

Nigerian Universities and Agriculture: Their Role in the Development of Agriculture for Sustainable Food Security

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Food insecurity affects proportionally more people in Africa than in any other region of the world. The incidence of food insecurity is greater in sub-Saharan Africa than in other regions of Africa. Nigeria is still far from achieving food security. Most food consumed in Nigeria is still produced by small-scale or household farmers who, in most cases, lack the know-how and resources to use modern techniques and procure the necessary farm inputs for maximum yields. Thus, their productivity remains very low. Nigerian universities have been actively involved in agricultural research and development and in training and extension services. The Nigerian Government has established agricultural universities whose primary objective is to tackle food security problems in Nigeria and beyond. However, the response to this challenge is constrained by inadequate research and training facilities. This paper expounds on the impacts and challenges confronting Nigerian universities in addressing food security in Nigeria in the context of the important role of university education in maintaining food security, and in the light of the changing needs of developing economies. It proposes, among other things, that increased collaboration between Nigerian universities and their counterparts in more developed countries will help Nigeria in its quest to achieve food security. A substantial percentage of foreign aid should be used to support developing sustainable agriculture through funding of agricultural research and training.

Key words: Food security, Nigerian Universities, Agriculture, Sustainable food production, Sub-saharan Africa

Introduction

Food security refers to access by all people at all times to sufficient food for an active and healthy life (World Bank, 1986). Food *in*security can be divided into chronic and acute insecurity. Chronic food insecurity occurs when people are unable to obtain sufficient, safe, nutritious food over long periods, such that this becomes their normal condition. Acute food insecurity describes the short-term lack of access to adequate food, usually because of shocks such as drought or war. Conceptually, food security is broken down into four components, availability, access, use and vulnerability, each capturing a different but overlapping dimension of the phenomenon (Migotto *et al.*, 2007). Despite efforts already made and the inclusion of food

security as part of the Millennium Development Goals (MDGs) by the United Nations in 2000 (www.unmillenniumproject.org), many of the developing world's people still suffer from malnutrition: worldwide, approximately 840 million people are undernourished or chronically food-insecure, and as many as 2.8 million children and 300000 women die needlessly every year in developing countries because of malnutrition (Guha-Khasnobis *et al.*, 2007).

Food insecurity affects proportionally more people in Africa than in any other region of the world. In fact, sub-Saharan Africa is experiencing the largest and fastest increase in food insecurity worldwide; undernourishment rates already exceed 40% (Sanchez *et al.*, 2005). Food insecurity is becoming worse on account of food price increases.

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Global food prices rose by 9% in 2006, by 23% in 2007, and by a staggering 54% in the 12 months ending April 2008 (FAO, 2008). In Africa, the prices of basic foodstuffs such as bread, rice, meat, and milk nearly doubled since 3 years (2006–2008), raising fears that malnutrition and hunger would grow (FEWS NET, 2008).

In Nigeria, the food insecurity situation is worrisome. For example, 65% of households have problems meeting food needs (NBS, 2006). The greatest percentage (25.3%) of households indicated that the primary mechanism for coping with poverty was reducing the number of meals, and 37% of the population of 47 million were unable to meet the 2900-kcal (12134-kJ) minimum food requirement in 2004 (NBS, 2004). The vulnerable and food-insecure include the poor, smallholder farmers, children, pregnant women, lactating mothers, and the elderly. Food intake and the nutritional wellbeing of many households are relatively poor and are affected by low economic status, especially as nutritious foods are sometimes expensive. Market and trade conditions have been constrained by unreasonably high prices and low stocks of major staple foods (FEWS NET, 2008). Although the growth rate of agriculture was 5.08% in

2000–2004 and 7.10% in 2004–2007 (Table 1) and agriculture contributed 42% to the national GDP in 2007 and 2008, the output of major commodities is still low (Table 2). The growth has been a result of an increase in land under cultivation (Table 2), yet productivity has been low. In fact, 70% of farm holdings are small scale, and the farmers hardly produce enough to sustain themselves for 8 months of the year (Uza, 2008).

Factors Militating Against Agricultural Development in Nigeria

Many factors militate against agricultural development in Nigeria. They can be grouped into technical, natural/environmental, socio-economic, and institutional problems (Uza, 2008). Technical problems include the use of unimproved agricultural technology, inadequate infrastructure, poor marketing, and distribution systems, and a high incidence of pests and diseases. Natural/environmental problems include drought, flood, and soil erosion. Socio-economic factors include high input costs, poverty, ageing farmers, and traditional land ownership problems. Institutional problems include government policy inconsistencies, macro-economic distortions, uncoordinated or unstable

Table 1. Primary production growth rates (%) in Nigeria, 1990–2007

	Crops	Livestock	Forestry	Fishery	Ag. GDP	GDP
1990	4.35	2	7.88	6.84	4.29	13.02
1991	4.5	-1.6	3	4	3.75	-0.81
1992	3	0.9	2.3	-10	2.1	2.26
1993	2.9	0.6	2	-25	1.4	1.28
1994	3	1	2.6	-6.5	2.47	0.22
1995	3.4	4.2	2.2	10	3.65	2.16
1996	3.79	2.9	0.5	20.8	4.15	4.38
1997	4.3	2.5	0.9	11.3	4.29	2.82
1998	3.9	2.7	1.2	14.1	4.11	2.94
1999	5.24	2.8	1.28	14.2	5.29	0.42
2000	3	2.3	1.52	4	2.95	5.44
2002	4.15	4.83	0.38	6.38	4.22	4.63
2003	7	4.21	1.53	4	6.65	9.57
2004	6.5	6.52	6.77	6.51	6.5	6.58
2005	7.13	6.71	5.99	6.11	7.06	6.51
2006	7.25	6.83	5.65	6.15	7.16	5.63
2007	7.51	6.96	5.96	6.51	7.42	6.22

Source: CBN (2006a, 2007) and NBS (2007).

Table 2. Production of key crops

	1990	2002	2003	2004	2005	2006	2007
Prod. ('000 t) of key output							
Yam	13624	21707	21743	24977	27126	28890	26571
Cassava	19043	27938	28546	31067	36583	40573	39130
Sorghum	4185	4649	4627	4657	5039	5251	5429
Millet	5136	3944	3964	4088	3970	4076	4388
Rice	2500	2236	2367	2416	2660	2765	3561
Maize	5768	4424	4483	5001	6203	6767	5796
Beans		1454	1452	1483	1504	1650	1921
Dried cowpeas	1345	1218	1233	1239	1529	1576	1580
Groundnuts	992	2040	1997	2232	2701	2737	2847
Cocoyam	731	2633	2622	2869	2719	2765	2818
Sweet potatoes	143	1108	1154	1248	1453	1514	1515
Total prod. of above crops		73352	74188	81276	91487	98564	95556
Total area used in prod. of key output above (ha)		22872210	23317350	24384893	26494182	27433753	24658170
Growth in total prod. above (% increase in total t prod.)			1	10	13	8	6.4
Yields (kg/ha) of key output							
Yam	10677	11412	11405	11978	12273	12552	11582
Cassava	12937	12091	12213	12061	12317	12505	13708
Sorghum	1000	1156	1144	1141	1149	1182	1287
Millet	1075	1049	1053	1063	1069	1085	1134
Rice	2070	1857	1874	1875	1884	1916	2142
Maize	1130	1521	1500	1547	1556	1573	1731
Beans	463	679	659	688	698	713	782
Dried cowpeas		502	503	506	540	551	782
Groundnuts	1403	1220	1093	1083	1218	1271	1293
Cocoyam	5184	7458	7559	6871	7210	7305	6939
Sweet potatoes	5107	6343	6357	6369	6183	6368	6139
Production-weighted ave. yield		8449	8507	8736	9006	9266	9692
Growth of production-weighted ave. yield (%)			1	3	3	3	4.6
Area-weighted ave. yield (kg/ha) i.e. total kg/total area [1]	2430	3207	3182	3333	3453	3593	3904
Growth in area-weighted ave. yields above (%)			-1	5	4	4	8.7
Growth in total prod. above (% increase in total t prod.)			1	10	13	8	6.4

Sources: FMA (2007), NBS (2005, 2006b, 2008).

institutional arrangements (especially in the administering of credit facilities), poor access to land and credit, and lack of market support and administration of subsidies. Most of the smallholder

farmers, who are the majority of the farmers in Nigeria, do not have access to improved technology (for example, improved seed species and farm practices) and still rely on basic technologies. Access to

extension services is low owing to poor funding. In fact, the Nigerian farmer extension system - the training and visit (T&V) system implemented by agricultural development programs (ADPs) - virtually collapsed owing to poor funding after the withdrawal of World Bank counterpart funding (Chukwuone and Agwu, 2005).

In Nigeria, both men and women farmers lack access to adequate resources, especially land and credit facilities. The access of women is even more limited owing to cultural, traditional, and sociological factors: in most parts of Nigeria, women have restricted access to land; this indirectly affects their access to credit and other inputs, as control of land confers on the owner such access. To facilitate the development of agriculture and to ensure food security, the Nigerian Government has implemented various policies and programs (Uza, 2008).

Past and Present Efforts Towards Achieving Food Security in Nigeria

To facilitate agricultural growth and development, the Federal Government of Nigeria instituted various programs and development initiatives. Agricultural development initiatives include cooperatives (1935-), commodity boards (1947-1980), agricultural research institutes (1964-), the National Accelerated Food Project (1970s), the Nigeria Agricultural Cooperative and Rural Development Bank (1973-), ADPs (1975-), river basin development authorities (1977-), Operation Feed the Nation (1976-1979), Green Revolution Policy of Nigeria federal Government (1979-1983), the Directorate for Food Road and Rural Infrastructure (1986-1999), the National Agricultural Land Development Authority (1991-1999), presidential initiatives on cocoa, cassava, rice, livestock, fisheries, and vegetables (1999-2007), the National Special Programme for Food Security (2001-2007), the Second Fadama Development Project (2004-2009), and the current Third Fadama Development Project (Fadama III; 2008-). The government also initiated other policies to guide agricultural growth and rural development, including an agricultural policy in place from 1998 to 2000, a new agriculture policy in 2001, and the framework of the national Economic Empowerment and Development Strategy, which was the Nigerian equivalent of a poverty reduction strategy program,

launched in June 2004. The new agricultural policy guides agricultural development in the country. It outlines the government's positions and policies on commodity pricing, agricultural trade, exchange rates, agricultural land, food production, industrial raw material crops, agricultural extension, agricultural credit and insurance, rural bank deposits, produce marketing, commodity storage and processing, agricultural cooperatives, water resources development, agricultural mechanization, rural infrastructure, agricultural statistics, agricultural investment, and advisory services. The policy assigns supportive roles to the government while leaving investment in the sector to the private sector. Other national policies cover integrated rural development and food and nutrition.

The agricultural and rural development policies and strategies are being pursued within the framework of a 7-point agenda. The agenda, adopted by the government in May 2007, sets out the broad policy priorities for implementing economic reforms and development programs in Nigeria (Federal Ministry of Agriculture and Natural Resources, 2008). It describes the key policy imperatives, directive principles, and instruments for promoting sustainable economic growth for the achievement of the MDGs by 2015 and Nigeria's Vision 20: 2020. The main agricultural goals enunciated under the agenda are diversified economy, food security, employment generation, economic linkages, exports, and poverty reduction. The agenda acknowledges that low productivity, low private sector investment, lack of domestic and international competitiveness, weak domestic policies and institutions, inadequate funding, and lack of organized land titling and tenure are the main challenges to agricultural development in Nigeria. The key elements of the agenda's strategy are land reform, commercial agriculture, irrigation development, institutional support, and market stabilization. Under the commercial agriculture program, arable land will be developed for use by well-trained, motivated commercial farmers, who will cultivate carefully selected, ecologically suitable, commercial market-responsive crops. It will involve the federal, state and local governments, each playing complementary and reinforcing roles.

The major policy offshoot of the agenda is the National Food Security Programme (Federal Min-

istry of Agriculture and Natural Resources, 2008), the current base document guiding agriculture and food security, which was published in August 2008. According to the Federal Ministry of Agriculture and Rural Development, its objective is to “ensure sustainable access, availability and affordability of quality food to all Nigerians and for Nigeria to become a significant net provider of food to the global community.” The key features of the program (Table 3) include providing a conducive environment for private sector involvement, encouraging large-scale commercial farming with strategic linkages to smallholder farmers, and significantly reducing postharvest losses through adequate storage, adequate processing, and appropriate market outlets.

The National Food Security Programme and other agricultural initiatives are being carried out in line with the Comprehensive Africa Agriculture Development Program (CAADP) (Federal Ministry of Agriculture and Natural Resources, 2008). CAADP is a common agricultural development

framework that uses key principles and targets defined by African heads of state and governments. It is based on the framework of the New Partnership for Africa’s Development (NEPAD) (NEPAD, 2008), aimed at halting or reversing the decline of agriculture in the continent. CAADP is the centerpiece of efforts by African governments under the African Union/NEPAD initiative to accelerate growth and eliminate poverty and hunger in Africa. CAADP aims at helping African countries improve economic growth through agriculture-led development and to eliminate hunger, reduce poverty, and reduce food insecurity. CAADP is based on the principle of agriculture-led growth as a main strategy to achieve the MDGs of poverty reduction and a 6% average annual agriculture growth rate at the national level, as well as the allocation of 10% of national budgets to the agriculture sector (NEPAD, 2008). The five pillars of CAADP are expansion of the area under sustainable land management and of reliable water control systems; improvement of rural infrastructure and

Table 3. Overview of the National Food Security Programme

Farmer category	Sponsorship/policy-making	Technical assistance	Input providers	Specific strategies	Genetic strategies
Small-scale	<ul style="list-style-type: none"> Local govt. 	<ul style="list-style-type: none"> agric. consultancy Fed. University local govt, MA & WR int. research institutes, NGOs, donors 	<ul style="list-style-type: none"> local government micro-credit orgs Nat. Seed Council Int. Fert. Dev. Center Nat. Special Prog. for Food Security NGOs, donor agencies e.g. FAO, IITA 	<p>Objectives:</p> <ul style="list-style-type: none"> additional 100million small-scale farmers (2 ha each) 1 tractor/500–1000 farmers <p>Actions:</p> <ul style="list-style-type: none"> active recruitment of farmers seed funding scheme expanded quality extension services farm Support Centers, farmers’ co-ops mechanization program 	<p>Objectives:</p> <ul style="list-style-type: none"> 74 ha of cultivated farmland 3.14 million ha of irrigated land 10 t/ha of agriculture products 10% of household income spent on food increase in food storage capacity by 500 t by 2008 year-end improve local processing capacity for local and international consumption viable market infrastructure to drive links between producers and processors/traders exploit biofuel/carbon credit potential
Medium- to large-scale	<ul style="list-style-type: none"> State MA & WR local govt. FMA & WR State MA & WR 	<ul style="list-style-type: none"> agric. consultancy Fed. University state MA & WR NGOs, donor agencies e.g. FAO, IITA Fed. university state MA & WR NGOs, donor agencies e.g. FAO, IITA 	<ul style="list-style-type: none"> state MA & WR commercial banks Nat. Seed Council Int. Fert. Dev. Centre Nat. Special Prog. for Food Security NGOs, donor agencies e.g. FAO, IITA Commercial banks Nat. Seed Council NGOs, donor agencies e.g. FAO, IITA 	<p>Objective:</p> <ul style="list-style-type: none"> empower small-scale farmers to enter into medium-scale farming <p>Actions:</p> <ul style="list-style-type: none"> seed funding scheme expanded quality extension services farm Support Centers, farmers’ co-ops mechanization Program <p>Objective:</p> <ul style="list-style-type: none"> promote/facilitate influx of large-scale farmers in Nigeria <p>Actions:</p> <ul style="list-style-type: none"> Fed Gov., State Gov, Commercial Bank’s special migration program equity participation framework for private sector involvement 	<p>Actions:</p> <ul style="list-style-type: none"> focus on product/crop of comparative advantage revitalized, private sector-driven fertilization program enhanced irrigation program build 2 strategic food storage facilities per geopolitical zone (private-sector driven) institute warehouse receipt system build processing parks in each of the 36 states and the FCT (private sector-led) revitalize Commodity Exchange establish guaranteed minimum pricing/commodity boards/Marketing Commission cultivate non-food crops (jatropha) and use crop by-products for biofuel; accrue and sell carbon credits
Linkage		<p><i>Land Use Act</i></p> <ul style="list-style-type: none"> Other fiscal policies Energy and industrial capacity 		<ul style="list-style-type: none"> microfinance education rural access and road network 	<ul style="list-style-type: none"> enabling market policies

Source: FMANR (2008).

Abbreviations: MA&WR (Ministry of Agriculture and Water Resources), FMA (Federal Ministry of Agriculture) FAO (United Nations Food and Agriculture Organization); IITA (International Institute for Tropical Agriculture), FCT (Federal Capital Territory).

trade-related capacities for improved market access; enhancement of food supply and reduction of hunger; development of agricultural research and dissemination and adoption of technologies to sustain long-term productivity growth; and sustainable development of livestock, fishery, and forestry resources (NEPAD, 2008).

Role of Nigerian Universities in Agricultural Development and Food Security

Nigerian universities have played roles in the development of agriculture, especially in labor and in the research and extension spheres. Five universities have been designated as agricultural universities and specifically train graduate and postgraduate students in agriculture and food security. Many other universities have faculties of agriculture, where they train graduate and postgraduate students in different agricultural disciplines (Table 4).

The universities within the Nigerian Agricultural Research System have been at the forefront of new agricultural technologies, especially in crop improvement and food processing technologies. For example, in the mid-1980s, researchers in the Department of Crop Science of the University of Nigeria developed a premium chili cultivar popularly called "Nsukka Yellow Pepper", which is now grown widely by farmers, especially in southeastern Nigeria. The crop has contributed immensely to community development and economic empowerment in the southeast and is marketed around the country. The researchers also developed a new tomato cultivar named 'UN-83' (University of Nigeria Newsletter, 1991) with a uniquely low moisture content and an ability to last 3 weeks at room temperature without spoilage. They also developed

a *Solanum melongena* hybrid with a higher yield, larger fruit and edible leaves. In the early 1980s, researchers in the Department of Agricultural Engineering and the Faculty of Engineering at the University of Nigeria Nsukka developed and fabricated several machines and devices that allow local people to process indigenous agricultural products. These include prototype machines for the mechanization of cassava production, shelling of melon, and hulling of rice. A total of 26 such inventions have been patented and are awaiting commercialization (UNN Newsletter, 1991).

The University of Nigeria has been at the forefront of agricultural extension services to rural people and farmers through the Village Adoption Scheme, pioneered by the Centre for Rural Development and Cooperatives of the University of Nigeria Nsukka. Staff of the Faculty of Agriculture provide scientific support to the ADP in their extension projects to farmers under the Training and Visit system.

Despite the effort in agricultural research and development (R&D) by the universities in enhancing agricultural development and food security in the 1980s, not much has been done since, especially during the period of military rule in Nigeria. The National Supervising Agency of the Nigerian Universities Commission noted that the quality and quantity of research output of tertiary institutions in Nigeria was about the best in sub-Saharan Africa up to the late 1980s (Karani, 1997). By 1996, research had declined to an all-time low (Okebukola, 2002), and effort was focused mainly on training labor. Summarizing the factors that contributed to the decline from 1988 to 1996 and the subsequent collapse from 1997, the Nigerian Universities Commission listed lack of research skills in modern methods; constraints of equipment

Table 4. Graduate output (types of agricultural degrees)

Degree	2000-01		2001-02		2002-03		2003-04		2004-05	
	M	F	M	F	M	F	M	F	M	F
Bachelor	1086	604	1381	705	1366	873	1268	828	299	167
Postgrad. dip.	287	30	169	42	101	37	214	40	136	46
MSc	681	304	1074	365	568	189	637	310	280	169
PhD	47	17	90	19	104	27	76	25	53	12

Source: National Universities Commission and National Bureau of Statistics (2005).

Table 5. Research grant allocation and releases from 1987 to 2003

Year of release	Allocation	Amount released (naira)
1987	12,776,000	12,776,000
1988	20,000,000	17,237,875
1989	20,000,000	20,000,000
1990	24,000,000	22,075,371
1991	51,266,530	16,645,034
1992	14,500,090	17,472,972
1993	122,182,102	122,182,102
1994	132,213,817	98,662,255
1995	155,534,575	73,973,806
1996	153,842,000	50,583,686
1997	194,013,732	122,020,447
1998	215,618,453	149,993,549
1999	302,735,543	183,501,468
2000	448,127,780	612,666,910
2001	206,410,910	206,410,619
2002	Not Available	Not Available
2003	73,435,618	73,435,618
Total	2,146,657,150	1,799,637,713

Source: Okebukola (2004).

for carrying out state-of-the-art research; overloaded teaching and administration schedules with little time for research; difficulty in acquiring research funds; and diminishing scope for mentoring junior researchers by seasoned and senior researchers because of brain-drain (Okebukola, 2002). The most pressing problems among these were poor R&D funding and funding instability. Most universities rarely received research funds, and if funds were allocated they were not released (Table 5). Funding of R&D in universities in Nigeria has now improved slightly, especially through the World Bank Science and Technology Education Post-Basic (STEP-B) Project (Ministry of Education, 2006) and through intervention by the Education Trust Fund in Nigeria, which provides scientific equipment for research.

Strategies for Improving Agricultural R&D in Nigerian Universities

Strategies for improving Nigerian universities' contributions to agricultural R&D can be grouped into actions to be taken by the universities and

actions to be taken by government. First, the universities should allocate a substantial part of their internally generated funds to agricultural R&D. Second, the university extension system should be given priority, especially as the ADPs are no longer effective (Chukwuone and Ahwu, 2005). Third, the universities should avail themselves of opportunities created by numerous competitive research grant schemes to conduct research in agriculture. Fourth, the senate research grant scheme of Nigerian universities should be restructured to make it more effective and targeted at solving real problems in industry. A major strategy for improving agricultural R&D in Nigerian universities currently in place is the forging of collaboration with institutions, development agencies, and universities abroad and the exploring of other avenues for funding.

Government has an enormous role to play in ensuring that agricultural teaching and research activities in Nigeria are comprehensively improved. Besides the overall improvement of the teaching and learning environment, the government should provide substantial funding for agricultural research. This will help improve technology discovery and dissemination by agricultural extension schemes.

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