience, security of land, and the compatibility of the crop with existing systems.

INTRODUCTION

Cooking banana was introduced in South East Nigeria in the late 1980s by the International Institute of Tropical Agriculture (IITA) from Asia, through the INIBAP Transit Centre. It was one of the measures of ameliorating the effect of *black sigatoka* attack on plantain. *Black*

sigatoka is a fugal leaf spot disease, which has become a major threat to plantain production in sub-Saharan Africa (Vuylsteke, 1995; Ahiekpor *et al.*, 1996; Ferris *et al.*, 1996; 1997; Craenen, 1998a), reducing yield by 30-50% (Stover, 1983; INIBAP, 1987; Dadzie, 1998). Plantain is an important food crop in the humid forest and mid-altitude zones of sub-Saharan Africa (Swennen, 1990, Tollens, 1995; Vuylsteke, 1995; Craenen, 1998b), and serves as a vital staple to about 70 million people in the region (Swennen, 1990; Robinson, 1996; Frison, 1997; Ferris, 1997; Gauhl *et al.*, 1998). Apart from being one of the major staples for rural and urban consumers, plantain is an important source of income, especially for smallholder farmers who produce it in compound or home gardens (Vuylsteke, 1995; Tollens, 1995; Gauhl *et al.*, 1998; Bayeri *et al.*, 1999). In Nigeria, it ranks very high as a carbohydrate source in the eastern part (Nweke *et al.*, 1988).

Apart from resistance to *black sigatoka*, cooking banana has other important attributes which include lodging/wind resistance, drought tolerance, early ratooning capacity, short duration (coming to harvest often below 12 months), as well as high bunch yield (Bayeri *et al.*, 1999; Dadzie, 1998; Ferris *et al.*, 1997; Singh and Uma, 1996). It is also less seasonal in production, has less sugar relative to plantain, and rich in iron and potassium (Chukwu, 1996). Most importantly, cooking banana has the potential of surviving in areas where plantain and sweet banana do not, due to its hardiness (Singh and Uma, 1996). This implies that the crop presents potential alternative to plantain consumers and farmers in West Africa where two-thirds of sub-Saharan Africa's plantain production is concentrated (Swennen, 1990; Swennen and Ortiz, 1997).

Since the introduction of the crop, no effort has been made to evaluate its status and position within the farming system. Specifically, no authentic step has been taken to establish the extent of its acceptability or adoption in the area. One major yardstick for assessing the suitability of a new technology or an innovation in an area is the

level and degree/rate of its adoption by the target group, which is a test of its compatibility with existing and local systems. Results of adoption studies are used to improve the efficiency of technology generation for farmers as well provide bases for assessing the effectiveness of technology transfer and its suitability to the local environment (CIMMYT, 1993). IITA has developed several high yielding black sigatoka resistant hybrid plantains that are currently undergoing multilocational on-farm trials, preparatory for introduction to the farmers. It is therefore imperative that the factors which might have influenced the acceptance or rejection of cooking banana introduced earlier are investigated. However, panel taste studies conducted earlier by Ferris *et al.* (1996) and Akele (1996) gave some cursory insight into the adoptions potential of cooking banana. But, they did not go beyond the "tongue judgement" to find out the actual situation of cooking banana at the farm level. This study was therefore initiated to fill the gap, with the main objectives of ascertaining the intensity and rate of its adoption and identifying the factors that have influenced the process. Information from this will constitute a useful feedback to aid the transfer of the new plantain hybrids to farmers and also serve as a guide for the future transfer of any technology to the farming community. The specific objectives were to (a) examine the level, intensity and rate of cooking banana adoption, (b), determine the forces that have influenced the intensity and rate of adoption by farmers, and (c) provide prospects for the future introduction of new hybrids.

METHODOLOGY

Study area: The study was carried out in eight States of the plantain/banana-growing belt in southern Nigeria: Abia, Akwa Ibom, Anambra, Bayelsa, Cross River, Delta, Imo, and Rivers. These States were selected, based on a reconnaissance survey prior to the main survey carried out to identify cooking banana-growing areas. Again, two

tissue culture laboratories (TCL) that were used for the multiplication of the crop are located within the area.

Sampling procedure: On introduction, cooking banana plantlets were multiplied in two TCLs located at IITA-Onne (Rivers State) and ADP-Owerri (Imo State) between 1988 and 1996. These plantlets were distributed to farmers mainly through non-governmental organisations (NGOs) and national institutions. These included Shell, Agip, State Ministries of Agriculture (MOA) and Agricultural Development Programmes (ADPs), and other disseminating agencies. The major types distributed were Cardaba, Bluggoe, Fougamou, Nzizi, and Pelipita. However, a large quantity of cooking banana suckers had earlier been released to farmers by IITA, Onne. With the assistance of these institutions, the villages where cooking banana was introduced were identified during the reconnaissance survey. Seven hundred and two villages were identified, and a random sample of about 11% (76) was chosen for the survey. In each village, a certain number of cooking banana farmers was chosen, depending on the intensity of cooking banana cropping (i.e., the number of farmers growing the crop). In all, 285 farmers, drawn from the eight States were selected and interviewed, and their fields visited. The distribution of the farmers by State is presented in Table 1.

Data collection and analysis: A structured questionnaire was designed and used in collecting data. Four groups of data were collected: household, institutional, land resource, and crop/market-related. Household data include farmer's social status, age, marital status, primary occupation, household size, years of formal education, as well as past experience with agricultural innovations. Institutional data collected include farmer's relationship with staff of the disseminating institution (as a proxy for extension contact/visits), membership of farmers' groups/co-operatives, as well as attendance at agricultural training/workshops/seminars. Data on land resources are

related to farmland ownership, and include the number of farm field acquired through inheritance, rentage, purchase, borrowing, and lease and the number of fields under fallow. Crop/market-related data includ the source from where suckers were first acquired, the condition c initial sucker acquisition, the number initially planted, and number c years of growing the crop. Other data include the number of cookin banana mats presently owned, number of plantain mats owned, gende ownership of plantain and cooking banana, problems of plantai pests/diseases, as well as attendance at training an workshops/seminars on cooking banana agronomic/managemer practices and utilisation methods. Also included are the availability c regular buyers of cooking banana, proportions of cooking banana an plantain sold, compatibility of cooking banana with existin cropping/local systems, complexity/ease of cropping and utilisin cooking banana, as well as the relative advantage of cooking banan attributes compared to plantain. Data collection lasted from April 199 to February 1999. Analysis of data was based on descriptive statistic such as percentages, frequencies and means, while tables were mostl used in presenting results. Factors influencing the intensity and rate c cooking banana adoption were determined by means regressio analyses.

Definition of cooking banana adoption: The adoption of a ne technology by farmers can be measured in several ways (CIMMYT 1993). Sometimes, it may be enough to simply report the proportion c farmers using or applying the technology, or the actual proportion c fields or crop area under the new technology (CIMMYT, 1993 Definition varies depending on the situation and the type of technolog under investigation (Lemchi *et al* 2003). In this study, cooking banan adoption is defined in terms of the adoption of the crop itself. Accordin to Zegeye (1990), the mere fact that a new technology is introduced in the smallholder farming does not guarantee adoption by itsel Therefore, the mere presence of cooking banana in a field is n

necessarily an indication of adoption. Cooking banana is a perennial crop, which requires about 12 months to yield fruit before the farmer makes any assessment. If the performance is satisfactory, the farmers are likely to keep on growing the crop, increase the number of mats in the same field or increase the number of fields bearing the crop. Otherwise, they may discontinue. In this study "cooking banana adopters" are taken as farmers whose:

(1) number of years of cropping cooking banana is more than one;

(2) number of cooking banana fields has increased; and,

(3) number of cooking banana mats has increased from the number initially planted (initial number of mats is taken as the number of suckers initially received and planted, since each sucker planted will likely result to a mat, assuming 100% survival rate).

Symbolically, cooking banana adopters are defined as those whose:

$CByear > 1$;

$CBfld_1 > CBfld_0$;

$Cbmat_1 > Cbmat_0$; where:

CByear = number of years of cropping cooking banana;

$CBfld_0$ = number of cooking banana fields initially had;

$CBfld_1$ = number of cooking banana fields at the time of survey;

$CBmat_0$ = number of cooking banana mats initially planted;

$CBmat_1$ = number of cooking banana mats at the time of survey;

In this report, cooking banana adopters are limited to those whose numbers of cooking banana mats have increased from the number initially planted, i.e. those whose $Cbmat_1 > Cbmat_0$

This limitation is necessitated by the fact that a farmer may decide to keep the crop in his field in order to appease the institution or agency that introduced the crop to him, so as to benefit from future offers. Again, in African traditional agriculture, a farmer never abandons completely a crop that can provide some food, even if it does not give the expected yield and quality characteristics. Also, because *Musa* generally are perennials that are produced in small, intensively

managed compound gardens (Nweke *et al.*, 1988), which are limited number, the assessment of adoption based on an increase in th number of cooking banana fields may not give a satisfactory resu Farmers are most unlikely to expand their production through th extension pathway. In other words, the most likely way of increasing th level of production by the farmers would be the intensive pathway, b increasing the number of mats.

The number of "cooking banana adopters" obtained from th above definitions expressed as a percentage of total farmers represe the level of cooking banana adoption. The degree or intensity adoption among the adopters is the difference in the number of ma presently owned and that initially planted. Symbolically, the intensity adoption is defined as:

$I = Cbmat_1 - Cbmat_0$;

Where I = intensity of adoption.

The annual rate of cooking banana adoption (the rate at which th farmers increases their cooking banana mats every year) is derived a follows:

$Matratyr = (CBmat_1-CBmat_0)/CByear$; where:

Matratyr = annual rate of adoption based on increase in the number cooking banana mats,

$CBmat_1$, $CBmat_0$, CByear = as defined above.

The regression model

***Theoretical model*:**

The intensity/degree and rate of cooking banana adoption yielde continuous dependent variables and an array of continuous an discrete explanatory variables. The analysis was thus based on th ordinary least square (OLS), using semi-log. Following James (1973 and Gomez and Gomez (1984), the generalised model form is a follows:

$Log Y_i = f(b_{ij}X_j)$
where:
Y_i = intensity/rate of cooking banana adoption by the ith farmer;
b_{ij} = coefficients; and
X_j = 1 to the jth explanatory variables.

Empirical model

The intensity of cooking banana adoption: The intensity of cooking banana adoption was evaluated through the difference in the number of cooking banana mats between the time the farmers started planting the crop and the time of the survey. This was limited to adopters only. The dependent variable (the level of increase in the number of cooking banana mats) was regressed on a number of groups of variables: farmer-related/household, land resource, institutional, and crop/market-related variables. The farmer-related or household variables are age, social status, marital status, household size, years of formal education, primary occupation, as well as past experience with agricultural innovations. Past adoption studies have found household variables to significantly influence the adoption decisions of farmers. The institutional factors considered were farmer's relationship with staff of the disseminating institution, membership of farmers' groups/co-operatives as well as attendance at agricultural training/workshops/seminars. The land resource variables are related to farmland ownership, and include the numbers of farm fields acquired through inheritance, rentage, purchase, borrowing, and lease, and the number of fields under fallow. The crop/market-related variables include the source of initial acquisition of suckers, the condition of initial sucker acquisition, the number of years of growing the crop, and the problem of plantain pests/diseases. Others include gender ownership of plantain and cooking banana, attendance at training on cooking banana agronomic/management practices and utilisation methods, the number of cooking banana mats initially planted, and the number of plantain

mats possessed. Also included are the availability of regular buyers of cooking banana, proportions of cooking banana and plantain sold, compatibility of the cooking banana crop with existing cropping/local systems, complexity/ease of cropping and utilising the crop as well as the relative advantage of the crop's attributes compared to plantain. These variables are described and presented in Table 2.

The rate of cooking banana adoption: The dependent variable is the annual increase in the number of cooking banana mats, while the same explanatory variables specified as driving the degree/intensity of adoption are assumed. The regression analyses were done in components of related variables. State dummies were included in all the models to reflect the effect of diversities among the States. Though the above variables have been specified, they are nonetheless not the only important factors that influence the adoption of innovation. According to Zegeye (1990), prices of input in relation to output prices as well the opportunity cost of land and labour are equally important variables. Considering the high rate of sucker production by cooking banana, the impact of opportunity cost of land may be great.

RESULTS AND DISCUSSION

Cooking banana adoption. From the results, 55% of the farmers have more cooking banana mats than they initially planted, indicating that 55% of the farmers have adopted the crop (see earlier definition of adopters). The figures varied among the States, ranging from 30% in Delta to 65.7% in Rivers (Table 3). The adoption level is considered fairly high, noting that the crop was barely about a decade old since introduction, in addition to being a new and non-traditional crop. In Nepal, Floyd *et al.* (1999) reported a 52% adoption level of improved maize varieties, and 5.7% level of adoption of vegetable seed production by farmers. Among the adopters, the degree or intensity of adoption (change in the number of mats) ranges from one mat to 599

mats with a mean of 23, while the annual rate of adoption ranges from 0.04 to 186 mats with a mean of 6. Among the States, the intensity of adoption varied from an average of 8.8 in Akwa-Ibom to 27.6 in Rivers, while for the rate of adoption, the average figure ranged from 1.8 in Delta to 8.1 in Imo State (Table 3). The intensity and rate of adoption are equally encouraging, taking into account the relatively "newness" of the crop in the area.

Determinants of intensity of adoption

Household variables: These explained about 18% of the variations in the degree or intensity of cooking banana adoption by the adopter farmers (Table 4). The overall fit is significant at less than one percent. The relationships between farmers' social status and age and the intensity of adoption are negative and non-significant. Farmers' marital status, household size, years of formal education, and primary occupation all yielded strong positive relationships with the intensity of adoption (Table 4). Many authors have identified household size as one of the major household variables that strongly influence the intensity of adoption of innovation (Zegeye, 1990; CIMMYT, 1993; Burton *et al.*, 1999). Married respondents with larger households tend to have more mouths to feed, and more income needs, and as a result always seek to expand opportunities that will guarantee more food and income sources. Also large households guarantee an adequate supply of farm labour (Zegeye, 1990), necessary for the expansion of farm enterprises. Among the cooking banana adopters, 86% are married, while the average size of household is 13 persons (Table 8). The level of educational attainment has also been found to exert a strong positive impact on the degree of adoption (Zegeye, 1990; Jha *et al.*, 1991; Baidu-Forson, 1999). More educated farmers tend to be in a better position to deal with problems that arise from expansion in production, as they often have more skill and access to needed information. Farmers that have farming as their primary occupation derive their

income mostly from farm output, and expansion in production is one primary way of guaranteeing this. In the UK, Burton *et al.* (1999) reported a positive relationship between the adoption of organic horticultural farming and farmers whose major income source is agriculture. Among the cooking banana adopters, about 67% had farming as their primary occupation (Table 8). Though non-significant, many authors have reported negative relationships between farmers' age and intensity of adoption. Older farmers tend to be more subsistence than market-oriented in their production, and thus, tend to expand less.

Institutional variables: These explained about 4% of the variations in the degree of adoption (Table 5), and the overall fit is non-significant. The probability of increasing production by farmers that have relationships with the staff of disseminating institutions is negative and non-significant. Where the farmers belong to farmers' group/co-operatives and have attended some form of agricultural training (e.g., seminar, workshops, field/demonstration days, etc.), the relationships with the intensity of adoption are positive, but significant only for those that have attended agricultural training. Attendance at agricultural-related training/workshops/seminars provides farmers with the opportunity of receiving extension advice which has been found by Jha *et al.* (1991) to exert a strong positive impact on the level of adoption of improved agricultural technologies in Eastern Province of Zambia. Also, Zegeye (1990) reported a strong positive effect of extension contacts with farmers on the adoption of improved varieties, intensity of fertiliser use, and use of Bullock tractor by farmers in Northern Ghana.

Land resource variables: The land resource variables explained about 15% of the variation in the intensity of adoption, with a significant overall fit (Table 6). The intensity of adoption has a positive and strong significant relationship with the number of farm fields owned by the farmer through inheritance and purchase; and a negative significant relationship with the number of fields under fallow. The intensity of

adoption is negative and non-significantly related with the number of farm fields acquired by the farmer through rentage. The relationships are positive but non-significant with the number of farm fields acquired through borrowing and lease. The strong positive relations of farmlands acquired through inheritance and outright purchase is a reflection of the impact of landholdings/farm size, which are expected, as they tallied with earlier reports by Manyong *et al.* (1996), CIMMYT, (1993) and Jha *et al.* (1991). Guaranteed sustainable usufruct right by farmers over their farmlands encourages long-term investment on land and the expansion of enterprise (Bishop and Toussaint, 1958), especially for perennials such as cooking banana. On the other hand, where long-term security is not guaranteed, planting and expansion in an enterprise of perennials will be discouraged. Among the adopters, the highest average number of farmlands was acquired through inheritance and purchase (Table 8). Farmlands under fallow are usually outlying farms, which do not favour *Musa* production. Manyong *et al.* (1996) reported that the availability of a large amount of fallowed land limited the degree of adoption of *Mucuna* in Benin Republic.

Crop/market variables: The variables explained about 34% of the variations in intensity of cooking banana adoption by the adopter farmers, with a high significance level for the overall fit (Table 7). Only four of the variables have a strong influence on the intensity of adoption. The intensity of cooking banana adoption/cultivation has a positive and significant relationship with the number of plantain mats owned by the farmer. Cooking banana and plantain are compatible in resources use. As such, more available land for plantain will also result in more available land for cooking banana, though competition for resources is associated with the two crops. Compatibility of innovation with existing systems has been found to strongly influence adoption (Zegeye, 1990). Where the farmer got initial suckers from fellow farmers, the intensity of adoption is significantly low. Psychologically, farmers usually attach a premium to inputs/farm materials from

institutions rather than from fellow farmers. Again, the number of materials from fellow farmers may be small compared to those from institutions. Among the adopters, 64% got initial suckers from fellow farmers (Table 8). The number of mats initially planted by the farmer has a positive and strong relationship with the intensity of adoption. Farmers that got more suckers are less likely to have trial failures than those who got only a few initially. The number of initial mats planted by the adopters ranges from one to 100 with a mean of 4 and a standard deviation of 10 (Table 8). Where the farmer produces plantain and cooking banana for market, the degree of adoption is positive and non-significant, while the relationship is positively significant where the farmer has regular buyers of cooking banana. The degree of adoption of new crops by farmers has been found to be strongly linked to market opportunities (CIMMYT, 1993; Enyong *et al.*, 1999; Kormawa and von-Oppen, 1997; Langyintuo, 1997). About 86% of the adopters sold plantain and 70% sold cooking banana, while 41% had regular buyers of harvested cooking banana (Table 8).

The intensity of adoption has positive and non-significant relationships with farmer's cooking banana cropping experience, free acquisition of initial suckers, and receipt of training on the crop's agronomic and management practices. It is also positive with female ownership of plantain, and where the cropping system and utilisation methods of cooking banana are compatible with those of plantain. On the other hand, the intensity of adoption is non-significantly low with farmers that received training on processing and utilisation methods as well as female ownership control of cooking banana in the household. Equally, the intensity of cooking banana adoption has negative and non-significant relationships with the complexity of cropping and utilising cooking banana compared to plantain. Though non-significant, these variables are presented since they border on issues that have been found by other authors to strongly influence adoption (Zegeye, 1990

CIMMYT, 1993; Adesina and Baidu-Forson, 1995; Amara *et al.*, 1999; Baidu-Forson, 1999).

Determinants of rate of adoption

Household-level variables: The variables explained about 17% of the variations in the annual rate of adoption by the adopter farmers, with a very high significant level for the overall fit (Table 4). The rate of adoption has a negative and non-significant relationship with the farmer's social status. Age and marital status are positive and non-significant. The rate of adoption has very significant and positive relationships with the size of the household, level of educational attainment and primary occupation. The rate of adoption by farmers who have had a past bad experience with agricultural innovations is low and non-significant. Size of household, level of educational attainment, and farming as primary occupation have earlier been shown to have a strong positive influence on adoption (Zegeye, 1990; Jha *et al.*, 1991; CIMMYT, 1993; Adesina and Baidu-Forson, 1995; Burton *et al.*, 1999).

Institutional variables: The variables explained about 8% of the variations in the rate of adoption (Table 5). The overall fit is slightly significant (at 10%). The relationships are positively non-significant with farmers who have relationships with staff of the disseminating institutions, and those who belong to farmers' groups/co-operatives. The relationship is positive and significant for farmers who have received some form of training on agriculture. Receipt of such training shows some evidence of extension contacts/education, which has been cited as having a strong positive link on adoption (Zegeye, 1990)

Land tenure variables: The variables explained about 16% of the variations in the rate of adoption with an overall significant level of less than 1% (Table 6). The relation with the number of farmlands acquired through inheritance is positive and highly significant. It is significantly negative with the number of fields under fallow, and negatively non-significant with the number acquired through rentage. The number of

farm fields acquired through purchases has a positive and very significant relationship. The number acquired through borrowing and lease are positively non-significant. The strong positive relationship of the annual adoption rate and the number of farmlands acquired through inheritance and purchase agrees with earlier results, showing the effect of security of farm holdings and farm size on adoption (Bishop and Toussaint, 1958; Jha *et al.*, 1991; CIMMYT, 1993, Manyong *et al.*, 1996).

Crop and market-related variables: The variables accounted for about 42% of the variations in the rate of adoption by the adopter farmers (Table 7). The overall fit is highly significant. The relationship is positive and very significant with the level of plantain cropping. The annual rate of adoption is significantly low with the number of years of cropping cooking banana, but highly significant and positive with the number of mats initially planted. Availability of regular buyers or customers for the disposal of the fruit is significantly positive. As the years go by, the rate at which farmers establish additional cooking banana mats decreases. This is as a result of the principle of diminishing marginal rate of crop/resource substitution (Bishop and Toussaint, 1958). Availability of regular buyers is a sign of a ready market for farmers' produce, which induces an increased rate of enterprise expansion. Market opportunity has been identified as one of the major forces driving increased adoption of innovation (Kormawa and von-Oppen, 1997; CIMMYT, 1993). The positive and significant relationship of the annual adoption rate with the level of plantain cropping may be associated with the pest/disease incidence on plantain. Big plantain growers are more endangered by crop failures (since they are likely to depend heavily on it for income), and will thus plant more varieties that present suitable alternatives. The annual rate of adoption is non-significantly high given free acquisition of initial suckers and the receipt of training on cooking banana agronomic and management practices, as well as the ownership of plantain by the wife. Also there is a non-significant

increase in the rate of adoption where plantain and cooking banana are produced for market, as well as the compatibility of cooking banana cropping and utilisation with those of plantain. There is a negatively non-significant relationship with the acquisition of initial suckers from fellow farmers. Receipt of training on cooking banana utilisation methods is negative and non-significant, so is the wife's ownership of cooking banana, and difficulty in cropping and utilising cooking banana compared to plantain. The non-significant variables are presented, given that some other studies have found then significant as determinants of adoption (Zegeye, 1990; Jha *et al.*, 1991; Adesina and Baidu-Forson, 1995; Burton *et al.*, 1999).

CONCLUSION AND RECOMMENDATIONS

Results showed a high level of intensity and rate of adoption by farmers in the area, implying that the crop is compatible with existing systems and acceptable to the farmers. Analyses of the factors influencing the adoption process gave some level of reliable statistical precision that the factors considered influenced the intensity and rate of adoption. There were variations however, in the strengths of impacts of individual variables considered in the different models. On the average, the statistical tests of some of the individual variables showed that significant explanatory variables exist in influencing the decisions of the adopters. The *apriori* expectation concerning the effects of the explanatory variables on the extent and rate of adoption by farmers is thus maintained.

Farm household size, level of educational attainment, farming as primary occupation, and increased security on farmland all strongly influenced the extent and rate of adoption positively. Thus, for an increase in the intensity and rate of adoption of new crops or innovation, initial introduction should favour households with the required labour supply, some level of formal education, and for whom farming is the major profession and source of livelihood. This demands increased

investment in rural education, as well as an increase in education awareness campaign. The introduction of new crops to full, rather than part-time farmers will guarantee increased adoption and cultivation of the crop. Also, policies that enhance farmers' access to, and security on farmlands will boost the intensity and rate of innovation adoption.

Market opportunity greatly influenced the extent and rate of adoption by the farmers positively. Therefore, for increased adoption of innovations, increased access to market opportunities and infrastructure by farmers is important. Increased access to, and investment in market opportunities and infrastructure motivate farmers' adoption decisions concerning new crops as they enhance demand for the outputs of innovation when adopted. The influence of market opportunities also has implications for breeding purposes. Breeders for new crops should, as much as possible, incorporate the market potential of intending crop varieties into their agronomic objectives.

Extension education and training positively and strongly influenced both the intensity and rate of adoption. Farmers usually acquire this through attendance at training and workshops/seminars organised by extension institutions. Creating an avenue for more access to such trainings and workshops/seminars will positively increase the chances of successful introduction and increased adoption of innovations. However, it is important to see that the right information is disseminated at such forums. This is because the dissemination of the wrong information, or information that cannot be easily applied by farmers within their technical limitations will strongly disfavour increased adoption, and also the spread of the innovation. Information on cooking banana utilisation was mostly concentrated on uses not conventional to the rural farmers, and whose application was not within their technical competence. This made most of them drop the cultivation of the crop, and thus, had a strong negative effect on adoption. Therefore, disseminating the right information at the right time to farmers is crucial in the introduction of new crops/technologies.

The intensity and rate of adoption were, positively, and strongly influenced by the level of plantain cropping by the farmers. This denotes that adoption is favoured more by farmers that already practice a similar system, than by farmers to whom such innovation is entirely new. Apart from increasing the chances of compatibility in resource use and production systems, resources for such an innovation will be more available to those farmers already practising similar ones.

REFERENCES

Adesina, A.A. and Baidu-Forson, J. (1995). Farmers' perception and adoption of new agricultural technology: evidence from analysis in Burkina-Faso and Guinea, West Africa. *Agricultural Economics*. 13(1): 1-9.

Ahiekpor, E.K.S., Afreh-Nuamah, K., Ortiz, R. and Ferris, S. (1996). Advanced *Musa* yield trial at the University of Ghana Agricultural Research Station, Kade: 1. Growth and yield characteristics. *MusAfrica*. (9): 15 – 18.

Akele, S.A. (1996). Green River Project (GRP) of Nigerian Agip Oil Co. In *Plantain and banana: Production and research in West and Central Africa*. Ortiz, R. and Akoroda, M.O. (eds.). IITA, Ibadan, Nigeria. Pp. 65-66.

Amara, N., Traoré, N., Landry, R. and Romain, R. (1999). Technical efficiency and farmers' attitudes towards technology innovation: the case of the potato farmers in Quebec. *Canadian Journal of Agricultural Economics*. 47(1): 31-43.

Baidu-Forson, J. (1999). Factors influencing adoption of land-enhancing technology in the Sahel: lessons from a case study in Niger. *Agricultural Economics*. 20(3): 231-239.

Bayeri, K.P., Tenkouano, A., Mbah, B.N. and Mbagwu, J.S.C. (1999). Genetic and cropping system effects on yield and postharvest characteristics of *Musa* species in Southeastern Nigeria. *African Crop Science Journal*. 7(1): 1 – 7.

Bishop, C.E. and Toussaint, W.D. (1958). *Introduction to agricultural economic analysis*. John Wiley and Sons, New York.

Burton, M., Rigby, D. and Young, T. (1999). Analysis of the determinants of adoption of organic horticultural techniques in the Uk. *Journal of Agricultural Economics*. 50(1): 47-63.

Chukwu, U. (1996). Effect of Post-harvest injury on shelf-life and extrusion processing of *Musa* fruits. Ph. D. thesis, Dept of Food Technology, University of Ibadan, Nigeria.

CIMMYT Economic Program. (1993). *The adoption of agricultural technology: A guide for survey design*. CIMMYT. Mexico, D.F.

Craenen, K. (1998a). Black Sigatoka disease of banana and plantain: A reference manual. International Institute of Tropical Agriculture, Ibadan.

Craenen, K. (1998b). Technical manual on black sigatoka disease of banana and plantain. International Institute of Tropical Agriculture, Ibadan.

Dadzie, B.K. (1998). Postharvest characteristics of black sigatoka resistant banana, cooking banana and plantain hybrids. *INIBAP Technical Guidelines.* (4), International Plant Genetic Resources Institute (IPGRI), Rome, Italy.

Enyong, E., Coulibaly, O., Adesina, A., Youri, A., Raman, C. and The, C. (1999). Dynamics of maize production, adoption of improved varieties and food security in the Northern region of Cameroon. In *Strategy for sustainable maize production in West and Central Africa.* Badu-Apraku, B., Fakorede, M.A.B., Ouedraogo, M. and Quin, M. (eds.). Proceedings of a Regional Maize Workshop, 21-25 April, 1997. IITA-Cotonou, Benin Republic. Pp. 365-376.

Ferris, S.R.B. (1997). Improving storage life of plantain and banana. Research Guide (62). International Institute of Tropical Agriculture, Ibadan.

Ferris, R.S.B., Ortiz, R., Chukwu, U., Akalumhe, Y.O., Akele, S., Ubi, A. and Vuylsteke, D. (1997). The Introduction and market potential of exotic black sigatoka resistant cooking banana cultivars in West Africa. *Quarterly Journal of International Agriculture.* 36(2):141-152

Ferris, R.S.B., Adeniji, T., Chukwu, U., Akalumhe, Y.O., Vuylsteke, D. and Ortiz, R. (1996). Postharvest quality of plantains and cooking bananas. In *Plantain andbBanana: Production and research in West and Central Africa.* Ortiz, R. and Akoroda, M.O. (eds.). IITA, Ibadan, Nigeria. pp. 15-21.

Floyd, C.N., Harding, A.H., Paddle, K.C., Rasali, D.P., Subedi, K.D. and Subedi, P.P. (1999). The adoption and associated impact of technologies in the Western Hills of Nepal. *AgREN Network Paper No.90.* Agricultural Research and Extension Network, The Overseas Development Institute, Portland House, Stag Place, London SW1E 5DP, U.K.

Frison, E. (1997). Towards a *Musa* improvement programme. *MusAfrica.* (11): 5 – 6.

INIBAP (International Network for the Improvement of Banana and Plantain). (1987). *Plantain in West and Central America: Proposal for regional research and development network.* INIBAP, Montpellier, France.

Gauhl, F., Ferris, F., Pasberg-Gauhl, C. and Lawrence, A. (1998). On-farm yield loss assessment of black sigatoka on plantain and banana. Research Guide (67). International Institute of Tropical Agriculture, Ibadan.

Gomez, K.A. and Gomez, A.A. (1984). *Statistical procedures for agricultural research.* John Wiley and Sons Inc. New York.

James, T. (1973). *Introduction to quantitative methods in economics*. John Wiley and Sons Ltd. Jacaranda, Hong Kong.

Jha, D., Hojjati, B. and Vosti, S. (1991). The Use of improved agricultural technology in Eastern province. In *Adopting improved farm technology: A case of smallholder farmers in Eastern Province, Zambia*. Celis, R., Milimo, J.T. and Wanmali, S (Eds.) IFPRI, Washington, D.C., pp.173 - 201.

Kormawa, P. and von Oppen, M. (1997). Institutions affecting the adoption of a non-traditional crop: The case of soybean in West Africa. In *Institutions and technology for rural development in West Africa*. Bierschenk, T., Le Meur, P. and von Oppen, M. (Eds.). Proceedings of the International Symposium by the University of Hohenhein, Germany. 16 – 22 February 1996, Cotonou, Benin. Margraf Verlag, Weikershein, Germany. Pp. 145 – 152.

Langyintuo, A.S. (1997). Adoption of soybean technology: Lessons from Northern Ghana. In *Institutions and technology for rural development in West Africa*. Bierschenk, T., Le Meur, P. and von Oppen, M. (Eds.). Proceedings of the International Symposium by the University of Hohenhein, Germany. 16 – 22 February 1996, Cotonou, Benin. Margraf Verlag, Weikershein, Germany. Pp. 163 – 170.

Lemchi, J., Tenkouano, A. and Faturoti, B. (2003). Delivery and evaluation of disease-resistant plantain and banana hybrids and related technologies under smallholder management systems in Nigeria. Technical Report. Plantain and Banana Improvement Program (PBIP), International Institute of Tropical Agriculture, Ibadan, Nigeria.

Manyong, V.M., Houndékon, A.V., Gogan, V., Versteeg, M.N. and van der Pol, F. (1996b). Determinants of adoption of a resource management technology: the case of *Mucuna* in Benin Republic. In Advances in agricultural and biological environment engineering, Senwen, Z. and Yunlong, W. (eds). Proceedings of a Conference (ICABE), Beijing, 15-19 August 1996. China Agriculture University Press, Beijing, China. Pp. 86-93.

Nweke, F.I., Njoku, J.E. and Wilson, G.F. (1988). Productivity and limitations of plantain (*Musa* spp. cv AAB) production in compound gardens in Southeastern Nigeria. *Fruits*.43(3): 161 – 166.

Ortiz, R., de Cauwer, I. and Vuylsteke, D. (1995). Adaptations of plantain hybrids and cooking bananas in Africa. In *Abstracts of XIV EUCARPIA (European Association for Research in Plant Breeding): Adaptations and Plant Breeding*. Jyvaskyla, Finland. July 31 – August 4, 1995.

PBIP (Plantain and Banana Improvement Program). (1995). *Annual report 1994*. Crop Improvement Division, International Institute of Tropical Agriculture, Nigeria.

Robinson, J.C. (1996). *Bananas and plantains. Crop Production Science in Horticulture*. (5). CAB International, Wallingford, U.K.

Singh, H.P. and Uma, S. (1996). *Banana cultivation in India*. IASRI, Pusa, New Delhi.

Stover, R. 1983. Effet du *Cercospora* noir sur les Plantains en Amérique Centrale. *Fruits*, 38: 326-329.

Swennen, R. (1990). *Plantain cultivation under West African conditions: A reference manual*. International Institute of Tropical Agriculture, Ibadan, Nigeria.

Swennen, R. and Ortiz, R. (1997). Morphology and growth of plantain and banana. Research guide (66). International Institute of Tropical Agriculture, Ibadan.

Tollens, E. (1995). The Fundamental role of plantain and banana in tropical farming system. In *The King Baudouin Award to IITA:* Proceedings of the Celebration at Leuven, 6 April 1995. BADC, Brussels, Belgium. pp. 29-31.

Tshiunza, M., Lemchi, J., Tenkouano, A. and Ezedinma, C. (1999). IITA's partnership with oil companies, churches and public organisations for the delivery of cooking banana in Nigeria. Paper presented at the International Workshop on Effective and sustainable partnerships in a global research system: focus on Sub-Saharan Africa. 7 – 11 December, 1999. Bouake, Cote d'Ivoire.

Vuylsteke, D. (1995). Banana research at IITA: Current status and outlook. In *The King Baudouin Award to IITA:* Proceedings of the Celebration at Leuven, 6 April 1995. BADC, Brussels, Belgium. pp. 33-40.

Zegeye, (1990). The adoption of modern farm practices in African agriculture: Empirical evidence about the impact of household characteristics and input supply in the Northern Region of Ghana. Nyamkpala Agricultural Research Report (7). Verlag Josef Margraf Scientific Books, Weikersheim, Germany.

TABLE 1. Distribution of survey farmers by State

State	Number of farmers	Percentage
Abia	1	0.4
Akwa-Ibom	25	8.8
Anambra	9	3.2
Bayelsa	31	10.9
Cross River	31	10.9
Delta	10	3.5
Imo	44	15.4
Rivers	134	47.0
Total	285	100

TABLE 2. Definition of variables specified in the regression function of the determinants of intensity and rate of cooking banana adoption in Nigeria.

Variable	Type	Description
Dependent variables		
Matchang	Continuous	Intensity of cooking banana adoption by farmers (change in cooking banana mats of adopters)
Matratyr	Continuous	Rate of cooking banana adoption by farmers (annual rate of increase in the number of cooking banana mats of adopters)
Explanatory variables	Binary	
State1	Binary	1, if state is Akwa Ibom; else 0
State2	Binary	1, if state is Anambra; else 0
State3	Binary	1, if state is Bayelsa; else 0
State4	Binary	1, if state is Cross River; else 0
State5	Binary	1, if state is Delta; else 0
State6	Binary	1, if state is Imo; else 0
State7	Binary	1, if state is Rivers; else 0
Sstatus	Binary	Farmer's social status: 1 if titled; else 0
Age	Continuous	Farmer's age (years)
Mstatus	Binary	Marital status of farmer: 1 if married; else 0
Hsize	Continuous	Farmer's household size (no. of people eating from the same pot)
Feduc	Continuous	Farmer's level of education (no. of years spent in formal education)
Occup	Binary	Respondent's primary occupation: 1 if farming; else 0
Badexp	Binary	Farmer's experience with past innovation: 1 if good; else 0
Staffrel	Binary	1, if farmer has any relationship with staff of disseminating institution; else 0
Amember	Binary	1, if farmer belongs to any association/farmer group/co-operative; else 0
Inherit	Continuous	No. of fields owned by farmer through inheritance
Fldfallo	Continuous	No. of farmer's fields under fallow
Rented	Continuous	No. of fields acquired by farmer through rentage
Purchase	Continuous	No. of fields acquired by farmer through purchase
Borrow	Continuous	No. of fields acquired by farmer through borrowing

Lease	Continuous	No. of fields acquired by farmer through lease
Pbfld1	Continuous	No. of plantain mats owned by farmer
Cbyrs	Continuous	Number of years of cooking banana cropping by the farmer
Cbmat0	Continuous	No. of cooking banana mats initially planted by farmer
Introd	Binary	Source of initial sucker acquisition: 1 if fellow farmer; else 0
Conditon	Binary	Condition of acquisition of cooking banana suckers by the farmer: 1 if free; else 0
Pestdis	Binary	Whether farmer has had any incidence of plantain pests/diseases: 1 if yes; else 0
Cbregula	Binary	Whether farmer had regular buyers of his/her cooking banana harvested: 1 if yes; else 0
Cbbunch	Binary	1, if the bunch yield of cooking banana is superior to that of plantain, else 0
Cbfinbun	Binary	1, if the number of fingers per bunch of cooking banana is more than that of plantain; else 0
Cbataste	Binary	1, if the taste of the most common utilisation form of cooking banana is superior to that of plantain, else 0
Cbdrougt	Binary	1, if drought resistance of cooking banana is superior to that of plantain, else 0
Cbpulpel	Binary	1, if pulp/peel ratio of cooking banana fingers is superior to that of plantain, else 0
Prodsame	Binary	1, if cooking banana production system is compatible with that of plantain; else 0
Utilsame	Binary	1, if cooking banana utilisation methods are compatible with those of plantain; else 0
Cropdfty	Binary	Difficulty in cropping cooking banana compared to plantain: 1 if difficult; else 0
Usedfty	Binary	Difficulty in the utilisation methods of cooking banana compared to plantain: 1 if difficult; else 0
Ownerpb	Binary	1; if wife owns plantain in the household; else 0
Ownercb	Binary	1, if wife owns cooking banana in the household; else 0
Training	Binary	1, if farmer has received any agricultural training; else 0
Magt	Binary	1, if farmer has received any training on cooking

		banana agronomic practices; else 0
Util	Binary	1, if farmer has received any training on cooking banana utilisation methods; else 0
Soldpb	Binary	1, if farmers sales plantain; else 0
Soldcb	Binary	1; if farmers sales cooking banana; else 0

TABLE 3. Level, intensity and annual rate of cooking banana adoption in Nigeria

State	Adoption						
	Level of adoption (%)	Intensity of adoption			Annual rate of adoption		
		Range	Mean	Std	Range	Mean	Std
Akwa Ibom	56.0	1-23	8.8	6.7	0.5-15.0	4.4	4.3
Anambra	33.3	1-14	9.7	7.5	0.3-4.7	2.6	2.2
Bayelsa	35.5	1-133	15.9	39.0	0.1-33.3	4.0	9.7
Cross River	54.8	1-199	17.8	47.5	0.2-66.3	6.2	16.1
Delta	30.0	5-21	11.0	8.7	0.6-3.0	1.8	1.2
Imo	45.5	1-365	25.2	80.6	0.2-121.7	8.1	26.9
Rivers	65.7	1-599	27.6	97.0	0.04-186	6.0	22.5
All states	54.7	1-599	23.0	80.4	0.04-186	5.9	20.2

Source: Field survey, 1998

TABLE 4. Parameter estimates (based on semi-log) of household evel determinants of intensity and rate of adoption of cooking banana by farmers.

Explanatory variables	Coefficients	
	Matchang	Matratyr
Intercept	-0.4406	-1.794
	(-0.746)	(-1.853)*
State2	-0.1322	-0.3812
	(-0.166)	(-0.446)
State3	-0.1425	-0.6894
	(-0.300)	(-1.347)
State5	0.3156	0.2409
	(1.601)	(0.272)
State6	0.2478	-0.0827
	(0.633)	(-0.196)
State7	-0.0764	-0.6833
	(-0.272)	(-2.242)**
Sstatus	-0.0226	-0.0619
	(-0.085)	(-0.212)
Age	-0.0030	0.0006
	(-0.368)	(0.073)
Mstatus	0.6407	0.1914
	(1.918)*	(0.532)
Hsize	0.0445	0.0350
	(3.030)***	(2.191)**
Feduc	0.0783	0.0803
	(3.243)***	(3.083)***
Occup	0.6723	0.8611
	(2.662)***	(3.157)***
Badexp	-	-0.1456
		(-0.395)
Statistics:		
No of observations	149	149
R^2	0.18	0.17
F-value	2.787	2.301
Prob > F	0.0027	0.0106

Note: Values in parenthesis = t-ratio values; *** significant at P <= 0.01; ** significant at < P <= 0.05; * significant at 0.05 < P <= 0.10.

TABLE 5. Parameter estimates (based on semi-log) of institution level determinants of intensity and rate of adoption of cooking banana by farmers.

Explanatory Variables	Coefficients	
	Matchang	Matratyr
Intercept	1.5045	0.3030
	(5.261)***	(1.010)
State2	0.1872	-0.0763
	(0.221)	(-0.086)
State3	-0.3193	-0.7836
	(-0.655)	(-1.533)
State5	0.5086	-0.2546
	(0.607)	(-0.290)
State6	-0.0748	-0.3130
	(-0.250)	(-0.751)
State7	-0.0725	-0.6071
	(-0.174)	(-1.994)**
Staffrel	-0.0438	0.1155
	(-0.174)	(0.436)
Amember	0.1438	0.2802
	(0.591)	(1.086)
Training	0.5030	0.5317
	(1.865)*	(1.880)*
Statistics:		
No of observations	156	156
R^2	0.04	0.08
F-value	0.817	1.702
Prob > F	0.5890	0.1025

Note: Values in parenthesis = t-ratio values; *** significant at P <= 0.01; ** significant at < P <= 0.05; * significant at 0.05 < P <= 0.10

TABLE 6. Parameter estimates (based on semi-log) of farmland determinants of intensity and rate of adoption of cooking banana by farmers.

Explanatory Variables	Coefficients	
	Matchang	Matratyr
Intercept	1.1594	0.0913
	(4.220)***	(0.312)
State2	0.4279	0.1957
	(0.525	(0.225)
State3	-0.0977	-0.4660
	(-0.203)	(-0.905)
State5	0.5546	-0.2350
	(0.668)	(-0.265)
State6	0.1815	-0.0034
	(0.465)	(-0.008)
State7	0.1269	-0.3750
	(0.449)	(-1.245)
Inherit	0.0815	0.0808
	(4.413)***	(4.103)***
Fldfallo	-0.1039	-0.1055
	(-3.779)***	(-3.597)***
Rented	-0.0386	-0.0566
	(-0.525)	(-0.721)
Purchase	0.1010	0.1188
	(2.923)***	(3.223)***
Borrow	0.0512	0.1087
	(0.284)	(0.566)
Lease	0.0302	0.0095
	(0.348)	(0.103)
Statistics		
No of observations	154	154
R^2	0.15	0.16
F-value	2.229	2.446
Prob > F	0.0159	0.0080

Note: Values in parenthesis = t-ratio values; *** significant at P <= 0.01.

TABLE 7. Parameter estimates (based on semi-log) of crop and market level determinants of intensity and rate of adoption of cooking banana by farmers.

Explanatory Variables	Coefficients	
	Matchang	Matratyr
Intercept	0.7864	-0.1262
	(0.878)	(-0.140)
State2	0.6068	0.4190
	(0.585)	(0.401)
State3	-0.7778	-1.3021
	(-1.041)	(-1.734)*
State5	-1.1694	-1.4635
	(-0.815)	(-1.051)
State6	-0.0762	-0.2836
	(-0.170)	(-0.629)
State7	-0.3598	-0.5894
	(-1.027)	(-1.674)*
Pbfld1	0.1430	0.1365
	(2.571)***	(2.440)**
Introd	-0.5311	-0.4628
	(-1.678)*	(-1.455)
Conditon	0.3253	0.3977
	(1.036)	(1.260)
Magt	0.7383	0.7557
	(1.252)	(1.274)
Util	-0.7346	-0.7589
	(-1.131)	(-1.162)
Cbyrs	0.0154	-0.1001
	(0.584)	(-3.777)***
Cbmat0	0.0538	0.0559
	(3.915)***	(4.048)***
Ownerpb	0.3262	0.4870
	(0.393)	(0.584)
Ownercb	-0.7051	-0.8674
	(-0.887)	(-1.085)
Cbregula	0.6347	0.4936
	(2.286)**	(1.768)
Soldpb	0.1242	0.2771
	(0.228)	(0.505)
Soldcb	0.0865	0.0434

	(0.218)	(0.109)
Prodsame	0.1085	0.2306
	(0.189)	(0.399)
Utilsame	0.2130	0.2585
	(0.680)	(0.821)
Cropdfty	-0.5335	-0.6191
	(-0.753)	(-0.869)
Usedfty	-0.0072	-0.1448
	(-0.020)	(-0.401)
Statistics		
No. of observations	125	125
R^2	0.34	0.42
F-value	2.554	3.564
Prob > F	0.0010	0.0001

Note: Values in parenthesis = t-ratio values; *** significant at P <= 0.01; ** significant at < P <= 0.05; * significant at 0.05 < P <= 0.10

TABLE 8. Summary statistics of variables affecting cooking banana adoption in Nigeria

Variable	Statistic								
	All farmers (N = 285)			Adopters (N = 156)			Non-adopters (N = 129)		
	Mean	Std	%	Mean	Std	%	Mean	Std	%
Farmers with social title	-	-	25.8	-	-	26.9	-	-	24.4
Farmers' age	48.5	16.1	-	48.2	15.7	-	48.9	16.6	-
Married farmers	-	-	87.0	-	-	85.9	-	-	88.4
Household size	12	7.5	-	13.3	8.1	-	10	6.5	-
No. of years of formal education	8.5	5.0	-	8.6	5.0	-	8.3	5.0	-
Farming as primary occupation	-	-	65.8	-	-	66.5	-	-	65.1
Farmers who had relationship with staff of institutions	-	-	63.9	-	-	60.3	-	-	68.2
Farmers who belong to association	-	-	48.8	-	-	46.8	-	-	51.2
No. of fields under fallow	3.8	7.7	-	4.2	8.9	-	3.3	5.9	-
No. of fields acquired through rentage	0.5	1.7	-	0.5	1.9	-	0.4	1.4	-
No. of fields acquired through purchase	0.8	2.7	-	1.1	3.4	-	0.3	1.6	-
No. of fields acquired through inheritance	8.7	10.8	-	9.2	12.6	-	8.1	8.2	-
No. of fields acquired through borrowing	0.1	0.8	-	0.1	0.7	-	0.2	0.9	-
No. of fields acquired through lease	0.2	1.1	-	0.2	1.3	-	0.2	0.9	
Wife/female ownership of plantain	-	-	18.9	-	-	17.3	-	-	20.9

Wife/female ownership of CB	-	-	19.6	-	-	17.9	-	-	21.7
Farmers who got initial suckers from fellow farmers	-	-	59.6	-	-	64.1	-	-	54.3
Farmers who got initial CB suckers free	-	-	83.7	-	-	83.9	-	-	83.6
No. of CB suckers initially planted	6.9	15.0	-	4.4	10.0	-	10.0	19.0	-
No. of years of cropping CB	4.6	3.9	-	5.2	4.5	-	3.8	2.8	-
No. of plantain mats owned	2.2	1.9	-	2.4	2.1	-	2.0	1.6	-
Farmers who received training on agriculture	-	-	36.5	-	-	35.3	-	-	38.0
Farmers who received training on CB agronomic practices	-	-	28.1	-	-	26.9	-	-	29.5
Farmers who received training on CB utilisation methods	-	-	28.8	-	-	26.3	-	-	31.8
Farmers facing plantain pests/disease problems	-	-	57.2	-	-	60.3	-	-	53.5
Farmers who have had bad past experience with agricultural innovation	-	-	8.8	-	-	11.5	-	-	5.4
Farmers who are selling plantain	-	-	83.9	-	-	85.9	-	-	81.4
Farmers that are selling CB	-	-	64.9	-	-	69.9	-	-	58.9

Farmers that have regular buyers of CB	-	-	33.0	-	-	40.9	-	-	23.0
Farmers who see CB bunch yield as superior to that of plantain	-	-	81.6	-	-	85.2	-	-	77.2
Farmers that see CB taste as superior to that of plantain	-	-	38.1	-	-	41.2	-	-	34.0
Farmers who see CB pulp-peel ratio as superior to that of plantain	-	-	40.6	-	-	42.5	-	-	38.1
Farmers who see CB cropping system as similar to that of plantain	-	-	94.7	-	-	95.5	-	-	93.7
Farmers who see CB utilisation methods as similar to that of plantain	-	-	76.8	-	-	79.5	-	-	73.6
Farmers who see CB cropping system as difficult compared to plantain	-	-	2.1	-	-	2.6	-	-	1.6
Farmers who see CB utilisation methods as difficult compared to plantain	-	-	10.9	-	-	13.5	-	-	7.8

NB: CB = Cooking banana. Source = Field survey, 1998.

LIST OF CONTRIBUTORS

1. Olaleye, R. S is of the Department of Agricultural Economics and Extension, Federal University of Technology, Akure, Nigeria
2. E. C. Matthews-Njoku and C. C. Asiabaka are of the Department of Agricultural Extension, Federal University of Technology, Owerri, Nigeria
3. Oladele, O. I. and Adu, A. O. are of the Department of Agricultural Extension/Rural development, University of Ibadan and Federal College of Forestry, Ibadan respectively
4. M. A. C. A. Odii and C. S. V. Onyemauwa are of the Department of Agricultural Economics, Federal University of Technology, Owerri, Nigeria
5. T. J. Odeyemi is of the National Tree Crops Development Unit, Federal Department of Agriculture, Regional Office, Owerri, Nigeria
6. Adeokun, O.A. and Adereti, F.O. are of Department of Agric. Extension and Rural Sociology, Olabisi Onabanjo University, Ago-Iwoye and Department of Agric. Extension and Rural Sociology, Obafemi Awolowo University, Ile-Ife respectively
7. Angba, A. O. is of the Department of Agricultural Economics and Extension, University of Calabar, Nigeria
8. E.C. Okorji., C.C. Eze. And V.C. Eze are of the Department of Agricultural Economics, University of Nigeria, Nsukka, Department of Agricultural Economics, Federal University of Technology, Owerri and Imo State Ministry of Agriculture and Environment respectively.
9. E.C. Matthews-Njoku, Ugochukwu A. I. and Ben Chendo, N. G. are of the Department of Agricultural Extension and Department of Agricultural Economics, Federal University of Technology, Owerri, Nigeria
10. Ohajianya, D. O., Onu, D. O. and Echetama, J. A. are of the Department of Agricultural Economics and Extension, Federal University of Technology, Owerri, Nigeria

11. S. N. Odurukwe is of the Department of Agricultural Extension, Federal University of Technology, Owerri, Nigeria
12. J. Lemchi is of the Department of Agricultural Economics of Federal University of Technology, Owerri, Nigeria; M. Tshiunza and A. Tenkouano are of International Institute of Tropical Agriculture, Oyo Road, Ibadan, Nigeria