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Full Length Research Paper

Determinants and Prospects of IITA Plantain and Banana Technologies Adoption in Niger Delta

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High yielding and disease resistant plantain and banana hybrids and its associated technologies generated by IITA to combat the menace of black Sigatoka disease (*Mycosphaerella fijiensis*) were massively disseminated in year 2000. Since the hybrids were slightly different from the existing varieties in fruit size there was a need to assess thier prospects. Structured questionnaire and interview schedule were used to collect data on the adoption of the fourteen disseminated innovations among 85 randomly selected farmers in 15 villages drawn from the three states. Correlation analysis was used to test the strength of relationship between the respondents personal and socio economic factors, the variables investigated and the adoption index. The results showed that all the respondents adopted at least one of the 14 disseminated innovations. Average adoption level was 40.33% ranging from Rivers 36%, Akwa-Ibom 38% and Bayelsa 47%. The adoption process was strongly influenced by household size, educational attainment, farming experience, frequency of extension visit, overall experience from innovation, market access, access to credit and profit as a result of the technology. It was concluded that the high level of adoption of the technology was not unconnected with the induced model of adoption where farmers saw the yield before embarking on the cultivation and the support (educational and material incentive) received from the disseminating institutions.

Key words: hybrids, disease resistant, adoption, innovations, induced model

INTRODUCTION

Plantain and banana (musa Spp. L.), are one of the major starchy staples in the local food of sub-Saharan Africa, providing more than 25% of the carbohydrates and 10% of the daily calorie intake for more than 70 million people in the continent (IITA, 2000). The production of the crop was threatened by a leaf disease black Sigatoka disease which broke out in the early 1980s causing yield reductions of more than 50% (Vuylsteke, 1995; Ahiekpor et al., 1996; Ferris et al., 1996; Craenen, 1998a). The outbreak led to the establishment of IITA plantain and banana improvement programme to breed varieties that are resistant to this disease and higher yielding than the existing varieties. These (PITA14, PITA17, BITA3 and landrace control Agbagba) varieties were massively deployed into the farming system through the extension arm of the agricultural development programme in these states. The improve varieties though share the same agronomic practices and physiological characteristics with the existing local varieties they are nevertheless different in some features. Their fruits are usually many (greater than 100) but with reduced fruit length, sucker production is profuse and they can be processed into more local and marketable products such as flour, jam, juice, wine, cake and baby foods. This difference in fruit size was initially of consideration to the pilot farmers, therefore an examination of the hybrid prospects and their adoption determinants as well as other plantain based technologies that were ordinarily not valued by the farmers but are of great consequence to sustainable production becomes neces-

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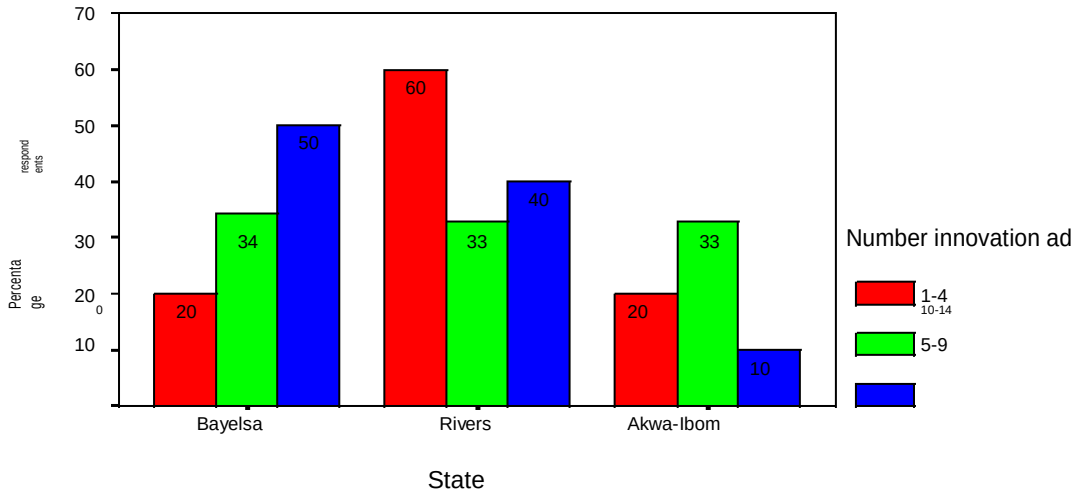

Figure 1. Number of innovations adopted by each state from the 14 innovations disseminated.

sary.

A study conducted by Tshiunza et al. (2001) in South East Nigeria reported that two major factors influenced farmers' decision to produce cooking banana for market and or for household use; they are farmer related and market related factors. The regression analysis conducted revealed that the decision to produce for sale was driven by both groups of variables (R^2 = 0.52). However, the proportion sold was driven significantly more by market led variables. In other words, the farmers tend to respond positively and significantly to market forces in their production.

Mansfield (1963) viewed adoption as a process of imitation, where in contacts with others, led to the spread of technology. In the same vein, Lehvall and Wahlbin (1973) expanded the theory by incorporating various factors of learning, delineating users of innovations to (a) innovators (the internal learners) and (b) imitators (the external learners) and concluded that the investments and risks of an innovation can only be rewarded by levels of imitations and the diffusion of innovations.

The objective of this paper therefore is the examination of prospects of IITA plantain and banana based technologies and the unveiling of factors that determined their adoption in 3 states of the Niger Delta area of Nigeria.

MATERIALS AND METHODS

The population was extracted from the Agricultural Development Programme (ADP) operating zones of Akwa-Ibom, Bayelsa and Rivers state in the Niger Delta area of Nigeria. Five (5) farmers in each State were initially selected by IITA in the pilot project. These 5 pilot farmers represented 5 villages spread across local government areas and the zones. The project under review started in year 2000 and as such, the pilot farmers were expected to have influenced other farmers, and hence five (5) other farmers per village were examined to determine the level of adoption. A total of 85 respondents were interviewed.

Data were collected in two phases. Phase one included collection of data from researchers and extension agency, on Plantain production technologies developed and disseminated to farmers. While phase two was the individual farmer's field survey and interview. The researchers' data provided background for the innovations, while their prospects for adoption were being studied. These data revealed the major Plantain and banana-based technologies developed and passed on to extension outfits for farmers adoption in the study area. These include selection of planting materials, selection of land (soil), cropping system (intercropping method), post-harvest processing technique, weed control methods and rapid sucker multiplication techniques as well as fertilizer usage and disease resistant hybrids varieties. The second phase data were provided by farmers and it involved an interview and completion of structured questionnaires by the farmers. The data were analyzed using descriptive statistics such as frequency counts, percentages, means and standard deviation. Simple correlation analysis (Pearson's correlation coefficient) was used to test the strength of relationship between the farmers' personal and socio- economic characteristics and adoption index. The adoption index was calculated using number of innovation adopted divided by number of innovation disseminated multiply by 100.

RESULTS AND DISCUSSION

Fourteen innovations were disseminated in a package. All the respondents adopted at least one of the disseminated innovations. The highest adoption percentage was recorded in Bayelsa state with 50% of the respondents adopting 10-14 innovations while the lowest adoption rate in the category of 10-14 innovations was recorded in Akwa Ibom state with 10% (Figure 1). This is no doubt a good trend in innovation adoption considering that only 17% (pilot project farmers) of the respondents had direct contact with the innovation propagators. The result revealed great potentials for the disseminated innovations among the respondents. This is

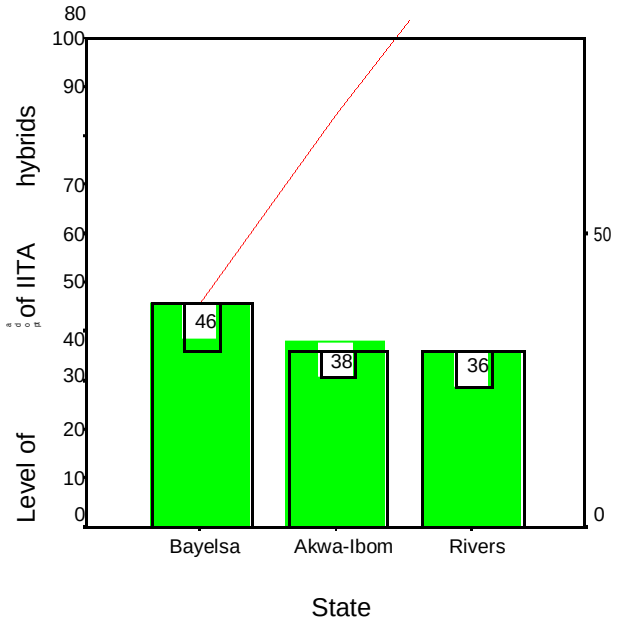

Figure 2. Adoption level of IITA Plantain and Banana hybrids in Bayelsa, Akwa-Ibom, and Rivers states.

attributed to the use of guided adoption model where the farmers were made to see results from similar trial before innovation dissemination and trial.

The adoption index revealed that 80.5% of the respondents had 41-100% adoption index. This appears unprecedented in the adoption study of a new technology. The high adoption index can be traced to peers support in favor of adoption of innovation. Also the exploratory baseline survey carried out before the innovation dissemination, to collate farmers' problems and needs in plantain production in the study area, endeared respondents' interest in the disseminators and consequent high level of adoption rate, as the innovations set out to solve perceived problems of the farmers.

The rates of adoption of the new hybrids disseminated in the States were slightly different from each other. Bayelsa state had the highest rate of 46% followed by Akwa-Ibom State 38% and Rivers State 36% (Figure 2). The organized major plantain and Banana market situated in Bayelsa State and the high enthusiasm generated by the project farmers in the State were responsible for the high adoption rate.

Fourteen variables (Table 1) were correlated with adoption index. Results revealed that ten of the variables were either positively or negatively significant and have implications.

Variables such as household size (r =0.345**), number of years of formal education (r =0.069*) and plantain farming experience (r = 0.231*) revealed a positive and highly significant relationship with adoption index, and this might not be unconnected with availability of family responsiveness of the highly educated to the technology which allows for even complex innovations within the package to be adopted. Experience, however, played a major role in explaining the value of the innovation in solving farmers' encountered problems in plantain production before the innovations. Other variables that had positive relationship with adoption index in the study include source of innovation awareness (r = 0.341*); the relationship explains that a credible source is needed to trigger adoption. Another variable is experience since innovation awareness (r = 0.407**); the more encouraging, profitable and positive the respondents' experience was, since contact with the innovations, the higher the motivation for innovation adoption. Pioneers of innovation play a major role in its adoption and diffusion or discontinuance of innovation adoption.

Adoption is a continuous process that involves evaluation of rewards from early adopters, which may trigger bandwagon effect in adoption (Feder et al., 1985), as such the positive relationship that existed between profit as a result of innovation (0.407*) and adoption index is thus, a motivating factor for innovation spread. The market access (0.255**), highly significant relationship reinforces the assertion of Tziunza et al. (2001) that market forces played an important role in cooking banana adoption. Access to credit (0.414**), and innovation motivation (0.186*) relationship here can be explained in the fact that innovations mostly require additional expenditure on the part of the farmers where there is access to credit, the adoption is promoted. Also, there is no action without motivation hence the factors of motivation are strong enough to trigger adoption. It is worthy of note that the major constraints to plantain production (capital) turned out to be the main motivating factor for adoption in the study.

Finally, against all assumptions, a negative significant relationship was established between extension visits and adoption index r = -0.235*. This trend is unexpected and negates other studies on adoption; the explanation may be that extension support for the innovation under study was almost non-existent with 38.8% respondents recorded a no visit by extension. As such, since adoption could occur at its present level without the expected extension visit, the negative relationship is therefore not unexpected. Tziunza et al. (2001) recorded a negative relationship between staff of disseminating institutions and farmers in the dissemination of cooking banana in South Eastern Nigeria which was explained thus. The relationship of farmers with the staff of the disseminating institutions has been used as a proxy for extension contacts/visits, and was expected to positively influence farmers' adoption decisions. Most findings by other researchers have reported a strong positive relationship between adoption decisions and extension contacts with and visits/advice to farmers (Zegeye, 1990; Jha et al., 1991; Manyong et al., 1996; Baidu-Forson, 1999). This result may have proved wrong the assumption that such relationships denote extension visits/contact and advice. However, the result tallied with the findings of Adesina

Table 1. Determinants of adoption of IITA Plantain and Banana hybrids.

Variables	Correlation coefficient (With adoption index)	Remarks
Age of Farmer	0.164	Positive not significant
Size of household	0.345**	Highly significant
Years in Formal School	0.169*	Significant
Primary Occupation	0.095	Positive not significant
Farming Experience	0.231*	Significant
Source of awareness	0.341**	Highly significant
Frequency of Extension Visits	-0.235*	Negative significant
Innovation Experience	0.407*	Significant
Profit from Innovation	0.409*	Significant
Market Distance	0.269*	Significant
Access to Credit	0.414**	Highly significant
Innovation Motivation	0.186*	Significant

*Significant at the 0.05 level (2 tailed).
**significant at the 0.01 level (2 tailed).

and Baidu- Forsons (1995) on farmers' perception and adoption of new technology in Burkina-Faso and Guinea which also supports the remark of Zinnah et al. (1993), that extension-farmer interactions and linkages in Africa have been chronically weak and ineffective in inducing innovation diffusion and adoption.

CONCLUSION

A high level of adoption of plantain and banana based technologies by farmers in the study area was recorded. This is a confirmation that the innovations were well received and impacted positively on the respondents, thus the prospects of diffusion and adoption are very high. Analysis of the factors influencing the adoption process gave some level of reliable statistical precision. The factors considered influenced the adoption decisions of the respondents. Variations, however, existed in the degree of influence of individual variables considered in the analyses.

The quest for food security and availability of family labor, expressed through the household size, farming experience, market access, experience since awareness of the innovations, access to credit scheme and educational attainment were some of the variables that strongly influenced adoption decisions of the respondents. Zegeye (1990) and Burton et al. (1999) emphasized strong positive influence of education on adoption. Therefore, the initial dissemination of innovations to farmers with some level of scholarship and resources (progressive farmers) with the acumen needed in dealing with initial difficulties was encouraged. This facilitated the initial spread of the plantain and banana based technologies as the study revealed that farmer-to-farmer source of dissemination alone accounted for 30.3% innovation disseminated. For increased adoption and sustainability, continuous training and monitoring of farmers should be embedded in innovation dissemination as farmers do what you inspect and not what you expect.

The closeness of the innovation originators to the end users in this study accounted for the rapid and widespread adoption as the traditional extension institutions were not readily on hand for the farmers as revealed by the negative correlation recorded between extension visits and adoption.

Access to credit and profit as a result of the technology (quantification of superiority) had a strong and positive influence on plantain and banana based technologies. Capital was implicated as a major constraint to plantain production, as such the need to have varieties that yields earlier and better than the farmers' variety and marketability should not be wished away in crop development as these factors greatly enhanced the farmers' decision to adopt the innovations.

From the overwhelming message conveyed by the data in this study, it can be concluded that, provided the innovation is profitable, compatible, simple, triable, and accessible to the farmers, and the disincentive that can inhibit farmers from adoption are removed or weakened through the visible and or feasible motivations, farmers will not hesitate to make a positive adoption decision. As such, a thorough examination of the felt need or constraints through baseline survey should be accorded importance before technology development and transfer is undertaken. This no doubt was attributed as the main basis for massive adoption of the disseminated technologies in this study.

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