

Review

A review of policy acts and initiatives in plantain and banana innovation system in Nigeria

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Plantain and banana are among the most important staple food crops in humid forest zone of West and Central Africa. These has made the crop one of the key research mandates of International and national research institutes, both of which has developed many technologies aimed at improving the production of the crop and removing constraints posed by pest and diseases, marketing opportunities and perishability. Despite these efforts and research breakthrough the production of the crops has been on consistent downward trend in recent years. A ten years (1996 - 2005) production figure of the crops showed that land under plantain and banana production increased by 24.6% while yield reduction of 21.8% was recorded during the same period (FAOSTAT, 2006). This abysmal trend prompted a 40 years (1967 - 2006) review of policy acts and initiatives on the crops, with an examination of various efforts in the areas of research, dissemination, utilization, production and marketing. Seven gaps of critical implications to production and commercialization were identified; these include government non-intervention, marketing and constraints to production, weak/fragile links among stakeholders, research-farmers dichotomy, project sustainability, lack of documentation and funding. Linkages among stakeholders were generally weak and without cohesion, objectives were at variance and unhealthy. The study concluded that stakeholder's cohesion and coordination of efforts is needed for increased production and commercialization. Also governmental intervention is needed in the areas of policy initiatives and acts that will go beyond the ad-hoc response which are usually triggered by natural disaster such as pest and diseases as is the case with black Sigatoka outbreak in mid 80's which was the only period government really intervened in plantain and banana production in Nigeria.

Key words: Plantain and banana, policy acts, initiatives, stakeholders.

INTRODUCTION

Plantain and banana are among the most important staple food crops in humid forest zone of West and Central Africa. This is due to the crops contribution to food security, employment, diversification of income sources in rural and urban areas, and contribution to the gross national product (GNP) (Nkendah and Akyeampong, 2003). Banana is the world's second most important fruit crop after oil palm. It is grown in 130 countries worldwide, world production stood at 71 million metric tonnes, while plantain is grown in 52 countries with world production of 33 million metric tonnes (FAO, 2004). However no Africa country is ranked among the top 10

countries for banana production in the world while eight African countries were named among the top ten world producers of plantain with Nigeria ranking as the fifth highest producer of the crop (FAO, 2004). Presently plantains are of less importance than banana in terms of world trade in the genus but in West and Central Africa about 70 million people are estimated to derive more than one quarter of their food energy requirement from plantains (Robinson, 1996; Swennen and Ortiz, 1997). Moreover plantains have a high carbohydrate content (31 g/100 g) and low fat content (0.4 g/100 g). They are good sources of vitamins and minerals, particularly iron (24 mg/kg), potassium (9.5 mg/kg), calcium (715 mg/kg), vitamin A, ascorbic acid, thiamin, riboflavin and niacin. The sodium content (351 mg/kg) is low in dietary terms hence recommended for low sodium diets (Stover and Simmonds, 1987; Welford et al., 1988).

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The outbreak of Black Sigatoka disease (a leaf spot plantain/banana disease) in the early 1980s threatened the livelihood and welfare of the millions of sub Saharan Africa populace of which Nigeria is inclusive. Black Sigatoka disease has reduced production resulting in acute scarcity of the crops with a resultant high cost of the fruits. Yield loss of up to 50% and more were recorded making the disease a major threat to the farm economy in West and Central Africa (Jeger et al., 1995). A great danger was therefore posed to millions of people in the region where more land can hardly be found to increase production area, except by inducing catastrophic degradation of forest resources. Not only would increase hectare fail to restore food supply if resistant varieties are not used, but also, terminal destruction of the environment would occur and threaten livelihoods in this area.

Statement of the problem

Despite *musa* importance in both consumption, commercialization and exportation only 10% of the world production ends up in the export market (mainly bananas) while 90% are consumed locally, Land under plantain production in Nigeria over ten years period (1996 - 2005) increased by 24.6%, while a yield reduction of 21.8% was recorded during the same period (FAOSTAT, 2005). This bizarre trend suggests that if nothing is done by the stakeholders (Research, NARS, Extension, Farmers and Government in terms of policy direction) the yield will further reduce drastically as the chances of increased land is very remote as a result of increased population growth and higher rates of urbanization. Furthermore, many studies have examined the technical and productive viability of plantain and banana systems in West and Central Africa; no conscious study has been conducted to examine the policy consistence in the plantains and banana innovation system. Policies are important because they determine the costs of inputs and outputs and influence the relative sustainability, profitability and competitiveness of technologies. Policy study is needed to guide research and development activities for increased plantain production to arrest the dwindling rate of production.

To harness the maximum benefits obtainable from plantain and banana production, utilization and commercialization, an appropriate policy, which will include the entire stakeholders, need to be put in place. To do this, the policy acts and initiatives in plantain and banana innovations need to be examined.

Objectives

The objectives are to:

i. review policy acts and initiatives in plantain and banana innovation system

ii. identify and analyze key institutions in plantain and banana innovation system in Nigeria (technology generation, dissemination, and utilization)

iii. examine the linkages between the institutions and

iv. identify lessons and gaps in the existing policy acts and initiatives.

Examination of Table 1 suggested a worrisome trend that demands a quick policy intervention to arrest the dismal trend. It was ascertained that the yield per hectare has consistently made a downward move from 7.50 tonnes per hectare in 1990 to 5.41 tonnes per hectare in 2004. A policy initiative in place here, one can safely conclude that the co-ordination efforts of the inter-ministerial committee on Black Sigatoka established in 1987 with the research institutes ad-hoc work on Black Sigatoka disease might have accounted for the higher yield in 1990, which fizzled out with the curtailment of the disease and reversion to status quo of non governmental support for plantain and banana leaving the funding initiatives in the hands of international donors and international institutes both of whom have regulated focus and research bias. Also recorded is unsustainable increase in the area under cultivation/harvested which rose from 162,000 hectares in 1990 to 389,000 hectares in 2004, land is a fixed asset which cannot continue to be increased, hence a need for policy direction to maximise its use for the crop. The only cheering development is increase in price per ton from ₦5,300 in 1990 to ₦65,535 in 2003. This showed that a policy direction would obviously translate to positive economic reward for the country and other stakeholders in plantain and banana production, marketing and innovation system.

PLANTAINS AND BANANA STAKEHOLDERS IN NIGERIA

Plantain and banana attracted a network of people group and organisations (stakeholders), the common rallying point of these stakeholders, however remained increased production and increased earnings from the crop. Their efforts and roles in plantain and banana policy acts and initiatives are here reviewed.

International Institute of Tropical Agriculture (IITA) activities

The target areas for IITA research are primarily in the humid and sub humid zones of Sub-Saharan Africa. The mission is to enhance the food security, income, and well being of resource-poor people of tropical Africa. This is approached by conducting research and related activities to increase agricultural production, improve food systems, and manage natural resources in relation to sustainability. To make this possible IITA partners with national and international stakeholders (Hartmann, 2004).

Table 1. Production figures for plantain in Nigeria 1990 - 2004.

Production figure	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
QTY Produced (1000 Tonnes)	1,215	1,339	1,417	1,623	1,665	1,632	1,687	1,744	1,803	1,902	1,969	1,999	2,058	2,103	2,103
Yield/Hectare (Tonnes)	7.50	7.52	7.54	7.06	6.77	6.53	6.59	6.71	6.73	7.29	5.38	5.37	5.35	5.42	5.41
Producer Price Tonnes (N)		5,300	7,765	12,261	17,998	30,916	40,554	43,886	46,647	45,898	38,249	49,590	57,280	65,535	
Area Harvested (1000 Hectares)	162	178	188	230	246	250	256	260	268	261	366	372	385	388	389

SOURCE: FAO STAT, 2006.

Among the tasks of IITA are, conduct of research, germplasm conservation, training, and information exchange activities. These tasks are performed in collaboration with regional bodies and national programs including universities, non-governmental organisations (NGO's) and the private sector. A review of efforts in plantain and banana research revealed that though the International Institute of Tropical Agriculture (IITA) was established in 1967, plantain research by the institute did not start until 1976, when the crop was included as one of the institute's mandate crops (Tenkouano et al., 2002). Major efforts then were devoted to agronomic and cropping system research on plantain and banana with the introduction of germplasm (genetic materials) from various plantain and banana nations of the world for further genetic breeding. The institute work on plantain became expanded with the outbreak of the black Sigatoka disease in the mid 1980's. Response to the outbreak necessitated a full-fledged *Musa* breeding research mainly at the high rainfall station of IITA at Onne in 1987. Plantain and banana improvement (PBIP) was created in 1991 with the objectives of;

- i. Incorporating black sigatoka resistant gene into available susceptible plantain and banana cultivars.
- ii. Selection traits includes, tolerance to weevil, and nematodes
- iii. Reduced plant height, short cycling period and

efficient root system.

The institute introduced a total of 367 *Musa* accessions from 20 countries between 1985 and 1992 with several of them having the black sigatoka resistant gene, these accessions are being maintained and used in generating the present high yielding disease resistant hybrids. One of the major steps taken by IITA when the black sigatoka broke out was to assist in massively importing cooking banana as an interim measure while the resistant hybrids were being developed. This dissemination was done in conjunction with other stakeholders in public and private sector; the disseminating bodies include the oil producing companies of Shell, Agip, and Agricultural Development Projects of states in the Nigeria plantain-growing belt. An examination of cooking banana introduction and dissemination phase (1990 - 1994) for combating black sigatoka disease revealed that the materials were imported without prior consideration of its acceptance by the farmers and populace it was meant to serve, also processing knowledge of the cooking bananas were not disseminated in the package as the taste and processing were not the same with the existing varieties, the consequence of this was the initial mass rejection of the variety by the target population. Another major deficiency of that efforts was the low awareness drive for the disease outbreak and the materials (cooking banana) brought to slow down disease spread,

the cooking banana adoption were later boosted with the post harvest processing intervention and a coordinated efforts of other stakeholders such as oil producing companies and national program partners through workshops and conferences, this amounts to putting the first last. The institute work on disease resistant varieties culminated in the development of elites varieties that combined high yielding, good post harvest qualities and disease resistant. Many of her results are yet to get to the farmers signalling that the interaction with other stakeholders is weak.

National Horticultural Research Institute (NIHORT) activities

The National Horticultural Research Institute (NIHORT) was established in 1975 with mandate on horticultural crops including plantain and banana, the institute conducts research in various aspects of horticultural crops, her main activities before the outbreak of black sigatoka disease as stated by Akinyemi (2003) was on agronomy and cropping system, the institute also conducted limited on-farm research to validate her research with contact farmers located around the institute. With the outbreak of black sigatoka disease in 1986 she extended her work to pathological activities aimed at unravelling the biology of the disease, this led to close, fragile collaboration with

IITA and the federal government body established specifically for plantain and banana development (PDPB). Her efforts and interactions has been largely unheralded, an indication of non-functional linkage.

Plantain and banana improvement program (PBDP) activities

The PBDP was established in 1987 as an arm of the Federal Department of Agriculture and as a follow-up to recommendations of the inter-ministerial committee on black sigatoka. Her objectives were to boost plantain and banana production, arrest the upsurge of black sigatoka in conjunction with the research institutes, and create awareness on importance of plantain and banana. The programme was also expected to conduct on-farm trial for rapid spread of new technologies and rapid transfer to farmers and to develop training components to assist in providing needed expertise to transform plantain into major income earner for farmers and the nation. The farmers do not know them while their interactions with other stakeholders have not been effective.

State Agricultural Development Program (ADP)

The ADP's are the extension arm of the Ministry of Agriculture carved out to cater for dissemination of agricultural innovations. They are the link between research and farmers. The ADP's in the plantain-growing belt of Nigeria have participated in various plantain and banana projects in the country. Their activities have been limited to dissemination of designated improved innovations arising from research efforts to farmers. They have largely being passive player in plantain and banana developmental activities.

Universities faculty of agriculture

Faculty of agriculture in universities in the plantain growing belt such as university of Ibadan, university of Nigeria Nsukka, federal university of agriculture Akure and university of agriculture Abeokuta, partnered in plantain and banana innovation system in the area of on farm evaluation and linking with research for training (industrial attachment) of their students. The link has not transcended beyond occasional conferences and workshop interactions. The link has been chronically weak.

Oil producing companies agricultural department

As part of their community development's efforts the oil producing companies are involved in agriculture and have been a major link in the dissemination of innova-

tions in plantain and banana development. Shell and Agip are the leading partners in this regard; they participated actively in the dissemination of cooking banana and the black sigatoka resistance hybrids. Their collaboration is also limited to dissemination with paucity of ideas on materials disseminated thus falling back on research at the slightest constraints in adoption. The link is ineffective and ad-hoc in nature.

Hybrid delivery project and plantain and banana program in Nigeria (2000 - 2007)

Learning from the cooking banana experience IITA organised a workshop in 2000 to sensitise her stakeholders (NIHORT, PBDP, state agricultural development programmes, faculty of agriculture) of the newly developed hybrids and their characteristics. Twelve of these varieties were selected and one hundred and ten (110) on-farm demonstration trials were established by IITA in partnership with the public extension agencies (Agricultural Development Projects (ADPs), Ministries of Agriculture (MOA), oil producing companies (Shell Nigeria, Nigeria Agip Oil Company-Green River Project), churches, other community based organizations, and contact farmers with funding from international agencies. The objectives of the program were to increase the national plantain production and increase access to clean plantain planting material by training of stakeholders in use of rapid sucker multiplication methods, to create a hybrid delivery system aimed at disseminating improved clones and thereby ensuring food security, and also training in post harvest processing options.

As a spill over from the hybrid delivery project a government body in Ondo State, APAA (Accelerated Poverty Alleviation Agency) distributes plantlets to nurseries on cost recovery basis wherein after the first production cycle the nurseries gave back four plantlets to APAA for every plantlet initially received from them. This procedure helped to maintain and sustain the dissemination of new clones in the country. Results from fragmented government interventions in some states revealed a positive catalytic role of policies in sustainable use of the crop. In Akwa-Ibom the school to land program encouraged all secondary school students in plantain farming in their school and a concept to distribute five suckers per student yearly is before the executive (Personal communication with AKADEP, 2006). In Delta state of Nigeria the government agricultural program "Live On And Own a Farm" (LOAF) was mandated to distribute 60,000 plantain plantlets yearly in the state, the programme is in its third year of implementation and it has evidently promoted plantain production in the state (Personal communication with Adayigbe, 2006)

As observed by Charlotte (2005), Nigeria plantain program has succeeded in establishing a distribution channel of nurseries disseminating improved clones and an evolving production and processing options, however

free distribution of plantlets by research institutes reduced sales of regular nurserymen. It should be noted that developmental efforts in plantain and banana production, processing and marketing in Nigeria and Africa is largely dependent on foreign donors funds, this is disturbing and constitutes a controlled developmental process as research and development activities on the crop can only be carried out to the dictates of the donors.

CHRONICLE OF POLICY INITIATIVES IN PLANTAIN AND BANANA INNOVATION SYSTEM IN NIGERIA

An examination of policies acts and initiatives in plantain production and innovation in Nigeria from, revealed some gaps in coordination of efforts and stakeholders at various points in time to arrive at the present state where Nigeria is ranked the fifth highest producer of plantain in the world and not ranked among the first top ten banana producer in the world, despite the availability of conducive weather and resources for the crop (FAO, 2004).

A summary of the historical events relevant to the plantain research, production and innovations from 1967 – 2006 revealed some gaps and policy inconsistency.

- 1967-** IITA was established in Nigeria to research into food crops in Sub – Saharan Africa plantain not inclusive.
- 1975 -** NIHORT was established with mandates for Horticultural crops (plantain and banana inclusive) in Nigeria. Efforts majored on agronomy and farming systems.
- 1976 –** Plantain and banana accepted as one of the mandate crops of IITA and she started research work on the crop. Efforts were directed at introduction and conservation of genetic materials and germ plasm collection from all parts of the world.
- 1976 -** IITA established the high rainfall station dedicated to research in plantain and banana at Onne, with emphasis on agronomy and farming system for plantain and banana improvement.
- 1986 -** Black Sigatoka disease outbreak was recorded in Nigeria.
- 1987 -** Inter ministerial committee on black sigatoka disease curtailment was established by the federal government to coordinate efforts in combating the disease.
- 1987–** Breeding work on plantain and banana improvement began at IITA. Main focus was on host plant resistance to black sigatoka disease.
- 1987 -** Plantain and Banana Development Program an arm of the Federal Department of Agriculture was established.
- 1991-** IITA established the Plantain and Banana Improvement Program (PBIP) to fully exploit plantain and banana breeding research and collaboration with both regional and national agricultural research bodies.
- 1990 – 1994 –** IITA assisted in massively importing cooking banana from South East Asia as an interim measure to combat black sigatoka disease, this cooking banana were disseminated in conjunction with the ADP, agricultural arm of oil producing companies like Shell and Agip, while re-

search into resistant varieties to the disease continued.

- 1993-** 14 black Sigatoka resistant hybrids developed by IITA were tested in 12 countries.
- 1995 –** Black sigatoka resistant materials were registered and released by IITA.
- 1996 -** IITA got King Bauldin award for excellence in science as a result of breakthrough made in developing black sigatoka resistant varieties.
- 1996 – 2000 –** International and regional testing of these resistant varieties were carried out.
- 1998 – 2000 –** evaluation of cooking banana adoption, diffusion and marketing in South Eastern Nigeria by IITA.
- 2000 – 2003 –** USAID sponsored plantain and banana hybrid delivery and associated technology in eleven Nigeria States commissioned.
- 2000 – 2007 –** Belgian government funding into biotechnology assisted breeding in West and Central Africa.

GAPS IDENTIFIED

Government non intervention

Since 1967 to date, the only period that government got actively involved in plantain and banana policy issues was between 1986 – 1987 when the black sigatoka disease broke out and the inter ministerial committee on black sigatoka was formed. The efforts of this committee reflected in increased yield from 1990 – 1992, which had since made a downward trend after withdrawal of government's intervention (FAOSTAT, 2006).

Marketing and constraints to production

There has been paucity of market opportunities for plantain and banana in Nigeria. Also no catalogue of constraints as perceived by the end users is available; this has often led to apathy in the end users acceptance of innovation from research efforts.

Linkage

Stakeholders in plantain and banana production and innovation have been working without cohesion each doing their things in their own way. Where linkage existed it was fragile and very weak, in most cases objectives were at variance and unhealthy.

Research - Farmers Dichotomy

Many laudable and sound scientific outputs have been churned out by research in plantain and banana innovation system, climax of which was the king Bauduin of Belgium award to IITA in 1994 for outstanding achievement in breeding plantains for black sigatoka resistance and advances in *Musa* genetic. Sadly however

many of this sound scientific outputs are still sitting on the shelf of the Institute (IITA, 1992, Annual Report). Research agendas are formed without recourse to the farmer's priority, this mostly led to rejection of research results or low adoption of disseminated innovations in plantain and banana innovation system a case study is the cooking banana dissemination efforts of 1990 - 1994 which was rejected because farmers lacked utilisation knowledge of the cooking banana (Tshionza et al., 2001; Ferris et al., 1994).

Project sustainability

Plantain innovation system had been operated as projects in Nigeria; this ad-hoc nature of projects had constrained the sustainability of such projects. From the past project reviewed it was revealed that before the awareness of an innovation spreads, project funding and life would have expired (Faturoti et al., 2006). It was further noted that post harvest utilisation in the USAID funded project is still evolving but the funding and project has ended. Thus, only very few can be reached in projects likewise only few benefits from it.

Funding

Another major gap is the funding of plantain and banana innovation system in Nigeria; the review of policy acts and initiatives revealed that funding for the crop has largely been from international donors who have their agenda and restriction on the use of funds provided for research. This situation has been largely responsible for the imbalance between plantain research and development. The international donors focused more on breeding and genetic diversity whereas the government agencies responsible for dissemination of research results lacked the required funds and supports hence the ultimate user are denied the results of many years of research and resources.

CONCLUSION

The study concludes that plantain and banana occupies a prime place as a staple in the diet of Nigerian populace and revealed the potentials of the crop as a foreign exchange earner if policies that will increase production are put in place. This is further reinforced by the increase in price per tonne from ₦5, 300 in 1991 to ₦65, 535 in 2004. A fragile and poorly defined relationship was observed among stakeholders in plantain and banana innovation system this need to be strengthened if the six gaps identified in the study to have impeded plantain and banana revolution in Nigeria will be removed. Furthermore, a focused approach and coordination of efforts of the stakeholders are therefore needed to bridge these gaps, boost production and consequently place the crop in her prime position as a cash crop.

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