STATUS OF
AGRICULTURAL INNOVATIONS, INNOVATION PLATFORMS AND INNOVATIONS INVESTMENT

Nigeria

PARI
Program of Accompanying Research for Agricultural Innovation
www.research4agrinnovation.org

FARA
Forum for Agricultural Research in Africa

ARCN

zef
Center for Development Research
University of Bonn

Status of
Agricultural Innovations, Innovation Platforms and Innovations Investment in Nigeria

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LIST OF ACRONYMS

FGD	**Focus Group Discussion**
ARCN	Agricultural Research council of Nigeria
CRIN	Cocoa Research Institute of Nigeria,
FARA	Forum for Agricultural Research in Africa
HQCF	High quality cassava flour
IAR	Institute for Agricultural Research , Samaru, Zaria
IAR&T	Institute for Agricultural Research & Training , Ibadan
IAR4D	Integrated agricultural research for development
IITA	International Institute of Tropical Agriculture
LCRI	Lake Chad Research Institute , Maiduguri
LGAs	Local Government Areas
NAERLS	National Agricultural Extension and Research Liaison Services, Zaria
NAPRI	National Animal Production Research Institute , Shika, Zaria
NARIs	National Agricultural Research Institutes
NARS	National Agricultural Research System
NCRI	National Cereal Research Institute , Badeggi
NERICA	New Rice for Africa
NIFFR	National Institute for Fresh-Water Fisheries Research, New Bussa
NIFOR	Nigerian Institute for Oil-Palm Research, Benin City
NIHORT	National Horticultural Research Institute, Ibadan
non-PVS	non- Participatory Varietal Selection
NRCRI	National Root Crops Research Institute, Umudike
NSPRI	Nigerian Stored Products Research Institute , Ilorin
NVRI	National Veterinary Research Institute, Vom
PARI	Programme of Accompanying Research for Agricultural Innovations
PVS	Participatory Varietal Selection
RRIN	Rubber Research Institute of Nigeria, Iyanomo, Benin City.
WARDA	West Africa Rice Development Association
ZEF	Centre for Development Research (Germany)

STUDY BACKGROUND

Science and technology remains the fulcrum for development over the ages. There is hardly any national development in contemporary history that is not based on consistent efforts from the science and technology sector. The spate of development in agriculture follow suit; the state of efficiency in science and technology generation correlates highly with the development of agriculture. In Africa, agriculture is considered as the sector with the best potential to lead the socioeconomic development of countries on the continent. However, the sector is bedevilled with many constraints that could be categorized as technological, socio-cultural, institutional, infrastructural, and economical. The poor productivity of the enterprise stream in the sector is clearly seen from its contribution to a country's GDP versus the number of active workers engaged in the sector. Africa's agriculture currently engages about 65% of the working population and its average contribution to GDP still stands at 22.9%.

The crave to develop Africa has received good attention in recent years, starting with the political will of the heads of states, under the auspices of the Africa Union Commission, to develop and implement the Comprehensive Africa Agricultural Development Programme (CAADP), the Science Technology and Innovation Strategy (STISA). The Forum for Agricultural Research in Africa (FARA) also came up with a handful of continental initiatives, such as the Sub-Saharan Africa Challenge Programme (SSA CP), *Strengthening Capacity for Agricultural Research and Development in Africa* (*SCARDA*), Dissemination of New Agricultural Technologies in Africa (DONATA) and several others. The different initiatives aim to foster change by addressing specific issues that constitute constraints in the path of progress in Africa agriculture. The notion that African agricultural research system has generated a lot of technologies with great potentials, but which are not realized due to different institutional and organizational constraints—more specifically, the way agricultural research and development systems is organized and operated—is prevalent among stakeholders in the sector. Indeed, this notion appeals to reasoning. However, there is no known cataloguing or documentation of existing technologies and their veracity in delivering broad-based outcomes. The possibility of finding some documentation in annual reports of research institutes, journal articles and thesis in the universities is known, but this will not meet an urgent need.

Thus, the Programme of Accompanying Research for Agricultural Innovation (PARI) commissioned the three studies reported in this volume to provide a compressive analysis of the state of agricultural technology generation, innovation, and investment in innovations in the last 20 years in selected countries in Africa.

Study 1 is the "situation analysis of agricultural innovations in the country" and provides succinct background on the spate of agricultural innovation in the last 30 years. It provides useable data on the different government, international and private sector agricultural research and development interventions and collates information on commodities of interest and technologies generated over the years. It also conducted an assessment of the different interventions so as to highlight lessons learnt from such interventions, with regard to brilliant successes and failures.

Study 2 concerns a "scoping studies of existing agricultural innovation platforms in the country". It carried out an identification of all the existing Innovation Platforms (IP) in the country, including identification of commodity focus, system configuration, and partnership model. The study provides an innovation summary for each IP for use in the electronic IP monitor platform. It further synthesises the lessons learnt from the agricultural IPs established through different initiatives in the country in the last ten years.

Study 3 was an "Assessment of the national and international investment in agricultural innovation". It is an exhaustive assessment of investments in innovation for agricultural development, food and nutrition security in the country. It collates updated data on investment levels in the past and present, including a projection for the next decade requirement to assure food and nutritional security in the country.

The three studies form the comprehensive collation on the state of agricultural innovation in the 12 countries where the PARI project is being implemented. It is expected that these studies will benefit all stakeholders in Africa's agricultural research and development, including the users of technologies, research stakeholders, extension system actors and, more importantly, the policymakers.

STUDY **01**

Inventory of Agricultural Technological Innovations (1995 to 2015)

INTRODUCTION

Agricultural productivity remains low and declining at farm levels in Nigeria (World Bank 2013). This trend can be traced to a number of factors. First, the concept of innovation has for long been interpreted in the Nigerian agricultural system in terms of focusing only on research, to the exclusion of other components of the innovation system. Second, several agricultural research outcomes are either undocumented, or documented but largely not linked to development and diffusion processes. Stated differently, several agricultural technologies that would have boosted agricultural productivity remain largely on the shelves and, consequently, unknown. Three, funding for the generation, development and adoption of agricultural technologies in Nigeria have remained low in relation to the annual national budget, giving little hope to promoting the agricultural sector as the hub for improving food security, agricultural income, employment and foreign exchange earnings. These problems need urgent solutions and, probably, new strategies. Nigeria and, indeed, developing countries need not to 'reinvent the wheel' by investing in productivity-enhancing technologies that already exist; advances in science, technology and engineering elsewhere already make available adaptable options. Also, with proper documentation and improved collaborations among actors, on-shelf technologies can be revisited and developed to the adoption stage, with incremental collaborative investments. This will, in turn, require embracing a broader definition of innovation that involves farmers, extension workers, researchers, seed companies, government officials and many others. And it would require careful coordination of individuals and institutions that make up the innovation system in Nigeria.

The Forum for Agricultural Research in Africa (FARA), in partnership with the German Government, represented by the Centre for Development Research (ZEF) of the University of Bonn, under its 'One World No Hunger' initiative, is implementing the "Programme of Accompanying Research for Agricultural Innovations (PARI)." PARI is taking cognisance of the successes of research and innovation initiatives in African agriculture and, in consideration of the concept of integrated agricultural research for development (IAR4D) promoted by FARA, to building an independent accompanying research programme to support the scaling of agricultural innovations in Africa, thereby contributing to the development of Africa's agriculture. PARI is implemented together with the Agricultural Innovation Centres within the One World No-Hunger initiative. PARI collaborates with NARIs in 12 African countries (i.e.; Benin, Burkina Faso, Ethiopia, Malawi, Nigeria, Mali, Ghana, Cameroon, Kenya, Togo, Tunisia, and Kenya) to coordinate activities in their respective countries.
In 2015, PARI activities focused on the situation analysis of agricultural innovation. Specifically, the situation analysis entailed:

(i) an inventory of existing functional and promising agricultural innovations in each country;
(ii) a scoping study of existing agricultural innovation platforms in the country;
(iii) an assessment of the state of national investment in agricultural innovation system in the country.

METHODOLOGY

Desk review of previous studies

Much of the results presented in this report were drawn from the existing array of agricultural technologies already documented across the National Agricultural Research System (NARS) in Nigeria. Keeping in focus the agreed methodologies for the study, the innovation domains for this report covered arable crops, tree crops, livestock and fisheries. Within these innovation domains, crop varieties, livestock breed, livestock vaccines, agro-processing machines are some of the specific innovations presented in this report.

A total of six (6) studies relating to agricultural innovations in Nigeria, were reviewed from 2006 to 2011. These studies presented varying methodologies, obviously reflecting their respective initial objectives. In four of the studies reviewed (Phillip et al., 2009; Phillip et al., 2010a; Phillip et al., 2010b; Phillip et al., 2011), the fieldwork basically took samples of adopters and non-adopters from separate sampling frames across villages and LGAs in participating states, in relation to the agricultural technologies studied. Both household and FGD surveys were conducted for each agricultural technology under review. Beyond the fieldwork, screening questions in the survey instruments helped to further determine who were actual adopters and non-adopters. The screening questions for each innovation/ technology were (i) not aware of innovation, (ii) aware, never tried, (iii) tried and dropped, (iv) tried, undecided, and (v) tried and adopted. Households who chose responses (i)-(iv) were classified as non-adopters, while selectors of response (v) were classified as adopters, irrespective of the initial sampling frames.

In Dorward et al. (2006), households were classified into participatory and non-participatory in terms of the villages surveyed in two states, and samples were selected on that basis. In the study conducted across the Nigeria NARS (Chikwendu and Abubakar, 2014), attempt was made to document existing innovations nationally; but beneficiary evaluation was not an objective of the report.

Data analysis

The summaries of the foregoing studies are presented as Appendix (tables A1 to A6), which also provides the database used for analysis in the study. Relevant data were extracted and organized based on the agreed template for the study. There were, however, some challenges as to what information to classify as 'innovation triggers' vis a vis 'innovation benefits,' since the terms were not explicitly used in the studies reviewed. In some sense, the study argued that the two phrases are related. Indeed, when an innovation trigger is accomplished (e.g., yield improvement), it translates to innovation benefits, such as food security, higher income and reduced poverty. This is the sense in which the terms were reported (though separately) in the study.

The innovation triggers were classified according to the agricultural commodities identified from the studies reviewed. In classifying the innovation benefits, however, this study went beyond just reporting them as 'positive', 'negative 'or 'promising'. Rather, the study quantified innovation benefits, specifically in terms of adoption rates, adoption risks, yield or productivity gain, etc, to the extent reported in the reviewed studies. Two assumptions guided this identification of innovation benefits. First, benefits from an agricultural innovation are linearly related to adoption; that is, innovation benefits increase as adoption rates increase (Masters, 1986; Alston et al., 1995; Batz et al., 2003). Second, where an agricultural innovation was released to end-users without documented beneficiary evaluation, the reported on-farm trial results in terms of yield improvement relative to existing (traditional) options are taken as proxies for benefits.

RESULTS

Commodities, Innovation Domains and Types

Table 1 shows agricultural commodities, innovation domains and innovations found across the studies reviewed. A total of 4 innovation domains were identified, namely: crop, fishery, livestock and wildlife. The data in tables 1 and 2, shows that 116 innovations were identified nationally during the review period (2006-2014). However, the year of dissemination of some innovations to the end-users predated the studies reviewed.

Table 1. Innovation domains, commodities and innovation names

S/N	*innovation domain*	*commodity name*	*innovation name*
1	Crop	Cassava	CASSAVA-MAIZE-SOYBEAN RELAY
2	Crop	Cassava	CASSAVA STEM STORAGE
3	Crop	Cassava	HQCF
4	Crop	Cassava	NR 41044
5	Crop	Cassava	NR 8082
6	Crop	Cassava	NR 8083
7	Crop	Cassava	NR 8208
8	Crop	Cassava	NR 8212
9	Crop	Cassava	NR 83107
10	Crop	Cassava	NR 87184
11	Crop	Cassava	NR8082
12	Crop	Cassava	TM 92/0326
13	Crop	Cassava	TME 419
14	Crop	Cassava	TMS 30001
15	Crop	Cassava	TMS 30555
16	Crop	Cassava	TMS 30572
17	Crop	Cassava	TMS 4(2)1425
18	Crop	Cassava	TMS 50395
19	Crop	Cassava	TMS 81/00110
20	Crop	Cassava	TMS 82/00058
21	Crop	Cassava	TMS 82/00661
22	Crop	Cassava	TMS 84537
23	Crop	Cassava	TMS 90257
24	Crop	Cassava	TMS 91934
25	Crop	Cassava	TMS 96/1632
26	Crop	Cassava	TMS 97/2205
27	Crop	Cassava	TMS 98/0505
28	Crop	Cassava	TMS 98/0510
29	Crop	Cassava	TMS 98/0581
30	Crop	Cassava	TMS 980002
31	Crop	Cassava	TMS30572
32	Crop	Cassava	TMS92/0057
33	Livestock	Chicken	SHIKABROWN
34	Crop	Cocoa	PRECOCITY

35	Crop	Coconut	GREEN DWARF
36	Crop	Cowpea	IFE BPC
37	Crop	Cowpea	IFE BROWN
38	Crop	Cowpea	SAMPEA10
39	Crop	Cowpea	SAMPEA11
40	Crop	Cowpea	SAMPEA12
41	Crop	Cowpea	SAMPEA6
42	Crop	Cowpea	SAMPEA8
43	Crop	Cowpea	SAMPEA8
44	Crop	Cowpea	SAMPEA9
45	Crop	Assorted Commodities	HYBRID CROP DRYER
46	Fishery	Fish	FISH SMOKING KILN
47	Fishery	Fish	IMPROVED BANDA
48	Crop	Grains	INERT ATMOSPHERE SILO
49	Wildlife	Grasscutter	
50	Crop	Gum Arabic	ACACIA SENEGAL
51	Crop	Irish potato	NICOLA
52	Crop	Maize	ART-98-SW6-OB
53	Crop	Maize	ILE-1-OB
54	Crop	Maize	INDUSTRIAL MAIZE SHELLER
55	Crop	Maize	PORTABLE MAIZE SHELLER
56	Crop	Maize	SAMMAZ11
57	Crop	Maize	SAMMAZ17
58	Crop	Maize	SAMMAZ18
59	Crop	Maize	SAMMAZ19
60	Crop	Maize	SAMMAZ20
61	Crop	Maize	SAMMAZ21
62	Crop	Maize	SAMMAZ22
63	Crop	Maize	SAMMAZ23
64	Crop	Maize	SAMMAZ24
65	Crop	Maize	SAMMAZ25
66	Crop	Maize	SAMMAZ26
67	Crop	Maize	SAMMAZ27
68	Crop	Maize	SAMMAZ28
69	Crop	Maize	SAMMAZ29
70	Crop	Maize	SAMMAZ30
71	Crop	Maize	SAMMAZ31

72	Crop	Millet	LCIC-MV-1
73	Crop	Oil palm	SMALL SCALE PROC EQUIP
74	Crop	Oil palm	TENERA
75	Crop	Okra	LD-88
76	Crop	Okra	NHAE47-4
77	Livestock	Poultry	BACTERIAL VACCINES
78	Livestock	Poultry	KEROSENE INCUBATOR
79	Livestock	Poultry	VIRAL VACCINES
80	Crop	Rice Lowland	FARO 44
81	Crop	Rice Upland	FARO46/ITA150
82	Crop	Rice Upland	FARO48/ITA301
83	Crop	Rice	FARO 51
84	Crop	Rice Lowland	FARO 52
85	Crop	Rice Upland	FARO55/WAB-1-B-P38-HB
86	Crop	Rice Upland	NERICA-1/WAB-450-1-B-P38-HB
87	Crop	Rice Upland	NERICA 2
88	Crop	Rice	RICE PROCESSING MACHINE
89	Crop	Rice Upland	WAB 189
90	Crop	Sorghum	SAMSORG13
91	Crop	Sorghum	SAMSORG14
92	Crop	Sorghum	SAMSORG16
93	Crop	Sorghum	SAMSORG17
94	Crop	Sorghum	SAMSORG3
95	Crop	Sorghum	SAMSORG38
96	Crop	Sorghum	SAMSORG39
97	Crop	Sorghum	SAMSORG40
98	Crop	Sorghum	SAMSORG41
99	Crop	Sorghum	SAMSORG5
100	Crop	Sorghum	SAMSORG8
101	Crop	Soybean	TGE1987-2F
102	Crop	Soybean	TGX-1448-2E
103	Crop	Soybean	TGX1835-10E
104	Crop	Soybean	TGX1904-6F
105	Crop	Soybean	TGX1987-1DF
106	Crop	Sugarcane	NCS-001
107	Crop	Sugarcane	NCS-002
108	Crop	Sugarcane	NCS-003

109	Crop	Sugarcane	NCS-005
110	Crop	Sugarcane	NCS-006
111	Crop	Sugarcane	NCS-007
112	Crop	Sugarcane	NCS-008
113	Crop	Tomato	JM94/54
114	Crop	Tomato	MP WT-6
115	Crop	Wheat	LACI-WHIT-1
116	Crop	Yam	MINISETT

Source: Computed from the summary of studies in Appendix tables A1-A6

Table 2: Distribution of innovations by innovation domains in the study

Innovation domain	*Frequency*	*Percentage*
Crop	109	94.0
Fishery	2	1.7
Livestock	4	3.4
Wildlife	1	0.9
Total	116	100.0

Source: Computed from the summary of studies in Appendix tables A1-A6

Table 3 shows the frequency and parentage distributions of the agricultural innovations according to innovation domains and commodity names. It is significant that the top 4 commodities with the highest number of existing innovations are Cassava (32; 27.4%), maize (20; 17.1%), sorghum (11; 9.4%) and rice (10; 8.5%). These results closely reflect the national importance of the 4 crops (Phillip et al, 2014; Azih 2008). Cowpea comes in the 5th spot with 9 existing innovations and 7.7% of the total reported.

Triggers of agricultural innovations in Nigeria

At least 45 items were found to trigger agricultural innovations. Though not so obvious, table 4 (distributed into panels 1-4) is contains the analytical derivatives of Appendix tables A1-A6. In table 4, the numerical entry for each commodity represents the number of innovations triggered or accomplished. For example, panel 1 shows 31 varieties of cassava, 18 varieties of maize, 9 varieties of rice and 11 varieties of sorghum as being linked to the desire for improved yield. The trigger was thus yield improvement. A close study of table 4 (across all panels) shows that the strongest or most frequent triggers of innovation were yield improvement (panel 1; 101 occurrences), shorter time to maturity (panel 1; 51 occurrences), resistance to pests and diseases (panel 1; 43 occurrences), wide ecological adaptation (panel 1; 41 occurrences), high quality cassava flour, HQCF (panel 1; 28 occurrences), drought

resistance (panel 1; 11 occurrences), seed or grain colour (panel 3; 5 occurrences), malting quality (panel 3; 5 occurrences) and grain weight or size (panel 3; 5 occurrences). In general, some triggers are cross-cutting while several others are commodity specific.

Table 3: frequency and percentage distribution of commodities by associated number of innovations

S/No.	*innovation domain*	*commodity name*	*No. of innovations*	*% of total*
1	Crop	Cassava	32	27.4
2	Crop	Cocoa	1	0.9
3	Crop	Coconut	1	0.9
4	Crop	Cowpea	9	7.7
5	Crop	Assorted commodities	2	1.8
6	Fishery	Fish	2	1.7
7	Wildlife	Grass cutter	1	0.9
8	Crop	Gum Arabic	1	0.9
9	Crop	Irish potato	1	0.9
10	Crop	Maize	20	17.1
11	Crop	Millet	1	0.9
12	Crop	Oil palm	2	1.7
13	Crop	Okra	2	1.7
14	Livestock	Poultry	5	4.3
15	Crop	Rice	10	8.5
16	Crop	Sorghum	11	9.4
17	Crop	Soya bean	5	4.3
18	Crop	Sugarcane	7	6.0
19	Crop	Tomato	2	1.7
20	Crop	Wheat	1	0.9
21	Crop	Yam	1	0.9
	Total		116	100.0

Source: Computed from the summary of studies in Appendix 1 tables A1-A6

Table 4: Frequency distribution of commodities by triggers of innovations (panel 1)

Triggers of innovation											
commodity name	*yield improvement*	*resistance to pests/disease*	*shorter time to maturity*	*striga resistance*	*wide or high ecological adaptation*	*drought resistance /tolerance*	*high quality cassava products*	*low energy requirement*	*compact machine*	*import substitution*	*high capacity threshing machine*
Cassava	31	30			30		28				
Cocoa	1	1	1								
Coconut		1	1								
Cowpea	9	1	5		1						
Assorted commodities											
Fish											
Grass cutter											
Gum Arabic	1		1			1					
Irish potato	1		1								
Maize	18		11	1		4		1	1	2	2
Millet	1	1									
Oil palm	1	1	1								
Okra	2		2								
Poultry		3	1		1						
Rice	9	1	5		3					1	
Sorghum	11		8	2		1					
Soybean	5		5			4					
Sugarcane	7	1	6		6	1					
Tomato	2	2	2								

Wheat	1	1	1								
Yam	1										
	101	43	51	3	41	11	28	1	1	3	2

Source: Computed from the summary of studies in Appendix 1 Tables A1-A6

Table 4: Frequency distribution of commodities by triggers of innovations (panel 2)

	Triggers of innovation										
commodity name	*fast growth*	*improved mortality*	*improved egg quality*	*improved fish smoking*	*large roots*	*good stem multiplication*	*drawing ability*	*deep green colour*	*low N tolerance*	*height of crop*	*fertilizer response*
Cassava					2	1					
Cocoa											
Coconut											
Cowpea											
Assorted commodities											
Fish				1							
Grass cutter	1	1									
Gum Arabic											
Irish potato											
Maize									2		
Millet											
Oil palm										1	
Okra							2	2			
Poultry			1								
Rice											

Sorghum										3	1
Soybean											
Sugarcane											
Tomato											
Wheat											
Yam											
Total	1	1	1	1	2	1	2	2	2	4	1

Source: Computed from the summary of studies in Appendix 1 Tables A1-A6

Table 4: Frequency distribution of commodities by triggers of innovations (panel 3)

	Triggers of innovation									
commodity name	*improved lodging resistance*	*panicle improvement*	*seed or grain colour*	*malting quality*	*grain weight or size*	*less use of electricity*	*afford ability*	*flexible egg incubation capacity*	*early hatchability*	*flexible energy /power source*
Cassava										
Cocoa										
Coconut										
Cowpea			1							
Assorted commodities							1			1
Fish							1			1
Grass cutter										
Gum Arabic										
Irish potato										

Maize										
Millet										
Oil palm										
Okra										
Poultry						1	1	1	1	
Rice										
Sorghum	1	4	4	5	5					
Soybean										
Sugarcane										
Tomato										
Wheat	1									
Yam										
	2	4	5	5	5	1	3	1	1	2

Source: computed from the summary of studies in Appendix 1 Tables A.1-A.6

Table 4: Frequency distribution of commodities by triggers of innovations (panel 4)

	Triggers of innovation												
Commodity name	Shattering resistance	Padding habit	High number of pods	High number of peduncles	Daylight neutral	Milling quality	Processing efficiency	High oil extraction	Small scale equipment	high egg production	egg size	threshing ease	cooking quality
Cassava													
Cocoa													
Coconut													

Cowpea	1	1	2	1	2								
Assorted Commodities													
Fish													
Grass Cutter													
Gum Arabic													
Irish Potato													
Maize													
Millet													
Oil palm									2	1			
Okra													
Poultry										1	1		
Rice						1	1					1	1
Sorghum													
Soybean													
Sugarcane													
Tomato													
Wheat													
Yam													
Total	1	1	2	1	2	1	1		2	2	1	1	1

Source: Computed from the summary of studies in Appendix 1 Tables A1-A6

BENEFITS OF AGRICULTURAL INNOVATIONS IN NIGERIA

Estimates of innovation adoption rates

We have noted earlier in this report that a beneficial innovation is one that was 'released' to the end users and actually in use (adopted). Table 5 shows the adoption rates of some innovations across the studies reviewed. The data show that a farmer is likely to adopt an innovation that has been proven by him/her or elsewhere to be beneficial. The methodologies generating the adoption rates in table 5 differ among studies; some were computed based on the percentage of farmers adopting, while others were based on the area of land under a crop-based innovation. Table 5 shows that some innovations are associated with 50% or high adoption rates. Included in this category are Cassava TMS30572 (69%), Coconut GREENDWARF (69%), Cowpea SAMPEA6 (87.8%), Cowpea IFE BROWN (86.3%), Millet LCIC-MV-1 (51.2%), Rice FARO51 (50%), Rice FARO 44 (59.4%), Soybean TGX-1448-2E (87%), Tomato JM94/54 (72%), Wheat LACI-WHIT-1 (52%) and Yam MINISETT (78%). These and other values of adoption rates suggested varying amounts of benefits accruing from the innovations.

Beneficiary assessment of crop yields

The data in table 6 presents an assessment of the link between innovation and farm yield or productivity. The initial 5 rows in the table 6 represent beneficiary assessments of the effect of adopting the listed innovations on the yield of concerned crops. Specifically, the yield-increasing effect of varietal adoption was assessed as Rice FARO51 (33%), Cocoa PRECOCITY (93%), Wheat LACI-WHIT-1 (62%), Sugarcane NCS-001 (100%) and Gum Arabic ACACIA SENEGAL (85%). The figures in brackets are the percentages of adopters responding to the survey in the study reviewed (Phillip et al., 2010a). The rest of table 6 shows the researcher-managed on-farm trial estimates of yield gains over existing or traditional varieties of the relevant crops. While these estimates were quite promising, the information sources did not give details of how they were obtained. The obvious benefits of yield improvement among the crops listed in table 6, arising from varietal improvements, can be better appreciated when compared with the yields under traditional practices. Table 7 shows such evidence for cassava, maize, rice and sorghum, which are the national staple crops.

Table 5: Innovations with evidence of adoption

Commodity name	Innovation name	adoption rate %
Cassava	Cassava stem storage	2
Cassava	TMS30572	69
Cassava	NR8082	31
Chicken	SHIKABROWN	49-86.7
Cocoa	PRECOCITY	56
Coconut	GREENDWARF	69
Cowpea	SAMPEA6	87.8
Cowpea	SAMPEA8	12.2
Cowpea	IFE BROWN	86.3
Cowpea	IFE BPC	9.6
Fish	IMPROVED_BANDA	44
Gum Arabic	ACACIA SENEGAL	40
Irish Potato	NICOLA	51
Maize	SAMMAZ11	32
Millet	LCIC-MV-1	51.2
Oil palm	TENERA	64
Okra	NHAE47-4	9.9
Okra	LD-88	37.1
Rice	FARO51	50
Rice Lowland	FARO 44	59.4
Rice Lowland	FARO 52	13.8
Rice Upland	FARO46/ITA150	12.8
Rice Upland	FARO48/ITA301	7.9
Rice Upland	FARO55/WAB-1-B-P38-HB	6.2
Rice Upland	NERICA-1/WAB-450-1-B-P38-HB	42
Rice Upland	WAB 189	23-46
Rice Upland	ITA 150	46
Rice Upland	NERICA 2	14
Sorghum	SAMSORG38	27.9
Sorghum	SAMSORG39	16.1
Sorghum	SAMSORG40	13.5
Sorghum	SAMSORG41	42.6
Soybean	TGX-1448-2E	87
Sugar Cane	NCS-001	48
Tomato	JM94/54	72
Wheat	LACI-WHIT-1	52
Yam	MINISETT	78

Source: computed from the summary of studies in Appendix 1 Tables A.1-A.6

Table 6: Estimated on-farm yield gains for the crop innovations under review

Commodity name	Innovation name	Yield increase assessment	Remark
Rice	FARO51	33%	Beneficiary assessment
Cocoa	PRECOCITY	93%	Beneficiary assessment
Wheat	LACI-WHIT-1	62%	Beneficiary assessment
Sugarcane	NCS-001	100%	Beneficiary assessment
Gum Arabic	ACACIA SENEGAL	85%	Beneficiary assessment
Soyabean	TGE1987-2F	1.5-2.5t/ha	On-farm estimate
Soyabean	TGX1987-1DF	1.5-2.5t/ha	On-farm estimate
Soyabean	TGX1904-6F	1.5-2.5t/ha	On-farm estimate
Soyabean	TGX1835-10E	1.5-2.5t/ha	On-farm estimate
Sugarcane	NCS-002	100-110t/ha	On-farm estimate
Sugarcane	NCS-003	100-110t/ha	On-farm estimate
Sugarcane	NCS-005	100-110t/ha	On-farm estimate
Sugarcane	NCS-006	100-110t/ha	On-farm estimate
Sugarcane	NCS-007	100-110t/ha	On-farm estimate
Sugarcane	NCS-008	100-110t/ha	On-farm estimate
Maize	ART-98-SW6-OB	4.6-4.8t/ha	On-farm estimate
Maize	ILE-1-OB	3.9-5.0t/ha	On-farm estimate
Tomato	MP WT-6	10-15t/ha	On-farm estimate
Maize	SAMMAZ17	4.5t/ha	On-farm estimate
Maize	SAMMAZ18	4t/ha	On-farm estimate
Maize	SAMMAZ19	4.5t/ha	On-farm estimate
Maize	SAMMAZ20	4t/ha	On-farm estimate
Maize	SAMMAZ21	4.5t/ha	On-farm estimate
Maize	SAMMAZ22	5t/ha	On-farm estimate
Maize	SAMMAZ23	5t/ha	On-farm estimate
Maize	SAMMAZ24	5t/ha	On-farm estimate
Maize	SAMMAZ25	5.5t/ha	On-farm estimate
Maize	SAMMAZ26	3.5t/ha	On-farm estimate
Maize	SAMMAZ27	4.5t/ha	On-farm estimate
Maize	SAMMAZ28	3.5t/ha	On-farm estimate
Maize	SAMMAZ29	3.5t/ha	On-farm estimate
Maize	SAMMAZ30	3.5t/ha	On-farm estimate
Maize	SAMMAZ31	3.5t/ha	On-farm estimate
Sorghum	SAMSORG17	1.5-2t/ha	On-farm estimate

Sorghum	SAMSORG8	1.0-1.2t/ha	On-farm estimate
Sorghum	SAMSORG14	1.0-1.5t/ha	On-farm estimate
Sorghum	SAMSORG5	1.0-1.2t/ha	On-farm estimate
Sorghum	SAMSORG40	1.0-1.2t/ha	On-farm estimate
Sorghum	SAMSORG41	1.2-1.5t/ha	On-farm estimate
Sorghum	SAMSORG13	1.0-1.2t/ha	On-farm estimate
Sorghum	SAMSORG38	1.0-1.2t/ha	On-farm estimate
Sorghum	SAMSORG3	1.0-1.2t/ha	On-farm estimate
Sorghum	SAMSORG16	1.8-2.5t/ha	On-farm estimate
Cowpea	SAMPEA8	2.0 t/ha	On-farm estimate
Cowpea	SAMPEA9	2.3 t/ha	On-farm estimate
Cowpea	SAMPEA10	1.5 t/ha	On-farm estimate
Cowpea	SAMPEA11	1.6 t/ha	On-farm estimate
Cowpea	SAMPEA12	2.3 t/ha	On-farm estimate
Oil palm	TENERA	20-25 t/ha	On-farm estimate
Cassava	TMS 97/2205	25-29t/ ha	On-farm estimate
Cassava	TMS 98/0581	25-29t/ ha	On-farm estimate
Cassava	TMS 98/0505	25-29t/ ha	On-farm estimate
Cassava	TMS 98/0510	25-29t/ ha	On-farm estimate
Cassava	TME 419	25-29t/ ha	On-farm estimate
Cassava	TM 92/0326	25-29t/ ha	On-farm estimate
Cassava	TMS 96/1632	25-29t/ ha	On-farm estimate
Cassava	TMS 980002	25-29t/ ha	On-farm estimate
Cassava	TMS92/0057	25-29t/ ha	On-farm estimate
Cassava	NR 87184	25-29t/ ha	On-farm estimate
Cassava	NR 41044	25-29t/ ha	On-farm estimate
Cassava	TMS 30555	25-29t/ ha	On-farm estimate
Cassava	TMS 50395	25-29t/ ha	On-farm estimate
Cassava	TMS 30001	25-29t/ ha	On-farm estimate
Cassava	TMS 30572	25-29t/ ha	On-farm estimate
Cassava	TMS 4(2)1425	25-29t/ ha	On-farm estimate
Cassava	TMS 91934	25-29t/ ha	On-farm estimate
Cassava	NR 8208	25-29t/ ha	On-farm estimate
Cassava	NR 8083	25-29t/ ha	On-farm estimate
Cassava	NR 83107	25-29t/ ha	On-farm estimate
Cassava	NR 8212	25-29t/ ha	On-farm estimate
Cassava	NR 8082	25-29t/ ha	On-farm estimate

Cassava	TMS 81/00110	25-29t/ ha	On-farm estimate
Cassava	TMS 90257	25-29t/ ha	On-farm estimate
Cassava	TMS 84537	25-29t/ ha	On-farm estimate
Cassava	TMS 82/00058	25-29t/ ha	On-farm estimate
Cassava	TMS 82/00661	25-29t/ ha	On-farm estimate

Source: computed from the summary of studies in Appendix 1 Tables A.1-A.6

Table 7: Average yields of selected crops under traditional farm practices, various regions, Nigeria, 1999-2009, mt/ha

Region or zone	*Cassava*	*Maize*	*Rice*	*Sorghum*
North central	12.95	1.57	2.21	1.28
North east	9.93	1.50	1.79	1.26
North west	9.10	1.97	1.87	1.25
South east	13.22	2.00	2.28	n/a
South south	14.92	1.64	2.15	n/a
South west	14.34	1.76	1.84	0.93
National	12.41	1.74	2.02	1.18

Source: Phillip et al (2014); n/a = not relevant to the region

Table 8a (panel 1) presents further beneficiary assessments of some of the agricultural innovations under review. A close study of the data in table 8a (panel 1) shows that at least 60% of the adopters improved their income, access to food, community status and household assets through innovation adoption. With the exception of millet, at least 60% of the households in the survey reviewed improved their health status through innovation adoption. The data also show at least 50% of the adopters improved the yield, area and crop outputs of both the crops being assessed and of competing crops. This affirms that adoption decision is at the heart of any benefit to be derived from an innovation.

Table 8b (panel 2) presents beneficiary assessments of the adoption risks involving some of the innovations under review. Non-availability of fertilizer was a problem to 10%, 36%, 54% and 84% of the adopters of the indicated innovations for soybean, tomato, coconut and yam, respectively. Also, non-availability of seeds or planting materials was a problem to 24%, 36%, 54% and 60% of the adopters of the indicated innovations for yam, soya bean, coconut and tomato, respectively. Technology adoption risk was rated as medium to high by 38%, 54%, 73% and 88% of the adopters of soybean, coconut, tomato and yam, respectively. Notably and expectedly, yam and tomato were the main perishable items among the 4 sets commodities. The data also show that at least 90% of the adopters rated as medium to high the

profitability of the listed innovations. This means that, other incentives considered, farmers were not deterred from adopting any innovation by technology risks.

Table 8a: Selected beneficiary assessments of agricultural innovations (pPanel 1)

Commodity name	Name of innovation	innovation has led to income gain	innovation has led to more food access	community status improved with adoption	innovation has led to increase in household asset	innovation has reduced illness in the household	innovation has led to area increase	innovation has led to output increase	innovation has led to yield increase, other crops	innovation has led to area increase, other crops	innovation has led to output increase, other crops
Millet	LCIC-MV-1	98	82	86	62	45					
Irish Potato	NICOLA	100	100	98	94	78					
Maize	SAMMAZ11	100	100	78	96	93					
Rice	FARO51		100	90	96	64					
Oil Palm	TENERA	100	96	100	93	94					
Chicken	SHIKABROWN	80	88	65	65	89					
Fish	IMPROVED_ BANDA	100	100	94	94	97					
Cocoa	PRECOCITY				100		93	93	60	55	68
Wheat	LACI-WHIT-1				100		24	68	54	22	54
Sugarcane	NCS-001				100		100	100	98	98	98
Gum Arabic	ACACIA SENEGAL				100		73	96			

Source: Computed from the summary of studies in Appendix 1 Tables A1-A6

Table 8b: Selected beneficiary assessments of agricultural innovations (panel 2)

Commodity name	*Name of innovation*	*Constraint fertilizer not available*	*Constraint seed not available*	*technology/innovation adoption risk (medium-high)*	*technology/innovation adoption profitability (medium-high)*
Coconut	GREEN DWARF	54	54	54	100
tomato	JM94/54	36	60	73	98
Yam	MINISETT	84	24	88	100
Soya bean	TGX-1448-2E	10	36	38	94

Source: computed from the summary of studies in Appendix Tables A.1-A.6

STUDY **02**

Inventory and Characterization of Innovation Platforms

INTRODUCTION

The Nigerian agricultural sector has always been expected to lead in such roles as the provision of food for a population that presently stands at over 170 million, employment, foreign exchange earnings, agro-industrial raw materials and income for the actors along the various value chains. These roles are hardly fulfilled because agricultural research have been unable to deliver increased productivity, which would in turn lead to poverty reduction among rural households, food security for the nation and enhanced export and agro-industrial possibilities. One of the factors identified in the retardation of agricultural productivity growth in Nigeria is the prevalence of traditional research arrangement in which actors along each agricultural value chain act independently of each other. The primary focus of traditional agricultural research is to treat research as the only activity required to deliver on the expected roles of the agricultural sector. The extension system, input dealers, commodity traders, policymakers, non-government organizations and farmers seldom have much to contribute to the process of evolving innovations.

The recent advocacy is the need to rethink the agricultural research paradigm towards inclusive stakeholders' participation at the various levels along the relevant value chains. The new paradigm expects the various stakeholders to relate interactively in the process of developing an innovation. This paradigm, called Integrated Agricultural Research for Development (IAR4D), uses the 'Innovation Platform' (IP) as its operational instrument. The IAR4D, as promoted by the Forum for Agricultural Research in Africa (FARA), has received significant attention among national and international agricultural technology transfer and utilization stakeholders. The important thing is the incredible level of agreement among stakeholders about what agricultural IP is. In the words of Eicher (2006):

> The IAR4D structure is an Innovation Platform (IP)—an informal coalition, collaboration, partnership and alliance of public and private scientists, extension workers, representatives of farmers, farmers' associations, private firms, non-government organizations, and government policymakers who communicate, cooperate and interact (often across sectoral and ministerial lines) motivated by the common belief that increasing agricultural productivity can help improve the welfare of all members of society. The core competencies brought to bear by the IP are greater than the sum of the IP's constituents acting independently.

Furthermore, ILRI (2014) defined agricultural IP as: 'a space for learning and change'. It is a group of individuals (who often represent organizations) with different backgrounds and interests: farmers, traders, food processors, researchers,

government officials etc. The members come together to diagnose problems, identify opportunities and find ways to achieve their goals. They may design and implement activities as a platform, or coordinate activities by individual members. According to the Royal Tropical Institute:

> An agricultural innovation system is about people, the knowledge, technology, infrastructure and cultures they have created or learned, who they work with, and what new ideas they are experimenting with. The approach represents a major change in the way that the production of knowledge is viewed, and thus supported. It shifts attention away from research and the supply of science and technology, towards the whole process of innovation, in which research is only one element.

In this report, attempts are made to review the extent of compliance with the IP concept by a select number of agricultural value chains in Nigeria. The Forum for Agricultural Research in Africa (FARA), in partnership with the German Government represented by the Centre for Development Research (ZEF) of the University of Bonn under its 'One World No Hunger' initiative, is implementing the Programme of Accompanying Research for Agricultural Innovations (PARI). PARI is taking cognizance of the successes of research and innovation initiatives in African agriculture and, in consideration of the concept of integrated agricultural research for development (IAR4D) promoted by FARA, to build an independent accompanying research programme to support the scaling of agricultural innovations in Africa and thereby contribute the development of the African agriculture sector. The PARI will be implemented together with the Agricultural Innovation Centres within the 'One World No-Hunger' initiative.

PARI is collaborating with NARIs in 12 African countries (i.e.; Benin, Burkina Faso, Ethiopia, Malawi, Nigeria, Mali, Ghana, Cameroon, Kenya, Togo, Tunisia, and Kenya) to coordinate activities in their respective countries. In 2015, PARI activities focused on a situation analysis of agricultural innovation. Specifically, the situation analysis entailed:

1. an inventory of existing functional promising agricultural innovations in each country;
2. a scoping study of existing agricultural innovation platforms in the country;
3. an assessment of the state of national investment on agricultural innovation system in the country.

METHODOLOGY

In study 1, a total of 116 technologies were presented across 4 innovation domains (crops, livestock, poultry and wildlife). In principle, therefore, there should be almost an equivalent number of IPs to report around the several technologies. But in practice, the number of IPs that complied with the agreed reporting format was much fewer than anticipated. Specifically, the IPs that largely fitted into the agreed reporting format were cassava innovation platforms, cowpea/ soybean PICS IPs, cowpea/soybean crop-livestock IP, and aquaculture fish meal IP. Several IPs were encountered in the different reports consulted in Nigeria, but most were economical on the information relating to the format agreed for the study. Even at that, it was generally not the practice among the reports reviewed to provide location coordinates, IP villages and websites. These items were almost uniformly absent across the IPs presented in this report. Those technologies that could not be associated with any IP are presented in the Appendix.

Existing Agricultural Innovation Platforms

Cassava innovation platform, Abia State

Nigeria is the largest producer of cassava tubers. This global tuber production status is believed to have been achieved over the years largely through area expansion than productivity increase (Phillip et al., 2014). Cassava productivity at farm level has averaged 10-12 mt/ha for nearly 2 decades; however, on-station and on-farm experimental trials have shown that improved cassava varieties are capable of yielding 25-30 mt/ha (Chikwendy and Abubakar, 2014). Farmers are confronted with problems of access to improved cassava varieties (that are high-yielding and resistant to cassava mosaic disease (CMD), postharvest value adding technologies and ready markets for their harvests.

Thus, the entry point for the assistance provided in 2009 by RIU-Nigeria was to organize a platform to bring together partners that will address farmers' endemic cassava production problems. Specifically, stakeholders were organized to grant farmers access to CMD varieties of cassava, post-harvest value addition through linkage to private agro-processors, who by extension, provided sure markets for farmers' cassava tubers. In Abia state, about 70% of the cassava farmers are women. A summary is provided in table 1 on the role of stakeholders in the formation and functioning of Abia State Cassava Innovation Platform.

Table 1: Partners and roles in the Cassava Innovation Platform of Abia state, Nigeria

Stakeholder	*Role in the CIP*
IITA	Developed the varieties introduced to farmers : NR8082, NR8083, TME 419, TME 98/0505 and TMS 30572
	Conducted the needs assessment
	Demonstration of planting technique to farmers
	On-farm testing of varieties
	Identification and location of out-growers
	Assembling of NGOs and farmers' organisations
ADP	Participated in the introduction of the CMD resistant varieties to farmers
	Participated in the needs assessment
	Distributed the CMD resistant varieties
NRCRI	Participated in the introduction of the CMD resistant varieties to farmers
	On-farm testing of varieties
	Identification and location of out-growers
	Capacity building for farmers, processors, ADP on value addition
Aquada Development Corporation	Processes cassava roots into hyper-fine garri named ''Scintilla''
	Buys cassava tubers from farmers for processing
Nigerian Starch Mill (NSM)	Buys cassava tubers from farmers for processing
Post-harvest equipment fabricators	Fabricates and repair cassava processing equipment
Confectioners and bakers	Downstream users of processed cassava
Input and financial service providers	Sale of inputs within the reach of farmers Provision of credit to needy stakeholders based on credible intermediation by ADP, NARI, farmer groups
Farmers or outgrowers	Participated in the needs assessment
	Produces cassava tubers for consumption and agro-processing under guarantees by processors

Source: RIU (2011)

Table 2: Cassava Innovation platform, CMD variety NR8082, Abia State, Nigeria

IP Name	Cassava Innovation Platform
Entry Point or value chain (VC)	Development of Improved and Cassava Mosaic Disease (CMD) resistant varieties ; early maturity, high yield, ease of peeling, etc.
Innovations (technical or social and economic innovations)	Cassava Mosaic Disease (CMD) resistant varieties NR8082, NR8083, variety TME 419, variety TME 98/0505, variety TMS 30572
Location (name and GPS coordinates in UTM or degrees)	Secretariat at the state capital, Umuahia,
Intervention areas (regional/province/district/…)	Abia state, South East region
IP webpage:	Not available
Participating villages	Abia North: Ozuitem, Okon-Aku, Amaba Abia Central: Amaoba/Amawom, Ubaha-Oriendu, Umuokorodo Abia South: Osaa-Ukwu, Osisioma
Date IP establishment	5th of February 2009
Institutions setting up the IP	Research into Use (RIU)-Nigeria, International Institute of Tropical Agriculture (IITA), Agricultural Development Program (ADP) and National Root Crops Research Institute (NRCRI). Nigerian Starch Mill (NSM) industry; The state Ministry of Agriculture; Aquada Development Corporation; Projects Development Institute (PRODA), Enugu
Funding agents	RIU-Nigeria, IITA, NRCRI, Abia state
Number of years activities on the ground	2009 to date
IP is still active or not	Still active
Facilitators(names and contacts)	Dr. Udensi Ekea Udensi, Consultant-IITA Cassava Projects, South-Eastern, Nigeria/ Faculty of Agriculture, University of Port Harcourt, Nigeria; Yarama D Ndirpaya Agricultural Research Council of Nigeria
IP members (regrouped by VC actors and sectors)	Five categories of members: the farmers or cassava growers (70% women), processors, post-harvest equipment fabricators, researchers (from NRCRI, IITA), extension agents of the ADP, confectioners and bakers, input and financial service providers;
Opportunities addressed	Sale outlets to Nigerian Starch Mill (NSM) industry, Casual and regular jobs created,
Achievements to date	•Nigerian Starch Mill, a processor source and distribute high yielding varieties to farmers • NSM participation guarantees tuber market for the outgrowers •Farmers encouraged to increase adoption and put more land under cassava production
Challenges	Effective coordination of the various groups in the IP, given the complexity of activities and interests
Sustainability issues	Funding of IP beyond the RIU-Nigeria assistance
Phase in IP process (initial, maturity, independent)	Initial phase

Lessons from the cassava innovation platform

- Entry point: Development of Improved and Cassava Mosaic Disease- (CMD) resistant varieties; early maturity, high yield, ease of peeling, etc.
- Technologies promoted: CMD-resistant varieties NR8082, NR8083, variety TME 419, variety TME 98/0505, variety TMS 30572;
- Wide consultations and collaborations required for start-up, ownership and sustainability: Research into use (RIU)-Nigeria, International Institute of Tropical Agriculture (IITA), Agricultural Development Programme (ADP) and National Root Crops Research Institute (NRCRI). Nigerian Starch Mill (NSM) industry; State Ministry of Agriculture; Aquada Development Corporation; Projects Development Institute (PRODA), Enugu;
- Everyone benefitted:
- Nigerian Starch Mill, a processor sources and distribute high yielding varieties to farmers
- NSM participation guarantees tuber market for outgrowers
- Farmers were encouraged to increase adoption and put more land under cassava production

Cowpea storage innovation platform (CSIP)

Cowpea is the leading legume crop in northern Nigeria. The storage of cowpea after harvest has posed perennial problems at smallholder level in Nigeria. The insects called Bruchids causes considerable storage losses to cowpea farmers. The best option for protecting cowpea grains in storage has been the application of agro-chemicals. These chemicals are known to cause health hazards to consumers of beans. The entry point for the cowpea storage innovation platform was the introduction of a triple layer Purdue Improved Cowpea Storage (PICS) hermetic storage to farmers, which helps avoid the use of chemicals. PICS was developed by a Purdue University scientist, with active participation of some African scientists. The PICS project, initiated by Purdue University, was funded by Bill and Melinda Gates Foundation (BMGF).

RIU Nigeria initiated and funded the CSIP through IITA in 2009. Extension services were provided within the innovation platform by state ADPs and LG agencies. The private sector, led by Lela Agro Enterprises, manufactured the PICS bags locally, while marketers association sold the bags. Local community and religious leaders assisted to spread the health advantages of the PICS bags over agro-chemical options. The CSIP using the PICS bags empowered both farmers and marketers in the sense that both were given the freedom to publicly evaluate the bags and freely decided to adopt or not to adopt. The PICS bags were sold through state and local government extension agents. One unresolved issue, however, concerned the optimal size of PICS

bags. Women preferred small-size bags that would allow them keep their beans in small units for domestic consumption and seed saving (to avoid frequent opening of the bags) rather than in big bags. However, wholesalers preferred big bags because they deal in the assembly of large grain volumes.

Table 3: Cowpea / soybean innovation platform, Purdue improved cowpea storage

IP Name	Cowpea / Soybean Innovation Platforms
Entry Point or value chain (VC)	Improved Cowpea storage
Innovations (technical or social and economic innovations)	Purdue Improved Cowpea Storage (PICS); PICS or triple bagging cowpea storage is a technology.
Location (name and GPS coordinates in UTM or degrees)	Kaduna state, , Gombe state, Bauchi state, Kano state, Katsina state, Jigawa state
Intervention areas (regional/province/district/…)	Kaduna state, , Gombe state, Bauchi state, Kano state, Katsina state, Jigawa state
IP webpage:	Not available
Participating villages	Not indicated
Date IP establishment	November 2009
Institutions setting up the IP	RIU -Nigeria, International Institute of Tropical Agriculture (IITA), Purdue University, USA), the Bill and Melinda Gates Foundation, State Agricultural Development Programme (ADP), Kano Agricultural and Rural Development Programme (KNARDA), independent trainers and resource persons, , selected radio and TV stations, community/religious leaders, and associations of cowpea farmers and marketers, National Stored Products Research Institute (NSPRI),), Garko Local Government of Kano state, Bayero University Kano, LELA Agro Industry and Jubaili Agrotec Limited. RIU Nigeria fully funded the platform initially, but later KNARDA partially supported the platform by making available their facilities at no cost during RIU Nigeria platform activities.
Funding agents	Initial project: Bill and Melinda Gates Foundation (BMGF); RIU-Nigeria, IITA , State Government, state ADP
Number of years activities on the ground	2009 to date
IP is still active or not	Still active
Facilitators(names and contacts)	T Abdoulaye International Institute for Tropical Agriculture, IITA, PMB 5320, Ibadan, Nigeria; Utiang P Ugbe Coordinator RIU Nigeria; Baributsa, Dieudonné , Purdue University, IPIA, West Lafayette, In 47906, USA; S. A Sanni Agricultural Economist, Institute for Agricultural research, Ahmadu Bello University, Zaria, Nigeria;

	Grace Jokthan Project Manager, RIU Nigeria
IP members (regrouped by VC actors and sectors)	Farmers, marketers, community associations. PICS local manufacturer: Lela Agro Enterprises
Opportunities addressed	Virtual by-pass of chemical storage of cowpea, which is a health hazard to consumers
Achievements to date	•Adoption of PICS has addressed a major public health objective (reduced agro-chemical use) •increased income for many farmers, due to reduced post-harvest losses to cowpea farmers and marketers • Empowerment of rural farmers and agro marketers •Establishment of supply chain linking PICS bag producers and the retailers
Challenges	PICS manufacturers prefers urban distribution of bags, while the main demand lies among the rural farmers; Women prefer smaller bags to enable strategic storage (cooking, seed retention) without frequent opening of bigger bags; wholesalers prefer large size bags.
Sustainability issues	Contract between IITA and LELA Agro has expired; there is need for integration of a market-led supply of the PICS technology
Phase in IP process (initial, maturity, independent)	Initial

Lessons learnt from the Cowpea / Soybean Innovation Platform

- Entry point: Improved cowpea storage, using Purdue Improved Cowpea Storage (PICS); PICS or triple bagging cowpea storage was the technology;
- Broad based consultation among stakeholders along the cowpea value chain: International and national agricultural research organizations, agro-industrial businesses, ADPs, universities, farmers, marketers and religious bodies
- Everyone benefited:
  - Adoption of PICS has addressed a major public health objective (reduced agro-chemical use)
  - increased income for many farmers, due to reduced postharvest losses to cowpea farmers and marketers
  - Empowerment of rural farmers and agro-marketers
  - Establishment of supply chain linking PICS bag producers and the retailers

The Cowpea/soybean Crop-Livestock Integration Innovation Platform

Earlier research on cowpea largely focused on the improvement of grain yields for human consumption and sale. Little attention was paid to the prospect of using cowpea fodder in livestock feeding. Thus, farmers have been known to abandon

cowpea residues on their farms after harvest, either to be grazed by own livestock or the livestock of pastoralists in the neighbourhood. The entry point in this regard was the introduction, through the intervention by RIU Nigeria, dual purpose varieties of Cowpea for the promotion of the Cowpea/soybean Crop-Livestock Integration. Top on the list of such varieties are IT277-2 and IT98K-205-8. These cowpea varieties produce high grain and fodder yields and adapt widely across the Nigeria savanna agro-ecologies. Also significant is the introduction of baling equipment to farmers through the joint effort of the IITA and IAR. Farmers participated in the evaluation of the baling equipment. Indeed, farmers suggested the right position of the bolts and hinges in the equipment.

Table 4: Cowpea/soybean Crop-Livestock Integration Innovation Platform, Cowpea variety IT277-2

IP Name	*Cowpea/soybean crop-livestock integration innovation platform*
Entry Point or value chain (VC)	Food for man, feed for animals (meeting high grain yield and crop residues for livestock)
Innovations (technical or social and economic innovations)	Dual purpose varieties of cowpea (IT277-2), (IT98K-205-8)
Location (name and GPS coordinates in UTM or degrees)	Kaduna state
Intervention areas (regional/province/district/…)	Kaduna state, Kano state, Cross River state,
IP webpage:	Not available
Participating villages	Not available
Date IP establishment	2009
Institutions setting up the IP	Institute for Agricultural Research (IAR); International Institute for Tropical Agriculture (IITA) RIU-Nigeria; Private sector Input dealers in the platform (Premier Seeds Plc and The Seed Project Ltd); Wetlands Nig Ltd (makers of bailing equipment)

Funding agents	RIU-Nigeria, IITA, IAR, Private input dealers
Number of years activities on the ground	2009 to date
IP is still active or not	Still active
Facilitators(names and contacts)	Grace Jokthan RIU Nigeria
IP members (regrouped by VC actors and sectors)	Farmers, livestock pastoralists, marketers, hay balers, baling equipment operators
Opportunities addressed	Farmers were given the chance to suggest improvement in the bailing equipment; they suggested bolt placement at two ends to help keep the equipment steady; and hinges at four places near the rim for easy passage of ropes around the compacted bails.
Achievements to date	•Introduction of fodder bailing equipment to farmers resulted in a better way of storing fodder •More efficient management in fodder utilization by livestock owners •Bailing activities generates both income and employment for the youth • Demand for fodder created among Fulani pastoralists • Active involvement of all the stakeholders in the Cowpea Value chain • Creation of trust and confidence building among stakeholders in the cowpea value chain. • Ownership of ideas by the platform members and a sense of belonging.
Challenges	Limited availability and technical knowledge about baling equipment and fodder preservation among the farmers
Sustainability issues	Further sensitization among subsistence farmers, given their literacy levels.
Phase in IP process (initial, maturity, independent)	Initial

Lessons learnt from the Cowpea/soybean Crop-Livestock Integration Innovation Platform

- Entry point: Food for man, feed for animals (meeting high grain yield and crop residues for livestock), using dual purpose varieties of cowpea (IT277-2), (IT98K-205-8);
- Broad-based consultations and interactions among stakeholders: Institute for Agricultural Research (IAR), International Institute for Tropical Agriculture (IITA), RIU-Nigeria; private sector input dealers on the platform (Premier Seeds PLC and Seed Project Ltd); Wetlands Nigeria Ltd (makers of baling equipment), farmers, pastoralists;
- Everyone benefited:
  - Introduction of fodder bailing equipment to farmers resulted in a better way of storing fodder
  - More efficient management in fodder utilization by livestock owners
  - Baling activities generated both income and employment for the youth
  - Demand for fodder created among Fulani pastoralists
  - Active involvement of all the stakeholders in the cowpea value chain
  - Creation of trust and confidence building among stakeholders in the cowpea value chain.
  - Ownership of ideas by platform members and a sense of belonging.

Aquaculture Innovation Platform

Available estimates put fish feed at 60-80% of the total cost of fish production. Thus, the attainment of growth in the fish sector will depend on developing efficient and cost-effective means of feeding fish under the aquaculture regime. The entry point in the aquaculture innovation platform was the introduction of low-value fish species into the feeding of carnivorous high-value species, such as catfish. Clupeid is more familiar to fish farmers and more in abundance. So the challenge has been to grow matching quantities of Tilapia. The introduction of low-value fish species, freshwater Tilapia (*O. niloticus*) and Clupeid (*P. afzeliuzi*) were independently pursued by NIFFR and NIOMR, through alternative stakeholder arrangements, but which included feed millers, fish farmers, policymakers, private sector representatives and non-government organizations. The funding agency for this IP was RIU-Nigeria. The low-value fish meal has been found to be affordable to cottage aquaculture operators, leaving farmers and marketers with prospects of profit margins.

Table 5: Aquaculture innovation platform, low value tilapia in fish meal, Lagos State

IP Name	*Aquaculture Innovation Platform*
Entry Point or value chain (VC)	Improved fish meal production
Innovations (technical or social and economic innovations)	Low value Tilapia spp. feeding in fish farms as food for carnivorous species such as catfish and megalops.
Location (name and GPS coordinates in UTM or degrees)	Lagos state
Intervention areas (regional/province/district/…)	Lagos state, Delta state, Rivers state,
IP webpage:	Not available
Participating villages	Not available
Date IP establishment	2009
Institutions setting up the IP	Nigerian Institute for Oceanography and Marine Research, Victoria Island, Lagos; RIU-Nigeria; Private fish farm (Lekki)
Funding agents	NIOMR; RIU-Nigeria
Number of years activities on the ground	2009 till date
IP is still active or not	Project in progress
Facilitators(names and contacts)	G R Akande (Post-harvest Technologist) and A Oresegun (Fish Nutritionist) Nigerian Institute for Oceanography and Marine Research, Victoria Island, Lagos; J. O. Apochi Assistant Director (Fisheries), Agricultural Research Council of Nigeria
IP members (regrouped by VC actors and sectors)	Project in progress (expected to include fish farmers of all scales or sizes), marketers, processors, private producers of low value Tilapia.
Opportunities addressed	Feed constitutes about 70% of aquaculture production cost. Fish meal accounts for more than half the cost of fish feed in aquaculture business.
Achievements to date	•Tilapia-based fish meal reduces the cost of feed by about 30 per cent compared with imported fish feed; •Empowerment of NIOMR to produce low value Tilapia at own outstations, ARAC in Aluu and Buguma (Rivers State), NIOMR, Sapele (Delta State) and NIOMR, Badore (Lagos state) Empowerment of farmers to produce low value Tilapia as fish meal • Bridging of the supply and demand gaps in fish production •Creation of awareness and linkage of farmers to sources of good quality fish seeds • reduction of post-harvest losses in the fishery

	business • Capacity of IP members enhanced on -stocking of ponds with fish, -water quality requirements for fishing, -best feeding methods, -identification of diseases and treatment, -harvesting and -minimization of post-harvest losses
Challenges	Tilapia fish meal is high in ash content compared with imported fish meal; this must be remedied.
Sustainability issues	Production of sufficient quantities of low value Tilapia at all scales of aquaculture
Phase in IP process (initial, maturity, independent)	Initial

Table 6: Aquaculture Innovation Platform, Low value Tilapia in Fish Meal, Niger State

IP Name	*Aquaculture Innovation Platform*
Entry Point or value chain (VC)	Improved fish meal production
Innovations (technical or social and economic innovations)	Low value Tilapia spp. feeding in fish farms as food for carnivorous species such as catfish and megalops. Freshwater Tilapia (O. niloticus) and Clupeid (P. afzeliuzi) were two species identified.
Location (name and GPS coordinates in UTM or degrees)	Niger state
Intervention areas (regional/province/district/…)	Niger state, North Central region
IP webpage:	Not available
Participating villages	Not available
Date IP establishment	2010
Institutions setting up the IP	RIU Nigeria, National Institute for Freshwater Fisheries Research (NIFFR), feed millers, fish farmers, policy makers, private sector representatives and non-governmental organizations
Funding agents	RIU Nigeria, NIFFR, participating state governments
Number of years activities on the ground	2010 till date
IP is still active or not	Active
Facilitators(names and contacts)	J O Olokor Head Fisheries Technology Division A Raji National Institute for Freshwater Fisheries Research; J. O. Apochi Assistant Director (Fisheries), Agricultural Research Council of Nigeria

IP members (regrouped by VC actors and sectors)	feed millers, fish farmers, researchers and NGOs
Opportunities addressed	Feed constitutes about 70% of aquaculture production cost. Fish meal accounts for more than half the cost of fish feed in aquaculture business.
Achievements to date	• Formation of aquaculture platform consisting of feed millers, fish farmers, NGOs, scientists and fish processors • Members of IP pledged some of their facilities like farms, milling machines, staff etc. • bridging of the supply and demand gaps in fish production • Creation of awareness and linkage of farmers to sources of good quality fish seeds • reduction of post-harvest losses in the fishery business • Capacity of IP members enhanced on - stocking of ponds with fish, - water quality requirements for fishing, - best feeding methods, - identification of diseases and treatment, - harvesting and - minimization of post-harvest losses
Challenges	Clupeids were already in use and familiar to the farmers, but Tilapia was not commonly in use and had to be cultivated in adequate numbers as feed meal.
Sustainability issues	Adequate funding to continue the IP activities, post-RIU Nigeria
Phase in IP process (initial, maturity, independent)	Initial

Lessons learnt from aquaculture innovation platform

- Entry point: Improved fish meal production, using low value tilapia spp. feeding in fish farms as food for carnivorous species, such as catfish and megalops. Freshwater tilapia (*O. niloticus*) and Clupeid (*P. afzeliuzi*) were two species identified.
- Broad-based collaborations and consultations among stakeholders: Nigerian Institute for Oceanography and Marine Research, National Institute for Freshwater Fisheries Research,
- Everyone won:

- Tilapia-based fish meal reduces the cost of feed by about 30 per cent compared with imported fish feed;

- Empowerment of NIOMR to produce low value tilapia at own outstations, ARAC in Aluu and Buguma (Rivers State), NIOMR, Sapele (Delta State) and NIOMR, Badore (Lagos state)
- Empowerment of farmers to produce low value Tilapia as fish meal
- Creation of awareness and linkage of farmers to sources of good quality fish seeds
- reduction of post-harvest losses in the fishery business
- Capacity of IP members enhanced in:
  - stocking of ponds with fish
  - Water quality requirements for fishing
  - Best feeding methods
  - Identification of diseases and treatment

Plantain innovation platform in Nigeria[1]

Plantain is grown in the southern states of Nigeria for subsistence, as a cottage agro-industrial raw material (for chips) and as a provider of canopy for young Cocoa seedlings. Farmers are reluctant to scale up plantain production for fear of glut, since large agro-industrial use is uncertain. On the other hand, large agro-industrialists like Honeywell Flour Mills Limited lament the inadequate supply of plantain for its under-utilized machines. The entry point for the Plantain Innovation Platform is to link all stakeholders to ensure market access to farmers' plantain and adequate raw materials for various agro-industrial cadres.

Table 7: Plantain Innovation Platform, Osun State, Nigeria

IP Name	*Plantain Innovation Platform*
Entry Point or value chain (VC)	Improved plantain variety, market access, and agro-industrial raw materials
Innovations (technical or social and economic innovations)	Black Sigatoka disease by producing a resistant variety
Location (name and GPS coordinates in UTM or degrees)	South west states, initial pilot in Osun state.
Intervention areas (regional/province/district/…)	Southwest Nigeria
IP webpage:	Not available
Participating villages	Ago-Owu community
Date IP establishment	Friday the 26th of June 2015
Institutions setting up the IP	FARA, Ms Amah Delphine, a plantain researcher from IITA, Dr Latifou Idrissou, the West Africa Action site coordinator of Humidtropics program, Mr. Arowona of the Honeywell Flour

[1] FARA Supports the Take-off of Plantain Innovation Platform in Nigeria Action Area http://faraafrica.org/news-events.

	Mills Limited, farmer groups, Nigeria Institute of Horticultural Research (NIHORT), Central Bank of Nigeria, Bank of Agriculture
Funding agents	FARA
Number of years activities on the ground	Since June 2015
IP is still active or not	Still active
Facilitators(names and contacts)	Prof. Adeolu Ayanwale of Obafemi Awolowo University
IP members (regrouped by VC actors and sectors)	Farmers, Researchers, agro-processors, financial and development agencies.
Opportunities addressed	Better income for plantain farmers; Sure market for plantains; Sure raw materials for processors Employment generation at rural and urban sectors
Achievements to date	Launching of the platform ; linkages among VC actors
Challenges	Insufficient raw materials (plantain) for processors
Sustainability issues	The need to maintain the momentum developed at platform launching.
Phase in IP process (initial, maturity, independent)	Initial

Lessons learnt from the Plantain Innovation Platform

- Entry point: Improved plantain variety, market access, and agro-industrial raw materials
- Broad based consultations and collaborations among stakeholders: FARA, IITA, Humidtropics programme, the Honeywell Flour Mills Limited, farmer groups, NIHORT, Central Bank of Nigeria, Bank of Agriculture
- Everyone is expected to win at IP maturity :

- Better income for plantain farmers;
- Sure market for plantains;
- Sure raw materials for processors
- Employment generation at rural and urban sectors

Cocoa innovation platform[2]

Prior to the discovery of oil in Nigeria, cocoa was a leading foreign exchange earner and a major agro-industrial commodity. With the discovery and expansion of the Nigeria petroleum sector, cocoa and other cash crops began to take the back seat. However, with the renewed emphasis on growing the agricultural sector, different

[2] IITA. Catalyzing an innovative input supply system for Nigerian farmers, http://wpar12.iita.org/?p=2234

interventions have emerged and the cocoa subsector has been a beneficiary. One of the problems encountered by cocoa farmers in Nigeria has been the poor access to improved seedlings and associated inputs. FARA initiated a platform for addressing these and related problems, through IITA and CRIN. This platform includes IITA, CRIN, input dealers, and farmers. FARA was to support each IP with a loan of US$10,000 to jumpstart its activities.

WAAP-assisted Value Chain Innovation Platforms (VCIPs)

As part of the sustainability plan for RIU-assisted IPs in Nigeria, ARCN indicated plan to integrate the RIU-assisted cassava and aquaculture value chain innovation platforms into the World Bank-funded West African Agricultural Productivity Programme (WAAPP). Important partners in this plan are the Nigerian Institute for Freshwater Fisheries Research (NIFFR) in New Bussa, Niger State, and NRCRI, Umudike, Abia State. WAAPP-Nigeria reported assistance to the formation of what it described as Value Chain Innovation Platforms across 7 commodities and states in Nigeria. The VCIPs cover cassava, maize, mango, rice, sorghum, and yam. The details about these VCIPs were not available for this report, but their spread across the states as at 2014 is presented in table 8.

Table 8: WAAP-assisted Value Chain Innovation Platforms (VCIPs)

Commodity	*Places covered in Nigeria*	*Number of states covered as at October 1, 2014*
Aquaculture	Adamawa, Anambra, Abia, Akwa Ibom, Bauchi, Benue, Cross River, Ebonyi, Enugu, Federal Capital Territory, Kwara, Kaduna, Lagos, Niger, Ogun, Ondo, Oyo, Rivers	18
Cassava	Abia, Akwa Ibom, Benue, Cross River, Ebonyi, Enugu, Kogi, Kaduna	8
Maize	Bauchi, FCT, Gombe, Jigawa, Kaduna, Kano, Katsina, Kogi, Kwara, Niger, Oyo, Ondo	12
Mango	Pioneer Members	not indicated
Rice	Ebonyi, FCT, Kano, Jigawa, Niger	5
Sorghum	Bauchi, Gombe, Kaduna, Kano, Katsina, Niger, Jigawa	7
Yam	Cross River, Akwa Ibom, Ebonyi, Enugu, Niger, Rivers	6

Source: http://www.waapp.gov.ng/index.php/blog/innovation-platform

CONCLUSION

This study focused on the review of a few existing agricultural innovation platforms across different innovation domains. These include Cassava IPs, Cowpea storage IP, Cowpea crop/livestock IP, and Improved fish Meal IP, Cocoa IP and Plantain IP. The recurrent lessons across the IPs reviewed include the need to form broad based consultations and interactions among the value chain stakeholders for their mutual benefits. For example, through multi-stakeholder cooperation, the various IPs reviewed showed that farmers increase their income, secure market for their products; processors secure raw materials for their processing activities; intermediation guarantees credit availability to needy IP members; stakeholders have access to improved technologies and can make feedbacks available to the researchers; extension agents are on the same platform with the farmers, researchers and other technology dissemination stakeholders. On the Innovation platform, everyone appear to benefit.

STUDY **03**

Investments in Innovations for Agricultural Development and Food and Nutrition Security

INTRODUCTION

In Nigeria, agriculture is on the concurrent list, meaning that all tiers of government have the joint responsibility to ensure that agricultural policies are implemented. Public spending on agriculture in Nigeria is complicated by significant political realities. First, only the federal government funds agricultural research. Two, agriculture competes for funds at the federal and state levels with several other ministries, departments and agencies (MDAs). This retinue of ministries has resulted in bogus recurrent expenditure that leaves virtually little or no funds for real or capital activities such as agricultural research. Nigeria has consistently funded agriculture at less than the mandated Maputo minimum of 10%. A related dimension has been the asymmetric allocation of funds to services away from real activities. During the 2001-2005 periods, for example, the federal government expenditure went mainly to fertilizer procurement and subsidy, specifically 43.5% of the total allocation to agriculture (Omilola and Lambert, 2009). This means that all other agricultural programmes were denied their deserved emphasis, more so that the fertilizer distribution was riddled with inefficiencies and corruption.

Top on the issues confronting agricultural expenditure in Nigeria include the divergence between budgeted and actual spending, private sector roles in the funding of agricultural activities, and the relative share of agricultural spending in the total budget/spending in the economy. On the one hand, the agricultural sector is expected to perform such roles as ensuring food security, increasing productivity, export earnings, provision of agro-industrial raw materials and drive overall economic growth. On the other hand, the quality of agricultural policies and the political will to implement such policies at the federal, state and local levels make all the difference in the realization of the stated goals of the agricultural sector. For example, poor funding has bedevilled agricultural extension and agricultural research for decades despite lofty policy pronouncements (World Bank, 2013).

The Forum for Agricultural Research in Africa (FARA), in partnership with the German government, represented by the Centre for Development Research (ZEF) of the University of Bonn, under its 'One World No Hunger' initiative, is implementing the "Programme of Accompanying Research for Agricultural Innovations (PARI)." PARI is taking cognizance of the successes of research and innovation initiatives in African agriculture, and in consideration of the concept of integrated agricultural research for development (IAR4D) promoted by FARA, to build an independent accompanying research programme to support the scaling of agricultural innovations in Africa and thereby contribute to the development of the African agricultural sector.

The PARI programme was implemented together with the Agricultural Innovation Centres within the One World No-Hunger initiative.

The Programme of Accompanying Research for Agricultural Innovations collaborates with NARIs in 12 African countries (Benin, Burkina Faso, Ethiopia, Malawi, Nigeria, Mali, Ghana, Cameroon, Kenya, Togo, Tunisia, and Kenya) to coordinate activities in their respective countries. In 2015, the PARI activities focused on a situation analysis of agricultural innovations. Specifically, the situation analysis entailed:

1. An inventory of existing functional promising agricultural innovations in each country;
2. A scoping study of existing agricultural innovation platforms in each country;
3. An assessment of the state of national investment on agricultural innovation systems in each country.

Reports have been submitted in respect of specific objectives 1 and 2. This report attempts to address specific objective 3; it is presented as an assessment of the state of national investment on agricultural innovation system in Nigeria, to complement reports from other 11 participating countries in Africa.

METHODOLOGY

Data for this study came from published government reports, research reports and archived primary data. The data from published government reports include annual estimates of agricultural GDP, annual growth rates of the agricultural sector and subsector GDPs, annual growth rates of priority crops, annual productivities of priority crops, agricultural sector expenditure by government, and budgeted and actual spending on agricultural research. Taking advantage of the existing array of agricultural technologies already documented across the National Agricultural Research System (NARS) in Nigeria, much of the results presented in this report on research impacts were drawn from previously completed studies. Keeping in focus the agreed methodologies for the present study, the innovation domain for this report covers arable crops, tree crops, and livestock. Within these innovation domains, crop varieties and livestock breed are the specific technologies presented in this report.

In the studies reviewed (Phillip et al 2009; Phillip et al 2010; Phillip et al 2011), the fieldwork basically took samples of adopters and non-adopters from separate sampling frames across villages and LGAs in participating states, in relation to the agricultural technologies studied. Beyond the fieldwork, screening questions in the survey instruments helped to further determine who were the actual adopters and

non-adopters. The screening questions for each innovation/technology were: (i) not aware of innovation, (ii) aware, never tried, (iii) tried and dropped, (iv) tried, undecided, and (v) tried and adopted. Households who chose responses (i)-(iv) were post-classified as non-adopters, while selectors of response (v) were the adopters, irrespective of the initial sampling frame.

The results relating to the aggregate secondary data were presented using graphs, bar charts and percentages. The proportional contributions of yield and area to the total production of each crop in the review were computed as the ratio of the log of changes in the yield or area to changes in production between the relevant periods.

The agricultural research impact results presented utilized combinations of estimation tools, depending on the impact indicator and scope of each study. For aggregate level impact estimation, the economic surplus method (ESM) was employed under the assumption of parallel and non-parallel shifts in the aggregate supply curve. Time series data was available for the period 1997-2008. Parallel supply shift (Masters et al, 1996) and non-parallel supply shifts (Akino and Hayami, 1975) were examined under further assumptions about demand and supply elasticities. The ESM enabled us to estimate aggregate monetary gains to producers, consumers and the society, and the rate of return to agricultural research in selected value chains. At the household level, evidence of poverty reduction arising from technology adoption was provided using the procedure by Foster et al (1984). Furthermore, we used the non-experimental matching (specifically the nearest neighbour) procedures to demonstrate the monetary gains at the household level when technologies were adopted. We have computed the average treatment effects (ATE) and the average treatment effects on the treated (ATT). The ATE estimates relate to the full sample (adopters plus non-adopters), while the ATT estimates are for the effects on the adopters only. As a supplementary analysis, simple independent sample t-tests were carried out to compare the mean number of household assets between adopters and non-adopters of indicated technologies.

RESULTS

Trends in agricultural sector expenditure

The agricultural sector budget and/or spending, as a percentage of the total national budget/spending in Nigeria, had been mostly in the single digits in the post-independence period. Because this phenomenon had been the pattern across sub-Sahara Africa (SSA), the African heads of government in 2003 encouraged member nations to increase the budget and expenditure on agriculture to at least 10% of the

national total per annum. The aim was to grow agriculture to at least 6% per annum in each of the member countries in the years following 2003.

Table 1 and figure 1 show the public agricultural spending as a percentage of the total public expenditure in Nigeria, as estimated by ReSAKSS (1995-2010) and FAO (2003-2012). Relative to the Maputo reference line of at least 10%, both data series suggests that agricultural spending as a percentage of the total national expenditure largely remained below 10% per annum during the periods under review. The only exception was in 1999 (ReSAKSS data), during which 11.3% of the total national expenditure was devoted to agriculture. Indeed, during the 1995-2010 period, agricultural spending averaged 4.9% per year (ReSAKSS), while the average was 3.6% per annum during the 2003-2012 period, based on the FAO data source.

Table 1. Public agriculture expenditure as % of total public expenditure, Nigeria, ReSAKSS and FAO estimates

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
ReSAKSS estimate	3.6	3.2	1.1	3.2	11.3	1.6	6.4	4.6	3.4	5.7	6.1	6.9	5.2	4.5	5.3
FAO estimate									1.3	3.3	4	5.3	5.2	5.3	4.7

Sources: ReSAKSS (2013) and FAO (2015)

The agricultural budget process

Prior to the year 1975, the funding of agricultural research in Nigeria was a collective effort between the state and federal governments. Since the mid-1970s, however, the federal government assumed full responsibility for the funding of agricultural research in Nigeria. This development was probably well-intended. However, a few unintended results emerged. First, the total allocation to the National Agricultural Research Institutes (NARIs) has remained largely unstable and on the decline in real terms over the years. Recurrent allocations are well ahead of capital allocations for most years, with the result that inadequate fund is left for agricultural research. The budgetary process is cumbersome and release of funds is fragmented.

Apart from the relatively low fund allocation to agriculture, the budget appropriation process is a problem. Agriculture is time bound, especially for crop production activities. While appropriation occurs at a single point in time, funds are released on a monthly basis to the MDAs in a manner that bears little or no relevance to the agricultural calendar. This complicates long-term agricultural research investment. It also makes difficult the procurement of critical inputs like fertilizer ahead of the

planting season. Under the ATA, private sector participation was anticipated to address this problem.

Private sector and donor roles in the Nigerian agricultural sector

Donor funds can constitute a substantial contribution to agricultural investment, depending on how they come. The relevant issues here are the proportion of the donor funds in the total agricultural spending and the proportion of the donor funds that a country actually spends on agriculture. The work of Omilola and Lambert (2009) shows that during the 2002-2007 period, Nigeria allocated less than 1% of the total donor aids to agriculture.

Agricultural research funding by the private sector is almost non-existent in Nigeria. Being a public good, agricultural research outputs in Nigeria are available to everyone, including the private sector, at virtually no cost. Perhaps, one exception has been the multiplication of proven varieties of improved seeds (or breeds of livestock) which a few private companies take up for commercialization. In this regard, years of political instability, piecemeal release of research funds and unclear trade and other policies have limited long-term private investment in agricultural research and commercialization. The long duration required for basic and adaptive research before the release of technologies for adoption is also a reason for low private sector participation in agricultural research funding.

Private sector pledge to support the ATA stood at over US$8billion. Notable among the private sector giants were Cargill, Dangote Group, SAB Miller, AGCO, Coca Cola, Syngenta, Nestle and Flour Mills of Nigeria. A significant support was also pledged for the ATA by donors, including China Development Bank ($1 billion), World Bank ($300 million), AfDB ($200 million), IFAD ($574million), UNDP ($5.5 million), DFID UK-AID (£130,000), Bill & Melinda Gates Foundation($6.4 million) and Ford Foundation ($750,000). These funds, some of which are grants, were pledged for the promotion of specific programmes under the ATA (FMARD, 2013). Donor commitments were probably linked to international confidence in Nigeria's democratic process that began and endured into the implementation of the ATA. Table 2 provides specific details.

Trends in agricultural research expenditure

The prospect of poverty reduction in most developing countries has been widely linked to increase in agricultural productivity. In turn, agricultural productivity is critically linked to getting tangible results from agricultural research. Indeed, agricultural research needs to produce adoptable and beneficial innovations that will

ultimately impact on rural and urban income and poverty indices. All these aspirations were linked to national spending on agricultural research.

Table 2: A cross section of the donor resources pledged to the ATA

S/No.	*Donor /Investor*	*Area of investment*	*Estimated amount committed or being negotiated*
1	China Development Bank	100 rice mills and18 large high quality cassava plants	$1 billion
2	World Bank	FADAMA III; rice, cassava and horticulture value chains; infrastructure; linkage between research and extension; expansion of asset acquisition to promote gender and youth empowerment; and operational framework for Staple Crop Processing Zones	$150 million
3	World Bank	CADP; staple crop value chains of rice, cassava and sorghum by focusing on SCPZ support in the following areas: agro-processing and marketing; rural infrastructure; rural energy; development to outgrower schemes; and capacity building, including monitoring and evaluation.	$150 million
4	AfDB	Value chain work on cocoa, rice, sorghum and cassava.	$200 million
5	IFAD	Value chain work in cassava and rice in Ogun, Niger, Taraba, Benue, Ebonyi and Anambra States.	$74million
		Rice, cassava, cocoa, sorghum and cotton value chain activities.	$500,000grant
6	UNDP	Value chain support, technical advice and other activities is underway	$1.5 million grant
		Five advisors (provided by Bill &Melinda Gates Foundation)	$5million grant
7	DFID UK-AID	Two senior advisors (value chains, operations) and we are developing the terms of reference for a food security and nutrition advisor	£130,000
8	Bill & Melinda Gates Foundation	Short-term support for two advisors and to UNDP for five advisors	$5million
		Cassava: Adding Value for Africa (CAVA); implemented in Nigeria, Ghana, Malawi, Tanzania and Uganda (Coordinated by the Natural Resources Institute, Greenwich University, UK); lasted till 2012.	$1.4 million (Nigeria component)
9	Ford Foundation	Technical assistance and a stakeholders' conference	$750,000

Sources: FMARD (2013)

Nigeria's public spending on research and development per $100 of agricultural output has been low over time, and peaked at $0.81 in 1981, according to Beintema and Ayoola (2004). Table 3 and figure 2 provide some evidence. As shown, agricultural research spending stayed at less than $0.60 per $100 output during the 2000-2010 period.

Table 3. Agricultural research spending per US$100 output, Nigeria, 2000-2010

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Agric research spending per US$100	0.41	0.52	0.31	0.32	0.38	0.31	0.35	0.35	0.42	0.33	0.24

Source: FAO (2015)

Table 4 and figure 3 show that capital and recurrent fund appropriations were generally low from 1995 to 1999, compared to the subsequent years analyzed. There was a consistent rise over time in the nominal amount of capital and recurrent funds appropriated and released to the NARIs and Federal Colleges of Agriculture (FCAs). The key points to note from table 4 and figure 3 are the general volatility of capital appropriation and release from year to year. The released capital and recurrent funds were in most years far below appropriated amounts. But there were few exceptions in which released recurrent funds either matched or surpassed the amount appropriated. Beyond the general volatility already noted, there was a general improvement in agricultural research funding, at least nominally, over the years considered.

As shown in table 5 and figure 4, the percentage of recurrent appropriations released occasionally exceeded the appropriated amounts. Perhaps, for political reasons and to curb staff agitation, recurrent funds, which are largely salaries and benefits, hardly suffer withholding like capital funds. Ironically, capital funds are the basis for funding agricultural research and extension in Nigeria. During the 1995-2007 period under review, 52% of the capital appropriation was released, compared to the release of 92% of the recurrent appropriations.

Trends in agricultural sector performance

In this section, we will examine several indicators of the performance of the Nigerian agricultural sector. These include the percentage contribution to the total GDP by agriculture and its subsectors, growth rates of the GDP of agriculture and subsectors, growth rates of priority crops, and trends in the productivities of priority crops.

Table 4. Total capital and recurrent appropriation and release, Nigeria, NARIs, 1995-2007, N' billion (LCU)

Year	Total capital appropriated	Total capital released	Total recurrent appropriated	Total recurrent released	%capital released	%recurrent released
1995	0.0508	0.0581	0.234	0.24	114.4	102.6
1996	0.0823	0.0831	0.204	0.19	101.0	93.1
1997	0.1835	0.1165	0.204	0.244	63.5	119.6
1998	0.352	0.138	0.459	0.415	39.2	90.4
1999	0.428	0.127	1.019	0.732	29.7	71.8
2000	0.954	0.1975	1.172	1.126	20.7	96.1
2001	0.597	0.351	1.587	1.949	58.8	122.8
2002	2.067	0.121	1.985	1.5824	5.9	79.7
2003	1.695	0.3366	2.257	1.5383	19.9	68.2
2004	3.058	1.0593	2.384	1.7664	34.6	74.1
2005	0.872	0.65	3.2	2.1789	74.5	68.1
2006	1.187	0.679	3.804	3.774	57.2	99.2
2007	1.104	0.642	4.149	4.425	58.2	106.7

Source: Participating National Agricultural Research Institutes (NARIs) and Federal Colleges of Agriculture (FCAs)

Percentage contribution to the total GDP by agriculture and its subsectors

Table 6 and figure 5 show the percentage contribution to the total GDP by agriculture and its subsectors during the 1995-2013 period. The average contributions to the total GDP during the period were 39.0% (agriculture), 34.5% (crop), 3.0% (livestock), 0.6% (forestry) and 1.4% (fishery) (see figure 6). Thus, the crop subsector dominated the contribution of agriculture to the total GDP during the period under review. This is vividly shown in figure 5, in which the crop GDP trend stays close to the agriculture GDP, while it dwarfs the plots for the other subsectors. This is consistent with the view (World Bank, 2013) that the prospect of increasing agricultural income and reducing poverty in Nigeria rest critically in enhancing the productivity of the food crops.

Table 6: Percent contribution of agricultural subsectors to total GDP at 1990 Constant Basic Prices (1995-2013)

	Agriculture	*Crop*	*Livestock*	*Forestry*	*Fishery*
1995	34.2	28.7	3.6	0.9	1.1
1996	34.1	28.5	3.5	0.8	1.3
1997	34.6	28.9	3.5	0.8	1.4
1998	35.0	29.2	3.5	0.8	1.5
1999	36.7	30.6	3.6	0.8	1.7
2000	35.8	29.9	3.5	0.8	1.7
2001	34.3	28.6	3.3	0.7	1.7
2002	43.9	39.0	2.9	0.6	1.5
2003	42.6	38.0	2.7	0.6	1.4
2004	41.0	36.5	2.6	0.5	1.4
2005	41.2	36.7	2.6	0.5	1.4
2006	41.7	37.2	2.6	0.5	1.4
2007	42.0	37.5	2.6	0.5	1.4
2008	42.1	37.6	2.7	0.5	1.4
2009	41.8	37.3	2.7	0.5	1.4
2010	40.9	36.4	2.6	0.5	1.3
2011	40.2	35.8	2.6	0.5	1.3
2012	39.2	34.8	2.6	0.5	1.3
2013	39.0	44.4	3.3	0.6	1.7
Ave.	39.0	34.5	3.0	0.6	1.4

Source: Central Bank of Nigeria, Annual Reports and Statistical Bulletin, various years

Table 5. Percent of capital and recurrent appropriations released to NARIs, 1995-2007

Year	%capital released	%recurrent released
1995	114.4	102.6
1996	101.0	93.1
1997	63.5	119.6
1998	39.2	90.4
1999	29.7	71.8
2000	20.7	96.1
2001	58.8	122.8
2002	5.9	79.7
2003	19.9	68.2
2004	34.6	74.1
2005	74.5	68.1
2006	57.2	99.2
2007	58.2	106.7

Source: Participating National Agricultural Research Institutes (NARIs) and Federal Colleges of Agriculture (FCAs)

Growth rates of the GDP of agricultural sector and subsectors

Table 7 and figure 6 show the annual growth rates of GDP of agriculture, agricultural subsectors and total GDP during the 2000-2011 period. Going by the 6% annual growth rate benchmark anticipated by CAADP, the available data suggests that agriculture and its subsectors grew appreciably within this benchmark during the period under review. Indeed, figure 7 shows that during the 2000-2011 period, the annual growth rates of the GDP averaged 6.1% (agriculture), 5.9% (crops), 5.6% (livestock), 4.9% (forestry) and 6.0% (fishery). Total GDP grew at 7.0% per annum during the 2003-2011 period.

Table 7: Annual growth rates of GDP of agriculture, agricultural subsectors and total GDP

	Agriculture	*Crops*	*Livestock*	*Forestry*	*Fishery*	*Total GDP*
2000	3	3	2.3	1.5	4	
2001	3.8	3.8	3	2	8	
2002	4.2	4.2	4.8	0.7	6.3	
2003	6.64	7	4.2	1.5	4.1	9.57
2004	6.5	6.5	6.5	6.5	6.5	6.58
2005	7.06	7.13	6.76	5.92	6.02	6.51
2006	7.4	7.49	6.9	6.02	6.55	6.03
2007	7.19	7.25	6.91	6.02	6.58	6.5
2008	6.54	6.52	6.89	5.97	6.52	6
2009	5.94	5.9	6.5	5.85	6.03	6.7
2010	7.9	5.7	6.5	5.9	6	7.9
2011	7.4	5.7	6.2	5.9	5.9	7.4
Ave.	6.1	5.9	5.6	4.9	6.0	7.0

Source: Central Bank of Nigeria, Various Annual Reports; National Bureau of Statistics, Statistical Bulletin, Various editions

Growth rates of selected priority food and cash crops

The annual growth rates of selected priority food and cash crops are presented in table 8 and figure 8, respectively. The annual growth rates presented most likely drove the agricultural sector and crop subsector GDP growth rates, which exhibited comparable growth rates, though for slightly different data periods. Figure 9 shows that during the 2006-2011 period, the annual growth rates of the priority cash and food crops averaged 5.9% (sorghum), 6.7% (rice), 7.1% (maize), 8.3% (cassava) and 6.5% (cocoa).

Table 8. Annual growth rates of priority food and cash crops (%), 2006-2011

	Sorghum	Rice	Maize	Cassava	Cocoa
2006	6.1	6.9	6.9	10.8	5.7
2007	5.9	7.7	7.1	7.4	5.5
2008	6	7.3	7	9.1	5.6
2009	8.1	9.1	9.1	9.4	7.2
2010	4	4	5.9	6.9	6.6
2011	5.4	5	6.5	6	8.3
Ave.	5.9	6.7	7.1	8.3	6.5

Trends in the national annual yields of priority food crops

As part of the evaluation of the country-level performance of the agricultural sector, we now examine the trends in annual yields of priority food crops, namely maize, sorghum, rice and cassava. Table 9, and figures 10 and 11 present the available annual yields of the crops for the 1990-2013 period. We have plotted the cassava yields separately in figure 11 to avoid dwarfing the trends in the cereal crops (figure 10), because of the bulkiness of cassava tubers. In figures 10 and 11, we have added attained yields of the crops under on-farm research. As demonstrated, there are still considerable gaps between realized and realizable yields of the crops under review.

Likely sources of growth in the Nigerian agricultural sector

We have already shown in this report that during the different periods under review, the crop subsector drove the agriculture GDP: agriculture and most of its subsectors grew at an annual average of about 6%, and the constituent priority and cash crops grew at 6% or higher per annum. But we have also shown that there is a considerable gap between realized and realizable yields of all the crops under review. So, what is the source of the recorded growth of Nigerian agriculture, its subsectors and constituent commodities? To attempt answering this question, we have computed the percentages contributed to the observed production of each priority food crop by area and yield. Table 10 shows the results on regional and national basis between 2000/2002 and 2007/2009. Much of the reported growth performances were largely attributed to area expansion during the review period, and less so for productivity increases. The only exceptions, as shown in table 10, of yield-induced production increase are cassava (south-south), rice (north east and north west) and sorghum (north central). More recent data in the format presented will help to further update this claim.

Table 9: Average yields of maize, sorghum, rice under farmer and on-farm trial conditions, t/ha, 1990-2013

Year	Maize	Sorghum	Rice	cassava
1990	1.13	1.00	2.07	11.65
1991	1.13	0.97	1.95	10.19
1992	1.12	1.08	1.96	10.59
1993	1.18	1.08	1.96	10.59
1994	1.27	1.08	1.42	10.59
1995	1.27	1.15	1.63	10.67
1996	1.33	1.14	1.75	10.66
1997	1.25	1.11	1.60	11.88
1998	1.32	1.13	1.60	10.75
1999	1.60	1.13	1.50	9.60
2000	1.30	1.12	1.50	9.70
2001	1.40	1.10	1.30	9.60
2002	1.49	1.10	1.34	9.90
2003	1.50	1.16	1.41	10.40
2004	1.60	1.22	1.42	11.00
2005	1.66	1.26	1.43	10.99
2006	1.82	1.35	1.48	12.00
2007	1.70	1.16	1.30	11.20
2008	1.96	1.22	1.75	11.80
2009	2.20	1.11	1.93	11.77
2010	1.85	1.44	1.84	12.22
2011	1.53	1.41	1.77	14.02
2012	1.81	1.25	1.80	14.03
2013	2.00	1.22	1.81	14.03

Source: FAO (2015)

The morale of the foregoing results is evident. If agriculture contributed about 40% of the total GDP and was driven by the crop subsector, whose growth was largely determined by area rather than productivity increase, then there is an enormous potential for an expanded role of the agricultural sector in the Nigerian economy. The wide gap between realized and realizable crop yields needs to be narrowed or erased. To achieve this requires new platforms for generating, disseminating and using the wide array of agricultural technologies in Nigeria. There is a need for a common platform that embraces all the groups or actors along each value chain.

Table 10: Percentage contribution of area ('000ha) and yield (t/ha) to observed production ('000mt), between 2000/2002 and 2007/2009, national regions and Nigeria

Regions	***Commodities***							
	Cassava		*Maize*		*Rice*		*Sorghum*	
	Area %	*Yield %*	*Area %*	*Yield %*	*Area %*	*Yield %*	*Area %*	*Yield %*
North central	79.1	20.9	54.7	45.3	67.9	32.1	-3.4	103.4
North east	82.9	17.1	132.6	-32.6	12.2	87.8	478.5	-378.5
North west	94.5	5.5	202.3	-102.3	46.1	53.9	110.6	-10.6
South east	97.1	2.9	171.7	-71.7	82.0	18.0	NA	NA
South south	30.3	69.7	124.0	-24.0	101.3	-1.3	NA	NA
South west	78.2	21.8	94.1	5.9	129.7	-29.7	104.4	-4.4
NIGERIA	57.5	42.5	121.8	-21.8	85.5	14.5	156.9	-56.9

NA: Not applicable; commodity not grown in the zone.

Selected Indicators of Agricultural Research Impacts in Nigeria

This section presents some available estimates of the impact of agricultural research using a cross section of adopted technologies as reference. The results presented include both aggregate and household level evidence of agricultural research impacts.

Aggregate social gains from agricultural research

a. *Parallel Shifts in Aggregate Supply Response*

Table 11 shows the estimated aggregate annual monetary gains or losses associated with the adoption of indicated varieties of five agricultural commodities under varying assumptions of demand elasticity and parallel supply shift. With an elastic demand, the adoption of SAMMAZ 11 variety of maize resulted in an average annual gain of ₦4.6billion for the consumers and ₦12.6billion for the producers. Still assuming an elastic demand, the adoption of the Faro 51 variety of rice resulted in the average annual gain of ₦2.6billion for the consumers and ₦8.2billion for the producers. Other results under an elastic demand scenario can be similarly interpreted from table 11. But, it is noteworthy that under an inelastic demand scenario, the producers tend to lose while the consumers gain on the aggregate from technology development and adoption. The values enclosed in brackets under inelastic demand for cocoa, wheat and sugar cane represents aggregate annual losses to the farmers. In general, producers gain more from innovation than consumers under elastic demand; the converse is the case when demand is inelastic.

Table 11. Aggregate monetary impact of innovation adoption (1997-2008)

Commodity	***Technology***	***Average annual monetary gains/losses from technology adoption per annum***			
		Elastic demand		*Inelastic demand*	
		Consumers	*Producers*	*Consumers*	*Producers*
Maize	SAMMAZ 11	₦4,608,957,614	₦12,571,393,310		
Millet	Millet: LCIC-MV-1	₦3,154,888,562	₦9,202,762,044		
Rice	Faro 51	₦2,584,195,496	₦8,151,277,427		
Oil palm	Tenera	₦888,040,498.7	₦2,608,437,082		
Irish potato	Nicola	₦229,897,531.4	₦679,376,264.5		
Cocoa	Precocity	₦1,204,873,224	₦1,577,187,195	₦3,754,237,411	(₦692,941,514.80)
Wheat	LACI WHIT 1 (SERI M82)	₦99,438,219.23	₦139,244,039.7	₦313,241,840	(₦44,705,216.13)
Sugarcane	NCS-001	₦796,383,962	₦1,211,112,344	₦2,544,675,029	(₦226,132,437.30)

b. *Non-Parallel Shift in Aggregate Supply Response*

Table 12 shows the estimated aggregate annual monetary gains or losses associated with the adoption of indicated varieties of okra, cowpea, cassava and rice, under the assumptions of inelastic demand and non-parallel supply shift. The results were computed by cumulating yield gains between consecutive varieties of each crop. The average monetary gain per annum was ₦297.9million for consumers and ₦881.9million for producers of okra, arising from cumulative yield increases. The corresponding average aggregate gains from cowpea varietal improvement is ₦69.3billion for consumers and ₦43.1billion for producers. Consumers, on the average, gained ₦277.8billion while, the producers lost, on the average, ₦44.8billion from the adoption of the available cassava varieties. Similar computations over five varieties of rice showed an average annual gain of ₦660.9billion for the consumers and ₦64.1billion per annum for the producers. Again, as shown under the parallel supply shift assumption, producers gain less on the aggregate than the consumers from technical change, when inelastic demand is assumed.

Table 12. Aggregate monetary impact of technology adoption

Commodity	Technology	Assumptions	Annual gains or losses per annum (LCU)	
			Consumers	Producers
Okra 1998-2008	Varieties: local, NHA e 47-4 and LD-88	yield gains cumulated over improved varieties; constant inelastic demand and supply	₦797,940,032.94	₦881,942,061.31
Cowpea 1991-2008	Varieties: local, Ife Brown (latter preferred over local)	yield gains cumulated over improved varieties; constant inelastic demand and supply	₦69,353,093,932.18	₦43,050,537,404.28
Cassava 1992-2008	Varieties: NR 8082 gained over TMS 30372	yield gains cumulated over improved varieties; constant inelastic demand and supply	₦277,797,417,636.59	₦ (44,774,893,163.87)
Rice 1998-2008	Varieties: FARO 44 and FARO 52; FARO 55 gained over FARO 46 and FARO 48	yield gains cumulated over improved varieties; constant inelastic demand and supply	₦660,988,685,964.52	₦64,087,139,856.70

Rates of returns on agricultural research using ESM (1997-2008)

Table 13 shows the rates of return to agricultural research in respect of the technologies presented in table 11 for maize, wheat, Irish potato, rice and oil palm. With at least 30% rate of return to the research investment indicated for these technologies, there is a considerable potential for aggregate gains if more funds are allocated to agricultural research, development and dissemination in Nigeria.

Table 13. Rates of return to agricultural research

Commodity	Technology	Elasticity scenario	Rate of return (%)
Maize	Sammaz 11	Elastic supply Inelastic demand	34
Wheat	LCIC-MV-1	Inelastic supply & demand	43
Irish potato	NICOLA	Inelastic supply & demand	33
Rice	FARO 51	Elastic supply Inelastic demand	35
Oil palm	Tenera	Inelastic supply & demand	31-42

Micro-level Impact Results

Some evidence of technology adoption

It is now fairly accepted that a beneficial innovation is one that was 'released' to the end users and actually in use (adopted). Table 14 shows the adoption rates of some technologies across the studies reviewed. A farmer is likely to adopt a technology

that has been proven by him/her to be beneficial. The methodologies generating the adoption rates in table 14 differed among the sources reviewed: some were computed based on the percentage of farmers adopting, while others were based on the area of land under a crop-based technology. Some innovations are shown to be associated with 50% or higher adoption rates. Included in this category are cassava TMS30572 (69%), Coconut GREENDWARF (69%), cowpea SAMPEA6 (87.8%), cowpea IFE BROWN (86.3%), millet LCIC-MV-1 (51.2%), rice FARO51 (50%), rice FARO 44 (59.4%), soybean TGX-1448-2E (87%), tomato JM94/54 (72%), wheat LACI-WHIT-1 (52%) and yam MINISETT (78%). These and other values of adoption rates suggest that varying amounts of benefits have accrued from the listed technologies.

Table 14. Innovations with evidence of adoption

Commodity name	*Innovation name*	*Adoption rate %*	*Commodity name*	*Innovation name*	*Adoption rate %*
Cassava	Cassava stem storage	2	Rice Lowland	FARO 44	59.4
Cassava	TMS30572	69	Rice Lowland	FARO 52	13.8
Cassava	NR8082	31	Rice Upland	FARO46/ITA150	12.8
Chicken (layers)	SHIKABROWN	49-86.7	Rice Upland	FARO48/ITA301	7.9
Cocoa	PRECOCITY	56	Rice Upland	FARO55/WAB-1-B-P38-HB	6.2
Coconut	GREENDWARF	69	Rice Upland	NERICA-1/WAB-450-1-B-P38-HB	42
Cowpea	SAMPEA6	87.8	Rice Upland	WAB 189	23-46
Cowpea	SAMPEA8	12.2	Rice Upland	ITA 150	46
Cowpea	IFE BROWN	86.3	Rice Upland	NERICA 2	14
Cowpea	IFE BPC	9.6	Sorghum	SAMSORG38	27.9
Fish	IMPROVED_BANDA	44	Sorghum	SAMSORG39	16.1
Gum Arabic	ACACIA SENEGAL	40	Sorghum	SAMSORG40	13.5
Irish Potato	NICOLA	51	Sorghum	SAMSORG41	42.6
Maize	SAMMAZ11	32	Soyabean	TGX-1448-2E	87
Millet	LCIC-MV-1	51.2	Sugar Cane	NCS-001	48
Oilpalm	TENERA	64	Tomato	JM94/54	72
Okra	NHAE47-4	9.9	Wheat	LACI-WHIT-1	52
Okra	LD-88	37.1	Yam	MINISETT	78
Rice	FARO51	50			

Non-experimental matching estimators of research / adoption impact

Table 15 shows the nearest neighbour estimators of the effect of technology adoption on the household income and expenditure. We have computed the average treatment effects (ATE) and average treatment effects on the treated (ATT). The ATE estimates relate to the full sample (adopters plus non-adopters), while the ATT estimates are for the effects on the adopters only.

Among the coconut growing households, expenditure increased by ₦69,374.27 (p>|z|=.001), while income increased by ₦178,620 (p>|z|=.027) among the full sample. Among the green dwarf adopters, however, expenditure increased by ₦78,656.90 (p>|z|=.009), while income increased by ₦150,726.70 (p>|z|=.063). Among the soybean growing households, expenditure increased by ₦91,620.44 (p>|z|=.001), while income increased by ₦142,239.60 (p>|z|=.001) among the full sample. Among the TGX-1448-2E variety adopters, however, expenditure increased by ₦120,851.40 (p>|z|=.000), while the effect on income was not statistically significant. Among the adopters of the JM94/54 variety of tomato, expenditure was estimated to increase for the household by ₦139,532.90 (p>|z|=.02). Among the adopters of the Minisett variety of yam, expenditure was estimated to increase for the household by ₦406,982.80 ((p>|z|=.067).

Table 15: Monetary impact of innovation adoption at the household level

Innovation domain	*Name of commodity*	*Name of innovation*	*Monetary benefits of adoption (LCU)*
Crop	Coconut	Green gwarf	ATE: increase in expenditure by ₦69,374.27 (p>|z|=.001) and increase in income by ₦ 178,620 (p>|z|=.027) due to adoption; ATT: expenditure of the adopters increases by ₦78,656.90 (p>|z|=.009), while the income increases by ₦150,726.70 (p>|z|=.063);
Crop	Soybean	TGX- 1448-2E	ATE: increase in expenditure by ₦91,620.44 (p>|z|=.001) and increase in income by ₦142,239.60 (p>|z|=.001) due to adoption; ATT: expenditure increase of ₦120,851.40 (p>|z|=.000).
Crop	Tomato	JM94/54	ATT: expenditure of adopters increases by ₦ 139,532.90 (p>|z|=.02).
Crop	Yam	Minisett	ATE: increase in expenditure by ₦ 406,982.80 ((p>|z|=.067) due to adoption.

Effects of agricultural research on poverty incidence

Table 16 shows the incidence of poverty among the adopters and non-adopters of the indicated innovations, using the FGT (1984) computational approach. The results uniformly show that technology adoption lowers the incidence of poverty among the households in the study. Figure 12 provided further illustration.

Table 16. Aggregate monetary impact of innovation adoption

Innovation domain	*Name of commodity*	*Name of innovation*	*Poverty incidence (%)*
Crop	Coconut	Green dwarf	Adopters: 26% Non-adopters : 64%
Crop	Soya bean	TGX- 1448-2E	Adopters: 78% Non-adopters : 100%
Crop	Tomato	JM94/54	Adopters: 63% Non-adopters : 78%
Crop	Yam	Minisett	Adopters: 44% Non-adopters : 58%

Effects of agricultural research on household assets

Simple independent sample t-tests were carried out to compare the mean number of household assets between adopters and non-adopters of indicated technologies. The average number of the assets found among the households was higher among the adopters, and statistically significant (see table 17). Such assets include bicycles, motorcycles, radio, goats, sheep, cattle, poultry, beds/mattresses and houses.

Table 17. Effects of innovation on household assets

Innovation domain	*Name of commodity*	*Name of innovation*	*Effects of innovation*
Crop	Cocoa	Early bearing variety (Precocity) Released: 2004	Number of goats, cattle, bed /mattresses increased due to adoption
Crop	Wheat	LACI WHIT-1 Released:1997	Number of bicycles, goats, sheep, cattle, poultry and houses increased due to adoption
Crop	Sugar cane	NCS-001 Released 1997	Number of bicycles, motorcycles, radio, goats, sheep, cattle, poultry, beds/ mattresses, houses, increased due to adoption
Crop	Gum Arabic	*Acacia senegal* Released 1997	Number of goats, sheep, cattle, poultry and houses increased due to adoption

Source: Phillip et al. (2010)

CONCLUSION

This study reviewed the state of national investment on agricultural innovation system in Nigeria. Combinations of aggregate time series and household level data were employed in the report. During the 1995-2010 period, agricultural spending as a percentage of the national total averaged 3.6-4.9% per year from two data sources. This is quiet low, relative to the recommended minimum of 10% per annum. Agricultural research spending stayed at less than $0.60 per $100 output during the 2000-2010 period, contrary to the expected minimum of $1.00 per $100 output under the CAADP framework. There was a consistent rise over time in the nominal amount of capital and recurrent funds appropriated and released to the NARIs and Federal Colleges of Agriculture (FCAs). However, the percentage of the appropriated capital released was much lower than the percentage of the appropriated recurrent released during the period reviewed. Ironically, capital funds drive agricultural research in Nigeria.

The average contributions to the total GDP during the 1995-2013 period were 39.0% (agriculture) and 34.5% (crop), suggesting that the prospect of increasing agricultural income and reducing poverty in Nigeria rest critically with enhancing the productivity of the food crops. During the 2000-2011 period, the annual growth rates of GDP averaged 6.1% (agriculture), 5.9% (crops), 5.6% (livestock), 4.9% (forestry) and 6.0% (fishery). Considerable gaps were shown between the realized and potentially attainable yields of the priority crops, namely: rice, maize, sorghum and cassava. For example, while the attainable yield of cassava is 25-30 mt/ha, the realized yield under the farmers' conditions remains 10-14 mt/ha. It was of little surprise, therefore, that between 2000/2002 and 2007/2009, we demonstrated that much of the reported growth performances were largely attributed to area expansion and less so for productivity increases.

At least, 30% rate of return to agricultural research investment was indicated for selected innovations, suggesting a considerable potential for aggregate gains if more funds were allocated to agricultural research, development and dissemination in Nigeria. Both ATE and ATT estimates suggest household gains in terms of the average income and expenditure arising from agricultural technology generation and adoption. Poverty reduction was also indicated for the technology adopting households over the non-adopters based on the available data.

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APPENDICES

Appendix 1: Figures

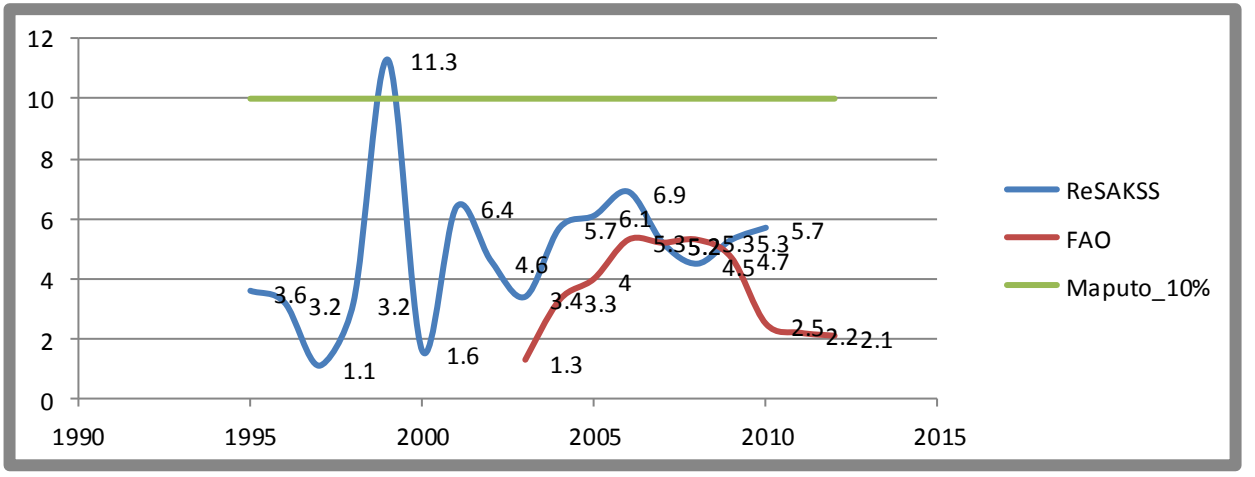

Figure 1. Public agricultural expenditure as % of total public expenditure, Nigeria
Sources: ReSAKSS (2013) and FAO (2015)

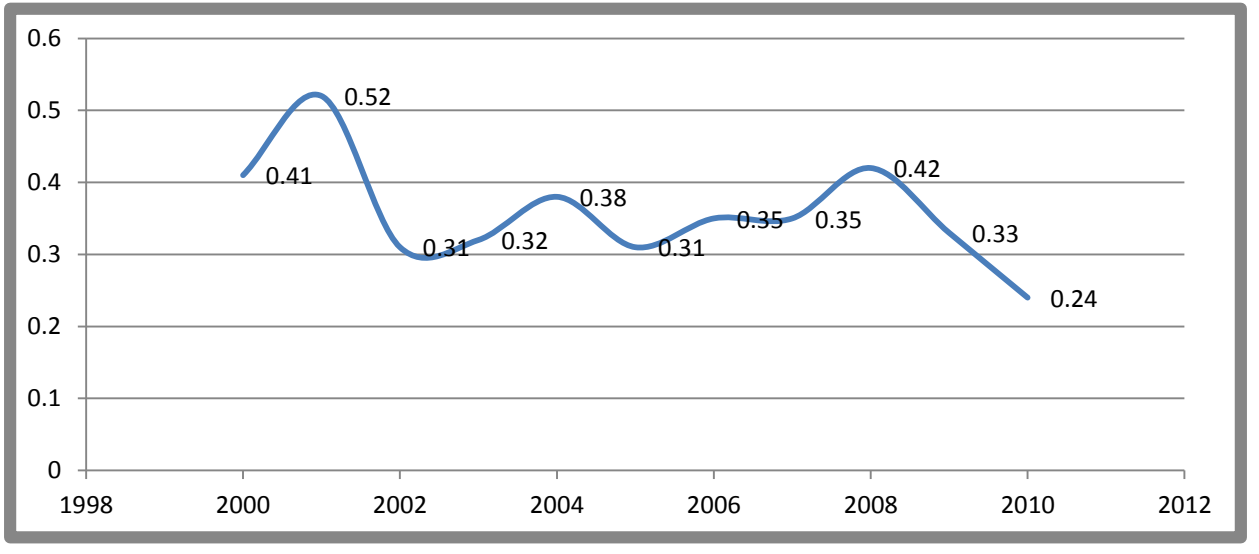

Figure 2. Agricultural research spending per US$100 output, Nigeria, 2000-2010
Source: FAO (2015)

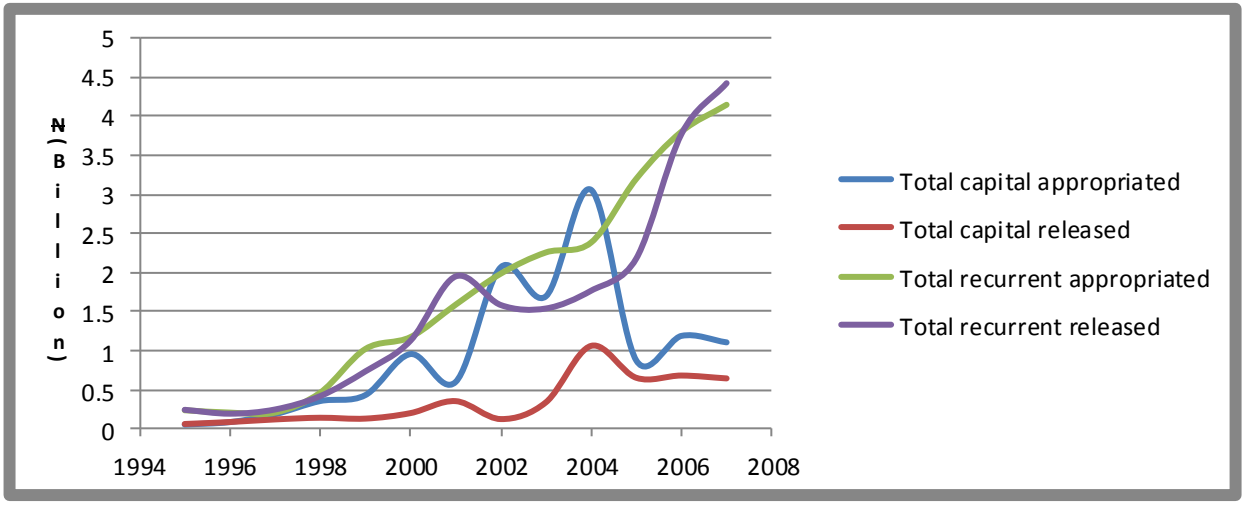

Figure 3. Total capital and recurrent appropriation and release, Nigeria, NARIs, 1995-2007, N' billion (LCU)
Source: Participating National Agricultural Research Institutes (NARIs) and Federal Colleges of Agriculture (FCAs)

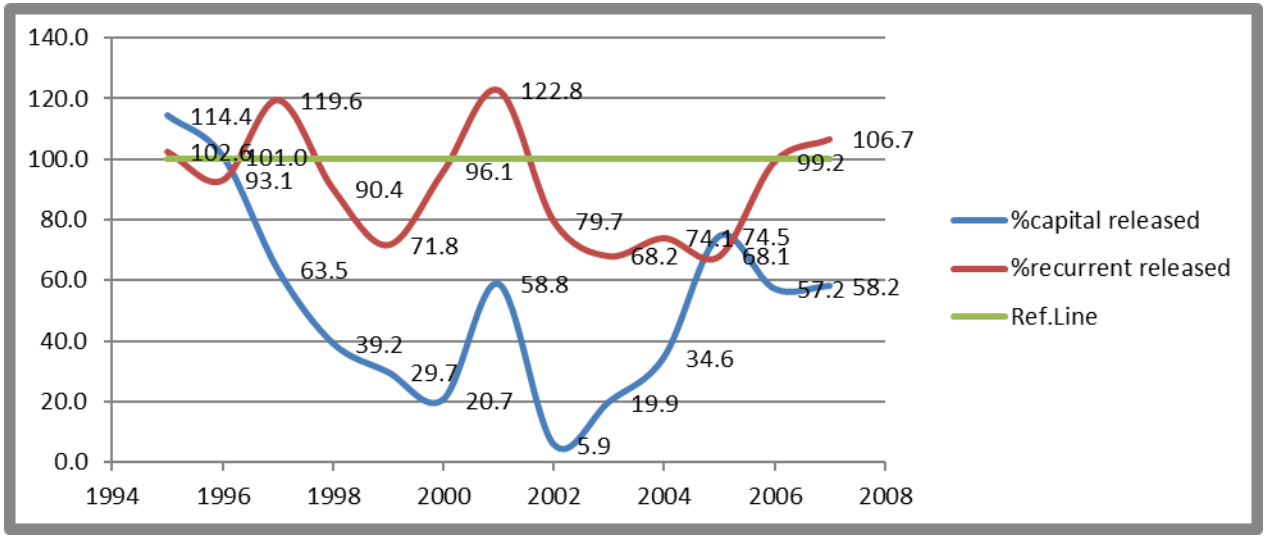

Figure 4. Percent of capital and recurrent appropriations released to NARIs, Nigeria, 1995-2007
Source: Participating National Agricultural Research Institutes (NARIs) and Federal Colleges of Agriculture (FCAs)

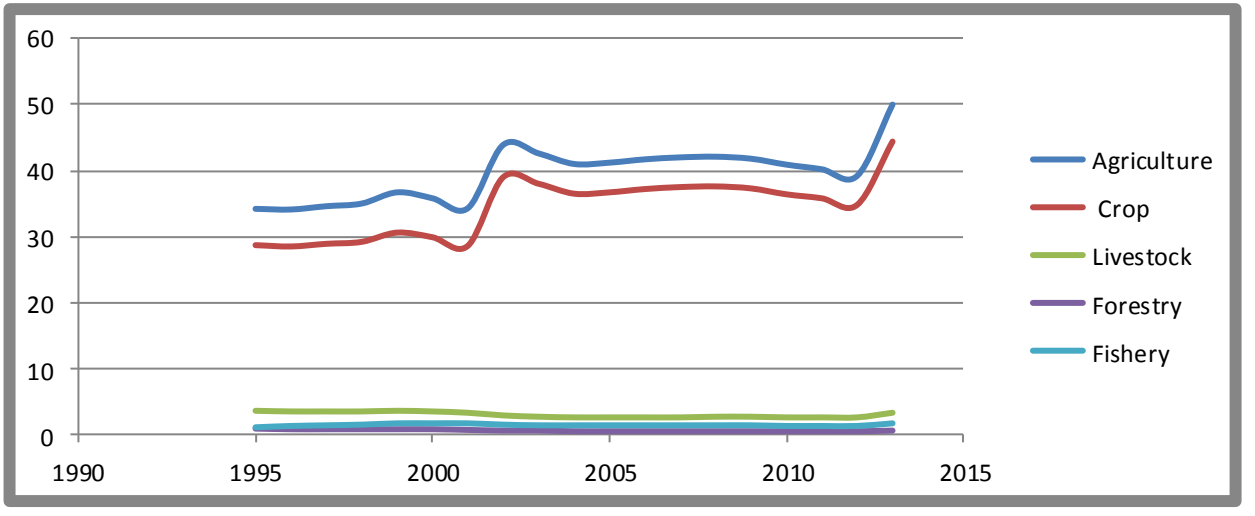

Figure 5. Percent contribution of agricultural subsectors to total GDP at 1990 Constant Basic Prices (1995-2013)
Source: Central Bank of Nigeria, Annual Reports and Statistical Bulletin, various years

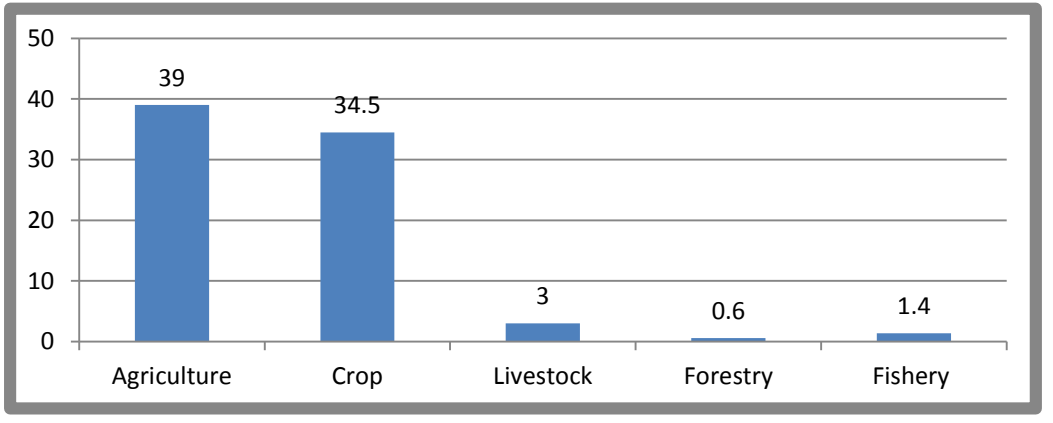

Figure 6. Average percent annual contribution of agricultural subsectors to total GDP at 1990 Constant basic prices (1995-2013)
Source: Central Bank of Nigeria, Annual Reports and Statistical Bulletin, various years

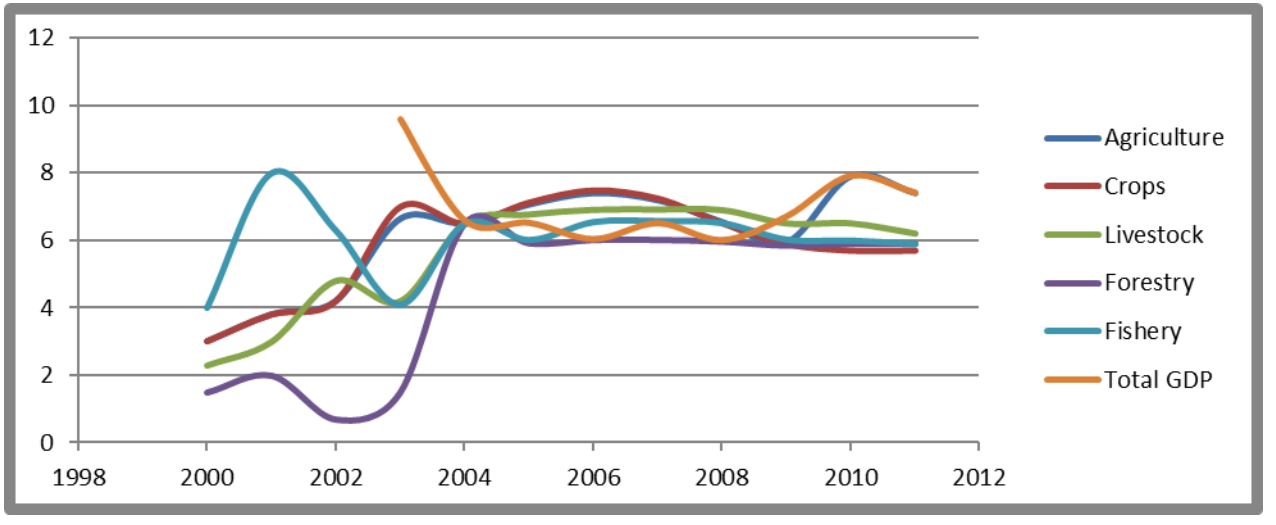

Figure 7. Annual growth rates of GDP of agriculture, agricultural subsectors and total GDP

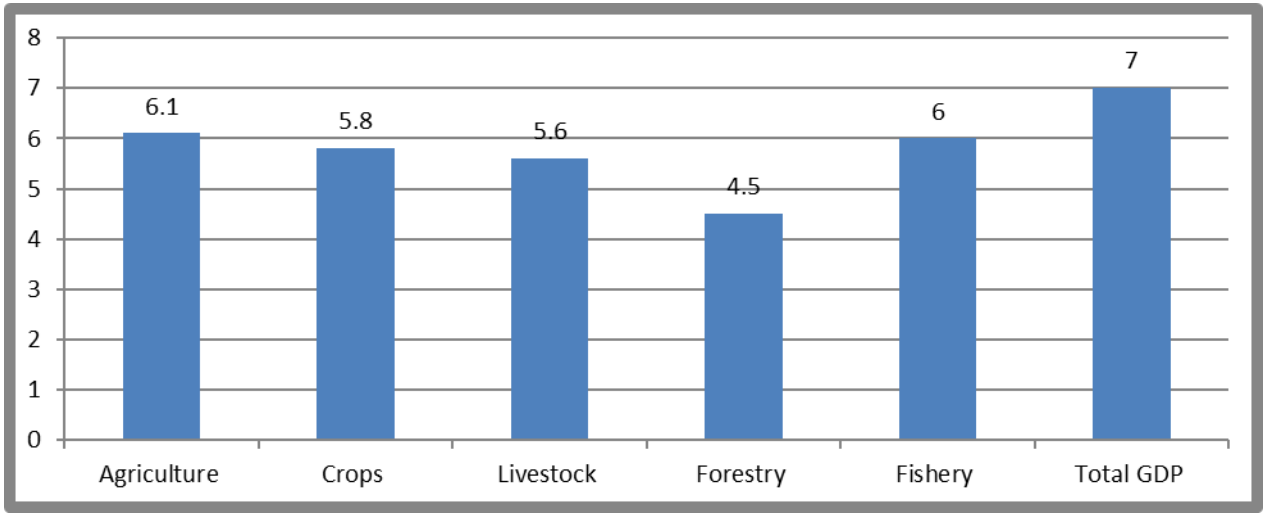

Figure 8. Average Growth rates of GDP by sector/subsectors of agriculture at 1990 constant basic prices, 2000-2011

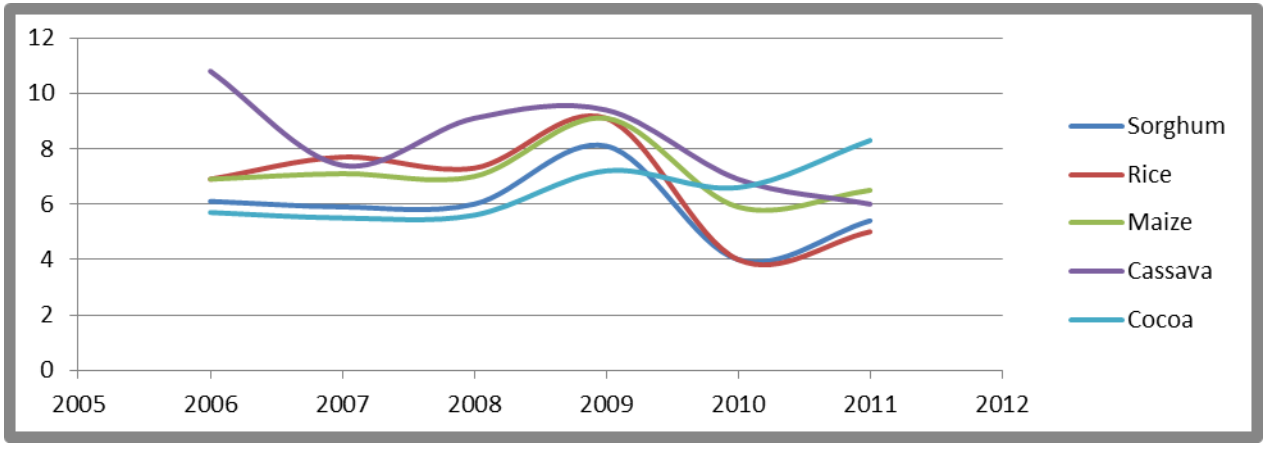

Figure 9. Annual growth rates of priority food and cash crops (%), 2006-2011

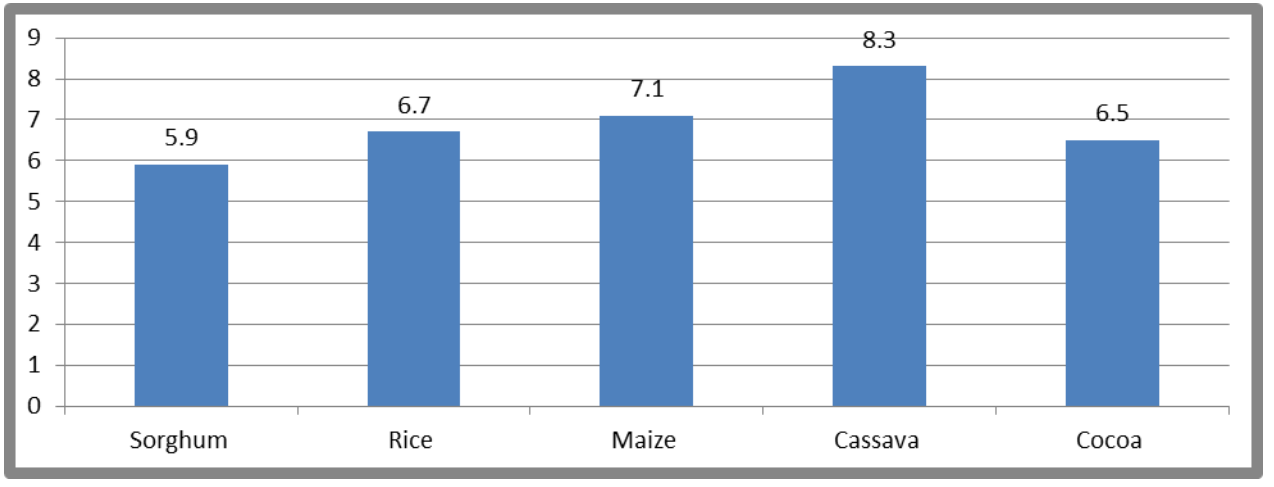

Figure 10. Average annual growth rates of priority food and cash crops (%), 2006-2011

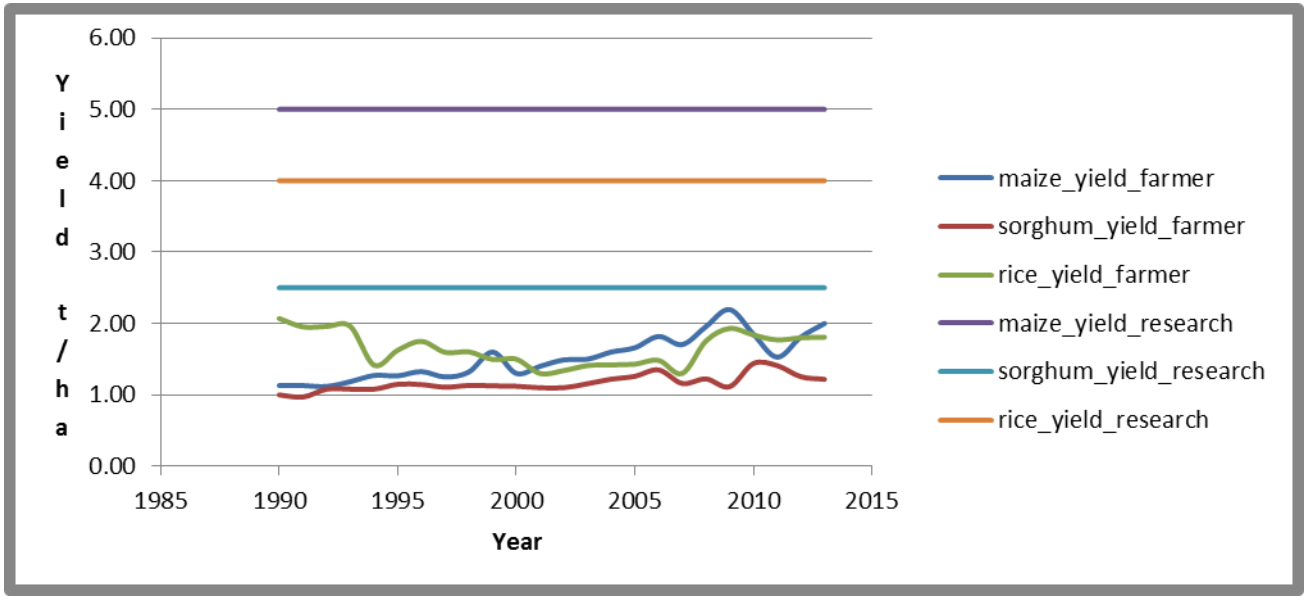

Figure 11. Average yields of maize, sorghum, rice under farmer and on-farm trial conditions, t/ha, Nigeria, 1990-2013
Sources: FAO ((2015); on-farm yields were obtained from various reports of the concerned NARIs.

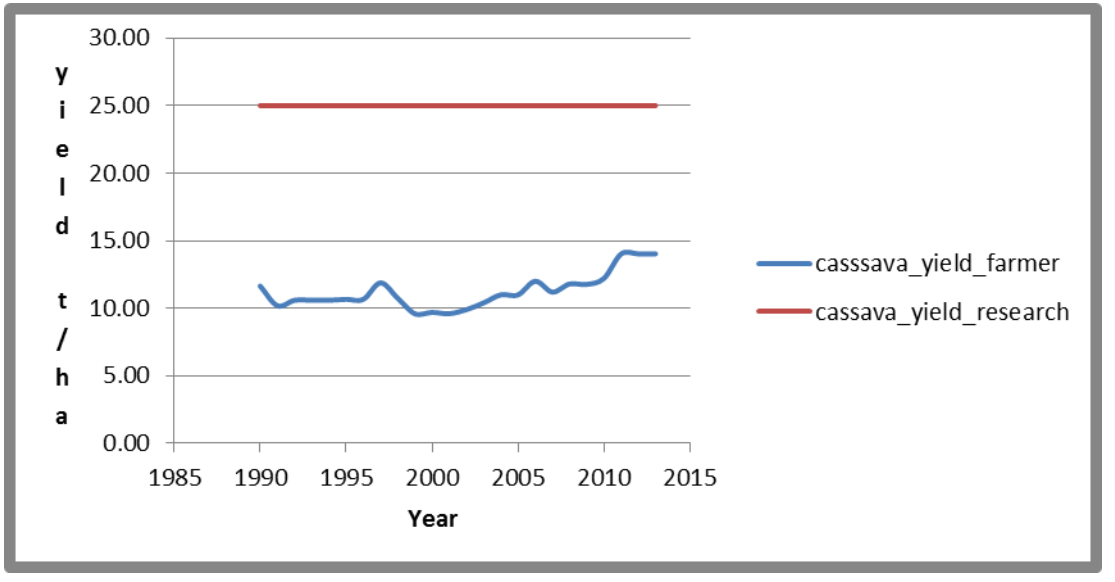

Figure 12. Average yields of cassava under farmer and on-farm trial conditions, t/ha, 1990-2013
Sources: FAO (2015); on-farm yields were obtained from various reports of the concerned NARI.

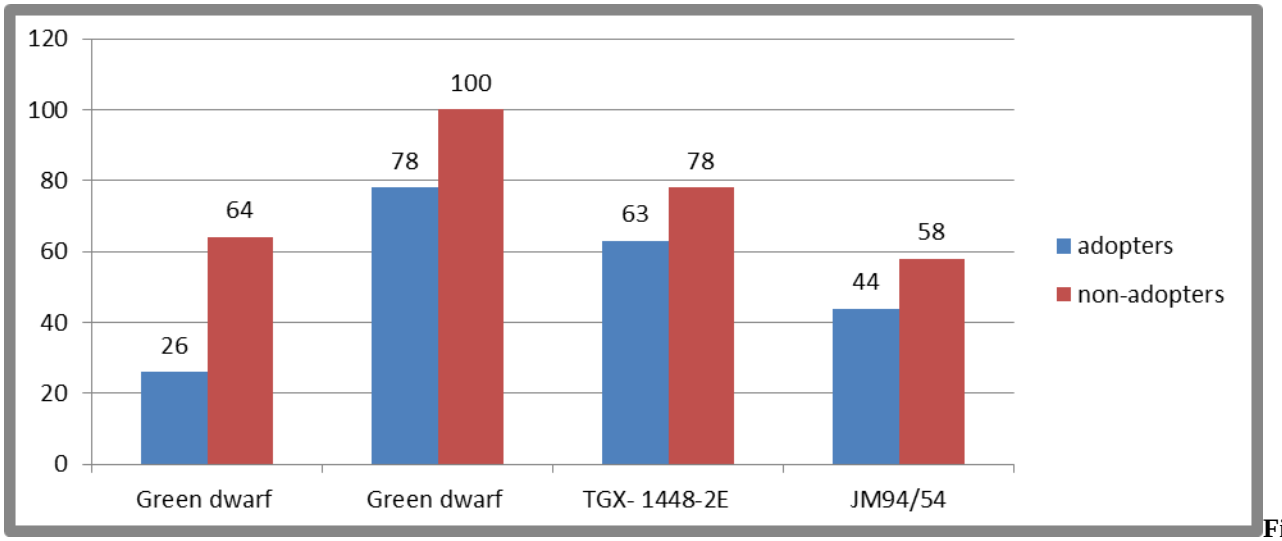

Figure 13. Estimated incidence of poverty among households in relation to technology adoption (%)

APPENDICES

Appendix 1

Table A1: List of documented Agricultural Innovations (2009)

S/N	Innovation domain	Project / organization	Name of commodity	Name of innovation	Triggers /drivers of innovation (problem being solved)	Methods of study (date, sampling/respondents, study area, analysis)	Effects of innovation (indicator i.t.o +ve, -ve, promising)
	Crop	LCRI, Maiduguri	Millet	LCIC-MV-1	-yield improvement -resistance to downy mildew	-survey conducted in 2009 -sample of 50 adopters and non-adopters using separate sampling frames -survey involved households and FGDs; -Borno state; 4 villages drawn from 4 LGAs	-adoption rate was 51.2% -beneficiary assessments: -rise in income for 98% households -improved food access for 82% of households -improved status in community for 86% of households -increase in asset for 62% of households -illness reduction for 45% of households

	Crop	NRCRI, Umudike	Irish potato	NICOLA	-yield improvement -medium maturity -storability	-survey conducted in 2009 -sample of 50 adopters and non-adopters using separate sampling frames -survey involved households and FGDs; -Plateau state; 18 villages drawn from 7 LGAs	-adoption rate was 51% -beneficiary assessments: -rise in income for 100% households -improved food access for 100% of households -improved status in community for 98% of households -increase in asset for 94% of households -illness reduction for 78% of households
	Crop	IAR, Samaru	Maize	SAMMAZ 11	-Striga resistance -early maturity	-survey conducted in 2009 -sample of 50 adopters and non-adopters using separate sampling frames -survey involved households and FGDs; -Kaduna state; 8 villages drawn from 6	-adoption rate was 32% -beneficiary assessments: -rise in income for 100% households -improved food access for 100% of households -improved status in community for 78% of households

						LGAs -Katsina state; 9 villages drawn from 3 LGAs	-increase in asset for 96% of households -illness reduction for 93% of households
	Crop	NCRI, Baddegi	Rice	FARO 51	-high yield -disease resistance	-survey conducted in 2009 -sample of 50 adopters and non-adopters using separate sampling frames -survey involved households and FGDs; -Ekiti state; 7 villages drawn from 4 LGAs	-adoption rate was 50% -beneficiary assessments: -higher yield for 33% of households -better crop price for 31% of households -higher cooking quality for 25% of households -rise in income for 96% households -improved food access for 100% of households -improved status in community for 90% of households -increase in asset for 96% of households -illness reduction for 64% of households
	Crop	NIFOR, Benin City	Oil palm	TENERA	-early maturity -early fruiting -high yield -slow stem growth -Fusarium tolerance	-survey conducted in 2009 -sample of 50 adopters and non-adopters using separate sampling frames -survey involved households and FGDs; -Edo state; 6 villages drawn from 5 LGAs	-adoption rate was 64% -beneficiary assessments: -rise in income for 100% households -improved food access for 96% of households -improved status in community for 100% of households -increase in asset for 93% of

							households -illness reduction for 91% of households
	Crop	NSPRI, Ilorin	Cassava	Cassava stem storage	-availability of planting stock -viability of planting stock	-survey conducted in 2009 -sample of 50 adopters and non-adopters using separate sampling frames -survey involved households and FGDs; -Kogi state; 5 villages drawn from 4 LGAs	-adoption rate was 2%
	Wildlife	IAR&T, Ibadan	Grasscutter	Improved management	-fast growth -improved mortality	-survey conducted in 2009 -sample of 50 adopters and non-adopters using separate sampling frames -survey involved households and FGDs; -Oyo state; 7 villages drawn from 4 LGAs -Ogun state; 13 villages drawn from 11 LGAs	-beneficiary assessments: -easy to adopt for 25% of households -not prone to disease for 12% of households -not prone to pest for 17% of households -not prone to theft for 19% of households -not prone to fire incidence for 20% of households -high mortality is a problem for 20% of households
	Livestock	NAPRI, Shika	Chicken / Layers	SHIKABROWN Released 2000	Improved egg quality	-survey conducted in 2009 -sample of 50 adopters and non-adopters using separate sampling frames -survey involved households and	-adoption rate was 49% -beneficiary assessments: -rise in income for 80% households -improved food access for 88% of households

						FGDs; -Kaduna state; 8 villages drawn from 6 LGAs	-good quality food for 88% of households -improved status in community for 65% of households -increase in asset for 65% of households -illness reduction for 89% of households
	Fishery	NIFFR, New Bussa	Fish	Improved Banda	-improved fish smoking	-survey conducted in 2009 -sample of 50 adopters and non-adopters using separate sampling frames -survey involved households and FGDs; -Niger state; 8 villages drawn from 3 LGAs	-adoption rate was 44% -beneficiary assessments: -rise in income for 100% households -improved food access for 100% of households -improved status in community for 94% of households -increase in asset for 94% of households -illness reduction for 97% of households

Source: Phillip et al (2009)

Table A2: List of documented agricultural innovations (2010a)

S/N	Innovation domain	Project / organization	Name of commodity	Name of innovation	Triggers /drivers of innovation (problem being solved)	Methods of study (date, sampling/respondents, study area, analysis)	Effects of innovation (indicator i.t.o +ve, -ve, promising)

	Crop	CRIN, Ibadan	Cocoa	Early bearing variety (Precocity) Released 2004	-early maturity -high yield -resistance to black pod	-survey conducted in 2010 -sample of 50 adopters and non-adopters using separate sampling frames -survey involved households and FGDs; -analysis used frequency tables, t-tests	-adoption rate 56% of farmers -t-test indicates assets such as goats, cattle, bed /mattresses increased due to adoption -cocoa output, area, yield increased for 93%, 93%, 93% adopters, respectively -other crop output, area, yields increased for 68%, 55%, 60% of adopters
	Crop	LCRI, Maidugur i	Wheat	LACI WHIT-1 Released 1997	-high yield -lodging resistance -stem borers resistance -early maturity -better tillering	-survey conducted in 2010 -sample of 50 adopters and non-adopters using separate sampling frames -survey involved households and FGDs; -analysis used frequency tables, t-tests	-adoption rate 52% of farmers -t-test indicates assets such as bicycles, goats, sheep, cattle, poultry and house numbers, increased due to adoption -wheat output, area, yield increased for 68%, 24%, 62% adopters, respectively -other crop output, area, yields increased for 54%, 22%, 54% of adopters
	Crop	NCRI, Badeggi	Sugar cane	NCS-001 Released 1997	-drought tolerance -better tillering -higher sucrose content -high yield -smut resistance	-survey conducted in 2010 -sample of 50 adopters and non-adopters using separate sampling frames -survey involved households and FGDs; -analysis used frequency tables,	-adoption rate 48% of farmers -t-test indicates assets such as bicycles, motorcycles, radio, goats, sheep, cattle, poultry, beds/ mattresses, house numbers, increased due to adoption -sugar cane output, area, yield

						t-tests	increased for 100%, 100%, 100% adopters, respectively -other crop output, area, yields increased for 98%, 98%, 98% of adopters
	Crop	RRIN, Benin City	Gum Arabic	*Acacia senegal* Released 1997	-drought tolerance -high gum yield -early maturity -high solubility of gum in water -high grade gum	-survey conducted in 2010 -sample of 50 adopters and non-adopters using separate sampling frames -survey involved households and FGDs; -analysis used frequency tables, t-tests	-adoption rate 40% of farmers -t-test indicates assets such as goats, sheep, cattle, poultry and house numbers, increased due to adoption -gum arabic output, area, yield increased for 96%, 73%, 85% adopters, respectively -other crop output, area, yield changes unknown to 83% of adopters

Source: Phillip et al. (2010)

Table A3: List of documented agricultural innovations (2010b)

S/N	Innovation domain	Project / organization	Name of commodity	Name of innovation	Triggers /drivers of innovation (problem being solved)	Methods of study (date, sampling/respondents, study area, analysis)	Effects of innovation (indicator i.t.o +ve, -ve, promising)
	Crop	IAR, Samaru	Cowpea	SAMPEA 6	-high yield -good palatability	Study conducted in 2010. NARI level data: year variety was released; log book estimate of	adoption rate = 87.8%

				Released 1978	-wide ecological adaptability	annual on-station yield/mt; log book or other estimate of annual on-farm yield/mt; best estimate of annual on-station research cost on variety before release; best estimate of annual on-farm research cost on variety before release. Household level data: approximate area under different varieties of each crop by year; Area-based adoption rates (ABAR) computed per annum and averaged.	
	Crop	IAR, Samaru	Cowpea	SAMPEA 8 Released 2005	-extra early maturity -resistance to diseases e.g. brown blotch, antracnose -resistance to shattering -high grain and fodder yields	Study conducted in 2010. NARI level data: year variety was released; log book estimate of annual on-station yield/mt; log book or other estimate of annual on-farm yield/mt; best estimate of annual on-station research cost on variety before release; best estimate of annual on-farm research cost on variety before release. Household level data: approximate area under different varieties of each crop by year; Area-based adoption rates (ABAR) computed per annum and averaged.	adoption rate = 12.2%
	Crop	IAR, Samaru	Sorghum	SAMSOR G 38	-panicle length -panicle size -grain colour -grain weight -malting quality -early maturity	Study conducted in 2010. NARI level data: year variety was released; log book estimate of annual on-station yield/mt; log book or other estimate of annual on-farm yield/mt; best estimate of annual on-station research cost on variety before release; best estimate of annual	adoption rate = 27.9%

					-grain yield	on-farm research cost on variety before release. Household level data: approximate area under different varieties of each crop by year; Area-based adoption rates (ABAR) computed per annum and averaged.	
	Crop	IAR, Samaru	Sorghum	SAMSORG 39 Released 1996	-panicle length -panicle size -grain colour -grain weight -malting quality -early maturity -grain yield	Study conducted in 2010. NARI level data: year variety was released; log book estimate of annual on-station yield/mt; log book or other estimate of annual on-farm yield/mt; best estimate of annual on-station research cost on variety before release; best estimate of annual on-farm research cost on variety before release. Household level data: approximate area under different varieties of each crop by year'; Area-based adoption rates (ABAR) computed per annum and averaged.	adoption rate = 16.1%
	Crop	IAR, Samaru	Sorghum	SAMSORG 40 Released 1996	-panicle length -panicle size -grain colour -grain weight -malting quality -early maturity -grain yield	Study conducted in 2010. NARI level data: year variety was released; log book estimate of annual on-station yield/mt; log book or other estimate of annual on-farm yield/mt; best estimate of annual on-station research cost on variety before release; best estimate of annual on-farm research cost on variety before release. Household level data: approximate area under different varieties of each crop by year; Area-based adoption rates (ABAR)	adoption rate = 13.5%

						computed per annum and averaged.	
	Crop	IAR, Samaru	Sorghum	SAMSORG 41 Released 1996	-panicle length -panicle size -grain colour -grain weight -malting quality -early maturity -grain yield	Study conducted in 2010. NARI level data: year variety was released; log book estimate of annual on-station yield/mt; log book or other estimate of annual on-farm yield/mt; best estimate of annual on-station research cost on variety before release; best estimate of annual on-farm research cost on variety before release. Household level data: approximate area under different varieties of each crop by year; rea-based adoption rates (ABAR) computed per annum and averaged.	adoption rate = 42.6%
	Crop	IAR&T, Ibadan	Cowpea	Ife Brown Released 1970 Registered 1990	-high yield -podding habit -seed colour (brown) -daylight neutral	Study conducted in 2010. NARI level data: year variety was released; log book estimate of annual on-station yield/mt; log book or other estimate of annual on-farm yield/mt; best estimate of annual on-station research cost on variety before release; best estimate of annual on-farm research cost on variety before release. Household level data: approximate area under different varieties of each crop by year; Area-based adoption rates (ABAR) computed per annum and averaged.	adoption rate = 86.3%
	Crop	IAR&T, Ibadan	Cowpea	Ife Branching	-high yield -high number of pods	Study conducted in 2010. NARI level data: year variety was released; log book estimate of	adoption rate = 9.6%

				Peduncle Cowpea (Ife BPC) Released 1985 Registered 1991	-high number of peduncles -daylight neutral	annual on-station yield/mt; log book or other estimate of annual on-farm yield/mt; best estimate of annual on-station research cost on variety before release; best estimate of annual on-farm research cost on variety before release. Household level data: approximate area under different varieties of each crop by year; Area-based adoption rates (ABAR) computed per annum and averaged.	
	Crop	NRCRI, Umudike	Cassava	TMS 30572 Released 1990	-wide ecological adaptation -large roots -resistance to pests / diseases -high yield	Study conducted in 2010. NARI level data: year variety was released; log book estimate of annual on-station yield/mt; log book or other estimate of annual on-farm yield/mt; best estimate of annual on-station research cost on variety before release; best estimate of annual on-farm research cost on variety before release. Household level data: approximate area under different varieties of each crop by year; Area-based adoption rates (ABAR) computed per annum and averaged.	adoption rate = 69%
	Crop	NRCRI, Umudike	Cassava	NR 8082 Released 1998	-wide ecological adaptation -large roots -resistance to pests / diseases -high yield	Study conducted in 2010. NARI level data: year variety was released; log book estimate of annual on-station yield/mt; log book or other estimate of annual on-farm yield/mt; best estimate of annual on-station research cost on variety before release; best estimate of annual	adoption rate = 31%

					-good stem multiplication	on-farm research cost on variety before release. Household level data: approximate area under different varieties of each crop by year; Area-based adoption rates (ABAR) computed per annum and averaged.	
	Crop	NIHORT, Ibadan	Okra	NHAE 47-4 Released 1985	-high yield -early maturity -drawing ability -deep green colour	Study conducted in 2010. NARI level data: year variety was released; log book estimate of annual on-station yield/mt; log book or other estimate of annual on-farm yield/mt; best estimate of annual on-station research cost on variety before release; best estimate of annual on-farm research cost on variety before release. Household level data: approximate area under different varieties of each crop by year; Area-based adoption rates (ABAR) computed per annum and averaged.	adoption rate = 9.9%
	Crop	NIHORT, Ibadan	Okra	LD-88 Released 1997	-high yield -early maturity -drawing ability -deep green colour	Study conducted in 2010. NARI level data: year variety was released; log book estimate of annual on-station yield/mt; log book or other estimate of annual on-farm yield/mt; best estimate of annual on-station research cost on variety before release; best estimate of annual on-farm research cost on variety before release. Household level data: approximate area under different varieties of each crop by year; Area-based adoption rates (ABAR)	adoption rate = 37.1%

						computed per annum and averaged.	
	Crop	NCRI, Badeggi	Lowland Rice	FARO 44 or SIPI 692033 Released 1992	-early maturity -grain size -taste -threshing -cooking quality -high yield	Study conducted in 2010. NARI level data: year variety was released; log book estimate of annual on-station yield/mt; log book or other estimate of annual on-farm yield/mt; best estimate of annual on-station research cost on variety before release; best estimate of annual on-farm research cost on variety before release. Household level data: approximate area under different varieties of each crop by year; Area-based adoption rates (ABAR) computed per annum and averaged.	adoption rate = 59.4%
	Crop	NCRI, Badeggi	Lowland Rice	FARO 52 Released 2001	-early maturity -high yield -tolerance to iron toxicity	Study conducted in 2010. NARI level data: year variety was released; log book estimate of annual on-station yield/mt; log book or other estimate of annual on-farm yield/mt; best estimate of annual on-station research cost on variety before release; best estimate of annual on-farm research cost on variety before release. Household level data: approximate area under different varieties of each crop by year; Area-based adoption rates (ABAR) computed per annum and averaged.	adoption rate = 13.8%
	Crop	IITA, WARDA,	Upland Rice	FARO 46 or	-early maturity -high yield	Study conducted in 2010. NARI level data: year variety was released; log book estimate of	adoption rate = 12.8%

		NCRI		ITA 150 Released 1992		annual on-station yield/mt; log book or other estimate of annual on-farm yield/mt; best estimate of annual on-station research cost on variety before release; best estimate of annual on-farm research cost on variety before release. Household level data: approximate area under different varieties of each crop by year; Area-based adoption rates (ABAR) computed per annum and averaged.	
	Crop	IITA, WARDA, NCRI	Upland Rice	FARO 48 or ITA 301 Released 1992	-early maturity -high yield	Study conducted in 2010. NARI level data: year variety was released; log book estimate of annual on-station yield/mt; log book or other estimate of annual on-farm yield/mt; best estimate of annual on-station research cost on variety before release; best estimate of annual on-farm research cost on variety before release. Household level data: approximate area under different varieties of each crop by year; Area-based adoption rates (ABAR) computed per annum and averaged.	adoption rate = 7.9%
	Crop	IITA, WARDA, NCRI	Upland Rice	FARO 55 or WAB-1-B-P38-HB Released	-early maturity -high yield -weed suppression	Study conducted in 2010. NARI level data: year variety was released; log book estimate of annual on-station yield/mt; log book or other estimate of annual on-farm yield/mt; best estimate of annual on-station research cost on variety before release; best estimate of annual	adoption rate = 6.2%

				2003		on-farm research cost on variety before release. Household level data: approximate area under different varieties of each crop by year; Area-based adoption rates (ABAR) computed per annum and averaged.	
	Livestock	NAPRI, Shika	Chicken Layers	SHIKABROWN Released 2000	-short maturity -high egg production -disease resistance -egg size -wide ecological adaptation	Study conducted in 2010. NARI level data: year breed was released; year Shikabrown (poultry layer) was first adopted by farmer; number of layers owned by the farmer responding (all breeds); number of Shikabrown owned by the farmer responding.	adoption rate = 86.7%

Source : Phillip et al (2010)

Table A4: List of documented Agricultural Innovations (2011)

S/N	Innovation domain	Project / organization	Name of commodity	Name of innovation	Triggers /drivers of innovation (problem being solved)	Methods of study (date, sampling/respondents, study area, analysis)	Effects of innovation (indicator i.t.o +ve, -ve, promising)
	Crop	NIFOR, Benin City	Coconut	Green Dwarf variety	-tolerance to lethal yellowing disease -higher fruiting per year -early maturity	-survey conducted in 2011 -sample of 50 adopters and non-adopters using separate sampling frames -survey involved	adoption rate = 69% Beneficiary assessments: Fertilizer: Non-adopters: Not-available for 46% of households High cost for 43% of households Adopters:

						households and FGDs; -screening questions posed to determine real adopters	Not-available for 54% of households High cost for 33% of households Seed: Non-adopters: Not-available for 54% of households High cost for 26% of households Adopters: Not-available for 54% of households High cost for 26% of households Technology adoption risk: Medium to high for 54% of households Profitability: medium to high for 100% of households Yield: satisfactory to very satisfactory for 98% of households Fodder quality: satisfactory to very satisfactory for 6% Processing ease: satisfactory to very satisfactory for 30%
	Crop	NIHORT, Ibadan	Tomato	JM 94/ 54	-tolerance to bacterial wilt disease -high yield -longer storage -early maturity	-survey conducted in 2011 -sample of 50 adopters and non-adopters using separate sampling frames -survey involved households and FGDs;	adoption rate = 72% Beneficiary assessments: Fertilizer: Non-adopters: Not-available for 55% of households High cost for 31% of households Adopters: Not-available for 36% of households

						-screening questions posed to determine real adopters	High cost for 46% of households Seed: Non-adopters: Not-available for 60% of households High cost for 30% of households Adopters: Not-available for 60% of households High cost for 27% of households Technology adoption risk: Medium to high for 73% of households Profitability: medium to high for 98% of households Yield: satisfactory to very satisfactory for 98% of households Fodder quality: satisfactory to very satisfactory for 44% Processing ease: satisfactory to very satisfactory for 70%
	Crop	NRCRI, Umudike IITA, Ibadan	Yam	Minisett Released 1982	-high yield -rapid seed multiplication -adaptation to sole cropping	-survey conducted in 2011 -sample of 50 adopters and non-adopters using separate sampling frames -survey involved households and FGDs; -screening questions	adoption rate = 78% Beneficiary assessments: Fertilizer: Non-adopters: Not-available for 92% of households Adopters: Not-available for 84% of households Minisett:

						posed to determine real adopters	Non-adopters: Not-available for 29% of households High cost for 40% of households Adopters: Not-available for 24% of households High cost for 45% of households Technology adoption risk: Medium to high for 88% of households Profitability: medium to high for 100% of households Yield: satisfactory to very satisfactory for 98% of households Fodder quality: satisfactory to very satisfactory for 28% Processing ease: satisfactory to very satisfactory for 66%
	Crop	NCRI	Soya beans	TGX-1448-2E variety	-early maturity -high yield	-survey conducted in 2011 -sample of 50 adopters and non-adopters using separate sampling frames -survey involved households and FGDs; -screening questions posed to determine real adopters	adoption rate = 87% Beneficiary assessments: Fertilizer: Non-adopters: Not-available for 78% of households High cost for 16% of households Adopters: Not-available for 10% of households High cost for 88% of households Seed: Non-adopters:

							Not-available for 19% of households High cost for 14% of households Adopters: Not-available for 36% of households High cost for 21% of households Technology adoption risk: Medium to high for 38% of households Profitability: medium to high for 94% of households Yield: satisfactory to very satisfactory for 100% of households Fodder quality: satisfactory to very satisfactory for 72% Processing ease: satisfactory to very satisfactory for 98%

Source: Phillip et al (2011)

Table A5: List of documented Agricultural Innovations (2006)

S/N	Innovation domain	Project / organization	Name of commodity	Name of innovation	Triggers /drivers of innovation (problem being solved)	Methods of study (date, sampling/respondents, study area, analysis)	Effects of innovation (indicator i.t.o +ve, -ve, promising)
	Crop	WARDA, IITA, Gatsby Foundation,	Upland Rice	NERICA 1 or WAB-450-1-B-P38-HB	-high yield -high ecological adaptation	Dissemination of varieties 1999-2004; Evaluation of adoption in two states, Kaduna and Ekiti, 2005; Samples selected from Participatory Varietal Selection (PVS) and non-PVS villages;	Adoption rates: Ekiti 42% Kaduna: PVS 42%

		Rockefeller Foundation				Data analysis was for full sample in Ekiti state and for PVS/non-PVS subsamples in Kaduna data.	Non-PVS 9%
	Crop	WARDA, IITA, Gatsby Foundation, Rockefeller Foundation	Upland Rice	WAB 189 variety	-high yield -high ecological adaptation	Dissemination of varieties 1999-2004; Evaluation of adoption in two states, Kaduna and Ekiti, 2005; Samples selected from Participatory Varietal Selection (PVS) and non-PVS villages; Data analysis was for full sample in Ekiti state and for PVS/non-PVS subsamples in Kaduna data.	Adoption rates: Ekiti 46% Kaduna: PVS 23% Non-PVS 36%
	Crop	WARDA, IITA, Gatsby Foundation, Rockefeller Foundation	Upland Rice	ITA 150	-high yield -high ecological adaptation	Dissemination of varieties 1999-2004; Evaluation of adoption in two states, Kaduna and Ekiti, 2005; Samples selected from Participatory Varietal Selection (PVS) and non-PVS villages; Data analysis was for full sample in Ekiti state and for PVS/non-PVS subsamples in Kaduna data.	Adoption rates: Ekiti 46%
	Crop	WARDA, IITA, Gatsby Foundation, Rockefeller Foundation	Upland Rice	NERICA 2	-high yield -high ecological adaptation	Dissemination of varieties 1999-2004; Evaluation of adoption in two states, Kaduna and Ekiti, 2005; Samples selected from Participatory Varietal Selection (PVS) and non-PVS villages; Data analysis was for full sample in Ekiti state and for PVS/non-PVS subsamples in Kaduna data.	Adoption rates: Ekiti 14%

Source: Dorward et al (2006)

Table A6: List of documented Agricultural Innovations (2014)

S/N	Innovation domain	Project / organization	Name of commodity	Name of innovation	Triggers /drivers of innovation (problem being solved)	Methods of study (date, sampling/respondents, study area, analysis)	Effects of innovation (indicator i.t.o +ve, -ve, promising)
	Crop	NCRI, Badeggi	Soya beans	TGE 1987-2F	-early maturity -high yield -drought resistance	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed.	Yield: 1.5-2.5 mt/ha Guinea & Sahel Savannah
	Crop	NCRI, Badeggi	Soya beans	TGX 1987-1DF	-early maturity -high yield -drought resistance	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed.	Yield: 1.5-2.5 mt/ha Guinea & Sahel Savannah
	Crop	NCRI, Badeggi	Soya beans	TGX 1904-6F	-early maturity -high yield -drought resistance	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed.	Yield: 1.5-2.5 mt/ha Guinea & Sahel Savannah
	Crop	NCRI, Badeggi	Soya beans	TGX 1835-10E	-early maturity -high yield -drought resistance	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed.	Yield: 1.5-2.5 mt/ha Guinea & Sahel Savannah
	Crop	NCRI, Badeggi	Sugar cane	NCS-002	-high yield -medium maturity -wide ecological adaptation	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed	Yield: 100-110 mt/ha Sudan savanna Guinea savanna
	Crop	NCRI, Badeggi	Sugar cane	NCS-003	-high yield -medium maturity -wide ecological adaptation	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed	Yield: 100-110 mt/ha Sudan savanna Guinea savanna
	Crop	NCRI, Badeggi	Sugar cane	NCS-005	-high yield -medium maturity -wide ecological adaptation	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed	Yield: 100-110 mt/ha Sudan savanna Guinea savanna

	Crop	NCRI, Badeggi	Sugar cane	NCS-006	-high yield -medium maturity -wide ecological adaptation	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed	Yield: 100-110 mt/ha Sudan savanna Guinea savanna
	Crop	NCRI, Badeggi	Sugar cane	NCS-007	-high yield -medium maturity -wide ecological adaptation	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed	Yield: 100-110 mt/ha Sudan savanna Guinea savanna
	Crop	NCRI, Badeggi	Sugar cane	NCS-008	-high yield -medium maturity -wide ecological adaptation	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed	Yield: 100-110 mt/ha Sudan savanna Guinea savanna
	Crop	NCRI, Badeggi	Rice	Rice processing machines Components: -thresher -winnower -wet cleaner -parboiler -rotary dryer -mills -pneumatic cleaners	-milling -improved quality -import substitution -high processing efficiency	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed	Attainable efficiency of processing: 90%
	Crop	IAR&T, Ibadan	Cowpea	Ife Brown	-High yield -day length neutral	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior	Yield is at least 30% in the savanna and 25% in

					-upright podding habit -fast cooking.	to varietal release is presumed	the forest ecologies higher than existing varieties.
	Crop	IAR&T, Ibadan	Cassava, Maize, Soya beans	Cassava / Maize / Soya beans intercropping	Maximization of the benefits in the component crops	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed	Marginal rate of return (MRR) is N2.70 for every N1.00 invested.
	Crop	IAR&T, Ibadan	Cassava, Maize, Soya beans	Cassava / Maize / Soya beans relay cropping	-multiple cropping -improved protein access -improved yield/ha	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed	At least 30% increase in land productivity and income
	Crop	IAR&T, Ibadan	Maize	ART-98-SW6-OB	-protein improvement -high yield	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed	-lysine improvement by 3.67% -tryptophan improved by 0.87% -yield: 4.6-4.8 tons per hectare over the existing varieties yielding 2.5 tons/ha.
	Crop	IAR&T, Ibadan	Maize	ILE-1-OB	-protein improvement -high yield	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed	-high level of Lysine 3.72% and tryptophan 3.87%. -yield: Yield advantage of 3.87 tons per hectare across Oyo, Ogun, Kaduna and Bauchi; and 4.70-4.96 per hectare in other states over the

							existing 2.5 tons per hectare.
	Crop	NIHORT, Ibadan	Tomato	MP WT-6	-early maturity -bacterial wilt tolerance -high yield	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed	-Yield: 10 – 15 ton/ha in derived savannah -Matures 56-60 days
	Livestock	NVRI, Vom	Poultry	Kerosene incubator	-lessens dependency on electricity -affordability -flexible capacities (100-, 300-, 500 hatchable eggs) -early hatchability	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed	Hatching: -14-17 days for quails -18-21 days for chicken -25-28 days for turkey -95% hatchability cross poultry types
	Livestock	NVRI, Vom	Poultry	Bacterial vaccines: Fowl Cholera Vaccine (FCV) Viral vaccines: Newcastle disease vaccine (NDV); Infectious Bursal disease vaccine (IBDV)		Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed	Institutional outputs of vaccines is about 35% of total national demand;
	Crop	NSPRI, Ilorin	Diverse commo	Hybrid crop dryer	-thermal energy; from kerosene stove	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior	-Can dry 50kg of produce within 8 hours

			dities		-solar energy -cost effectiveness or affordability	to varietal release is presumed	or more depending on type of produce. -wide ecological adaptation
	Crop	NSPRI, Ilorin	Grains	Inert atmospher e silo	-good grain quality -high germinability	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed	-at least 90% seed germination
	Fishery	NSPRI, Ilorin	Fish	Fish smoking kiln	-affordability -low input technology (firewood or charcoal)	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed	-drying of 50kg fish within 4 hours
	Crop	IAR, Samaru IITA, Ibadan	Maize	SAMMA Z 17	-intermediate maturity	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed	On-farm yield: 4,500 kg/ha
	Crop	IAR, Samaru IITA, Ibadan	Maize	SAMMA Z 18	-early maturity	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed	On-farm yield: 4,000 kg/ha
	Crop	IAR, Samaru IITA, Ibadan	Maize	SAMMA Z 19	-extra early maturity	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed	On-farm yield: 4,500 kg/ha
	Crop	IAR, Samaru IITA, Ibadan	Maize	SAMMA Z 20	-early maturity	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed	On-farm yield: 4,000 kg/ha
	Crop	IAR, Samaru IITA, Ibadan	Maize	SAMMA Z 21	-early maturity	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed	On-farm yield: 4,500 kg/ha
	Crop	IAR,	Maize	SAMMA	-late maturity	Beneficiary evaluation not available. However,	On-farm yield: 5,000

		Samaru IITA, Ibadan		Z 22	-drought tolerance	some on-station and on-farm evaluations prior to varietal release is presumed	kg/ha
	Crop	IAR, Samaru IITA, Ibadan	Maize	SAMMA Z 23	-late maturity -drought tolerance	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed	On-farm yield: 5,000 kg/ha
	Crop	IAR, Samaru IITA, Ibadan	Maize	SAMMA Z 24	-late maturity -drought tolerance	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed	On-farm yield: 5,000 kg/ha
	Crop	IAR, Samaru IITA, Ibadan	Maize	SAMMA Z 25	-late maturity -drought tolerance	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed	On-farm yield: 5,500 kg/ha
	Crop	IAR, Samaru IITA, Ibadan	Maize	SAMMA Z 26	-intermediate maturity	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed	On-farm yield: 3,500 kg/ha
	Crop	IAR, Samaru IITA, Ibadan	Maize	SAMMA Z 27	-early maturity	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed	On-farm yield: 4,500 kg/ha
	Crop	IAR, Samaru IITA, Ibadan	Maize	SAMMA Z 28	-extra early maturity	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed	On-farm yield: 3,500 kg/ha
	Crop	IAR, Samaru IITA, Ibadan	Maize	SAMMA Z 29	-extra early maturity	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed	On-farm yield: 3,500 kg/ha
	Crop	IAR,	Maize	SAMMA	-late maturity	Beneficiary evaluation not available. However,	On-farm yield: 3,500

		Samaru IITA, Ibadan		Z 30	-low N tolerance	some on-station and on-farm evaluations prior to varietal release is presumed	kg/ha
	Crop	IAR, Samaru IITA, Ibadan	Maize	SAMMA Z 31	-late maturity -low N tolerance	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed	On-farm yield: 3,500 kg/ha
	Crop	IAR, Samaru	Sorghum	SAMSOR G17	-good malting quality -high yield	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed.	On-farm yield:1.5-2t/ha
	Crop	IAR, Samaru	Sorghum	SAMSOR G8	-medium maturity -good height -good yield	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed.	On-farm yield:1.0-1.2t/ha
	Crop	IAR, Samaru	Sorghum	SAMSOR G14	-tolerance to Striga	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed.	On-farm yield: 1.0-1.5t/ha
	Crop	IAR, Samaru	Sorghum	SAMSOR G5	-very early maturity -dwarf height	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed.	On-farm yield: 1.0-1.2t/ha
	Crop	IAR, Samaru	Sorghum	SAMSOR G40	-non-lodging -drought tolerance -good response to fertilizers -good food and malting qualities	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed.	On-farm yield: 1.0-1.2t/ha
	Crop	IAR, Samaru	Sorghum	SAMSOR G41	-hard grains -high yield -drought tolerance	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed.	On-farm yield:1.2-1.5t/ha
	Crop	IAR, Samaru	Sorghum	SAMSOR G13	-semi dwarf -medium maturity	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed.	On-farm yield: 1.0-1.2t/ha
	Crop	IAR, Samaru	Sorghum	SAMSOR G38	-high yield -early maturity	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior	On-farm yield: 1.0-1.2t/ha

						to varietal release is presumed.	
	Crop	IAR, Samaru	Sorghum	SAMSORG3	-early maturity -tolerance to Striga -good palatability	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed.	On-farm yield: 1.0-1.2t/ha
	Crop	IAR, Samaru	Sorghum	SAMSORG16	-high yield -late maturity	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed.	On-farm yield:1.8-2.5t/ha
	Crop	IAR, Samaru	Cowpea	SAMPEA 8	-extra early maturity	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed.	On-farm yield:2.0 t/ha Northern Guinea Savanna
	Crop	IAR, Samaru	Cowpea	SAMPEA 9	-medium maturity	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed.	On-farm yield:2.3 t/ha Northern Guinea Savanna
	Crop	IAR, Samaru	Cowpea	SAMPEA 10	-early maturity	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed.	On-farm yield:1.5 t/ha Northern Guinea Savanna
	Crop	IAR, Samaru	Cowpea	SAMPEA 11	-medium maturity	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed.	On-farm yield:1.6 t/ha Northern Guinea Savanna
	Crop	IAR, Samaru	Cowpea	SAMPEA 12	-medium maturity	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed.	On-farm yield:2.3 t/ha Northern Guinea Savanna
	Crop	NIFOR, Benin city	Oil palm	TENERA	-early fruiting -high yield (FFB) -high oil extraction -high oil yield -Fusarium wilt tolerance	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed.	On-farm yield (FFB): 20-25 t/ha -bearing 2.5-3 years -slow stem growth
	Crop	NIFOR, Benin city	Oil palm	NIFOR small scale processing equipment	- Simple cottage type small scale processing equipment - suitable for small scale producers	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed	-calyx separator capacity of 0.25 – 1.5 tonnes FFB per hour; -extraction rate of 18% -profit margin 44-64%

				(SSPE) Components: - stripper -sterilizer/ cooker -digester screw press -clarifier -calyx separator The NIFOR Large: 0.5 -1.0 tonne FFB/hr, capable of processing FFB from 50-100 hectare plantation The NIFOR Medium: 0.25 -0.5 tonne FFB/hr, designed			

				for farmers with holding of 20 – 50 hectares. The NIFOR Mini: Designed for farmers with less than 20hectares, and appropriate for cottage palm oil production.			
	Crop	NRCRI, Umudike	Cassava	TMS 97/2205	-high fresh root yield -high quality of cassava products, such as cassava flour; -high dry matter content -high resistant/tolerant to major cassava pests and diseases -wide ecological adaptation	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed	Fresh root yields: 25-29tons / hectare
	Crop	NRCRI,	Cassava	TMS	-high fresh root yield	Beneficiary evaluation not available. However,	Fresh root yields:

		Umudike		98/0581	-high quality of cassava products, such as cassava flour; -high dry matter content -high resistant/tolerant to major cassava pests and diseases -wide ecological adaptation	some on-station and on-farm evaluations prior to varietal release is presumed	25-29tons / hectare
	Crop	NRCRI, Umudike	Cassava	TMS 98/0505	-high fresh root yield -high quality of cassava products, such as cassava flour; -high dry matter content -high resistant/tolerant to major cassava pests and diseases -wide ecological adaptation	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed	Fresh root yields: 25-29tons / hectare
	Crop	NRCRI, Umudike	Cassava	TMS 98/0510	-high fresh root yield -high quality of cassava products, such as cassava flour; -high dry matter content -high resistant/tolerant to major cassava pests and diseases -wide ecological adaptation	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed	Fresh root yields: 25-29tons / hectare
	Crop	NRCRI, Umudike	Cassava	TME 419	-high fresh root yield -high quality of cassava products, such as cassava flour; -high dry matter content -high resistant/tolerant to	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed	Fresh root yields: 25-29tons / hectare

					major cassava pests and diseases -wide ecological adaptation		
	Crop	NRCRI, Umudike	Cassava	TM 92/0326	-high fresh root yield -high quality of cassava products, such as cassava flour; -high dry matter content -high resistant/tolerant to major cassava pests and diseases -wide ecological adaptation	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed	Fresh root yields: 25-29tons / hectare
	Crop	NRCRI, Umudike	Cassava	TMS 96/1632	-high fresh root yield -high quality of cassava products, such as cassava flour; -high dry matter content -high resistant/tolerant to major cassava pests and diseases -wide ecological adaptation	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed	Fresh root yields: 25-29tons / hectare
	Crop	NRCRI, Umudike	Cassava	TMS 980002	-high fresh root yield -high quality of cassava products, such as cassava flour; -high dry matter content -high resistant/tolerant to major cassava pests and diseases -wide ecological adaptation	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed	Fresh root yields: 25-29tons / hectare
	Crop	NRCRI, Umudike	Cassava	TMS92/0 057	-high fresh root yield -high quality of cassava	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior	Fresh root yields: 25-29tons / hectare

					products, such as cassava flour; -high dry matter content -high resistant/tolerant to major cassava pests and diseases -wide ecological adaptation	to varietal release is presumed	
	Crop	NRCRI, Umudike	Cassava	NR 87184	-high fresh root yield -high quality of cassava products, such as cassava flour; -high dry matter content -high resistant/tolerant to major cassava pests and diseases -wide ecological adaptation	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed	Fresh root yields: 25-29tons / hectare
	Crop	NRCRI, Umudike	Cassava	NR 41044	-high fresh root yield -high quality of cassava products, such as cassava flour; -high dry matter content -high resistant/tolerant to major cassava pests and diseases -wide ecological adaptation	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed	Fresh root yields: 25-29tons / hectare
	Crop	NRCRI, Umudike	Cassava	TMS 30555	-high fresh root yield -high quality of cassava products, such as cassava flour; -high dry matter content -high resistant/tolerant to major cassava pests and	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed	Fresh root yields: 25-29tons / hectare

					diseases -wide ecological adaptation		
	Crop	NRCRI, Umudike	Cassava	TMS 50395	-high fresh root yield -high quality of cassava products, such as cassava flour; -high dry matter content -high resistant/tolerant to major cassava pests and diseases -wide ecological adaptation	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed	Fresh root yields: 25-29tons / hectare
	Crop	NRCRI, Umudike	Cassava	TMS 30001	-high fresh root yield -high quality of cassava products, such as cassava flour; -high dry matter content -high resistant/tolerant to major cassava pests and diseases -wide ecological adaptation	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed	Fresh root yields: 25-29tons / hectare
	Crop	NRCRI, Umudike	Cassava	TMS 30572	-high fresh root yield -high quality of cassava products, such as cassava flour; -high dry matter content -high resistant/tolerant to major cassava pests and diseases -wide ecological adaptation	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed	Fresh root yields: 25-29tons / hectare
	Crop	NRCRI, Umudike	Cassava	TMS 4(2)1425	-high fresh root yield -high quality of cassava products, such as cassava	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed	Fresh root yields: 25-29tons / hectare

					flour; -high dry matter content -high resistant/tolerant to major cassava pests and diseases -wide ecological adaptation		
	Crop	NRCRI, Umudike	Cassava	TMS 91934	-high fresh root yield -high quality of cassava products, such as cassava flour; -high dry matter content -high resistant/tolerant to major cassava pests and diseases -wide ecological adaptation	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed	Fresh root yields: 25-29tons / hectare
	Crop	NRCRI, Umudike	Cassava	NR 8208	-high fresh root yield -high quality of cassava products, such as cassava flour; -high dry matter content -high resistant/tolerant to major cassava pests and diseases -wide ecological adaptation	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed	Fresh root yields: 25-29tons / hectare
	Crop	NRCRI, Umudike	Cassava	NR 8083	-high fresh root yield -high quality of cassava products, such as cassava flour; -high dry matter content -high resistant/tolerant to major cassava pests and diseases	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed	Fresh root yields: 25-29tons / hectare

					-wide ecological adaptation		
	Crop	NRCRI, Umudike	Cassava	NR 83107	-high fresh root yield -high quality of cassava products, such as cassava flour; -high dry matter content -high resistant/tolerant to major cassava pests and diseases -wide ecological adaptation	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed	Fresh root yields: 25-29tons / hectare
	Crop	NRCRI, Umudike	Cassava	NR 8212	-high fresh root yield -high quality of cassava products, such as cassava flour; -high dry matter content -high resistant/tolerant to major cassava pests and diseases -wide ecological adaptation	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed	Fresh root yields: 25-29tons / hectare
	Crop	NRCRI, Umudike	Cassava	NR 8082	-high fresh root yield -high quality of cassava products, such as cassava flour; -high dry matter content -high resistant/tolerant to major cassava pests and diseases -wide ecological adaptation	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed	Fresh root yields: 25-29tons / hectare
	Crop	NRCRI, Umudike	Cassava	TMS 81/00110	-high fresh root yield -high quality of cassava products, such as cassava flour;	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed	Fresh root yields: 25-29tons / hectare

					-high dry matter content -high resistant/tolerant to major cassava pests and diseases -wide ecological adaptation		
	Crop	NRCRI, Umudike	Cassava	TMS 90257	-high fresh root yield -high quality of cassava products, such as cassava flour; -high dry matter content -high resistant/tolerant to major cassava pests and diseases -wide ecological adaptation	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed	Fresh root yields: 25-29tons / hectare
	Crop	NRCRI, Umudike	Cassava	TMS 84537	-high fresh root yield -high quality of cassava products, such as cassava flour; -high dry matter content -high resistant/tolerant to major cassava pests and diseases -wide ecological adaptation	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed	Fresh root yields: 25-29tons / hectare
	Crop	NRCRI, Umudike	Cassava	TMS 82/00058	-high fresh root yield -high quality of cassava products, such as cassava flour; -high dry matter content -high resistant/tolerant to major cassava pests and diseases -wide ecological adaptation	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed	Fresh root yields: 25-29tons / hectare

	Crop	NRCRI, Umudike	Cassava	TMS 82/00661	-high fresh root yield -high quality of cassava products, such as cassava flour; -high dry matter content -high resistant/tolerant to major cassava pests and diseases -wide ecological adaptation	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed	Fresh root yields: 25-29tons / hectare
	Crop	NRCRI, Umudike	Cassava	High quality cassava flour (HQCF)	-raw material for other downstream cassava products -value addition -rural agro- industries	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed	On-farm output: 200 kg HQCF from 1 ton of fresh tubers
	Crop	Federal College of Agricultur e, Ibadan	Maize	Portable Maize Sheller	-high capacity -low energy requirement -easy dismantling -compact size -petrol engine power -small scale maize farms	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed	-500 kg/hour shelled maize -reduction of post-harvest losses by at least 30%
	Crop	Federal College of Agricultur e, Ibadan	Maize	Industrial Maize Sheller Compone nts; -feeding -shelling -cleaning - collecting	-high capacity -import substitution	Beneficiary evaluation not available. However, some on-station and on-farm evaluations prior to varietal release is presumed	-High capacity (1,500kg per hr); -major advantage over existing imported equivalent types: incorporates tractor lifting attachment -labour saving -at least 30% loss reduction to avoidance of pests and mould

Source: Chikwendu and Abubakar (2014)

Appendix 2: List of potential Innovation platforms

List of **Potential** (not yet formed) innovation platforms: compiled strictly from available researchers' activities. Data for the gaps in the list of tables may be filled if corresponding IPs are formed around the commodities / innovations.

IP Name	Wheat value chain
Entry Point or value chain (VC)	Breeding for yield improvement, stem borer tolerance and early maturity
Innovations (technical or social and economic innovations)	Technical Variety: LACRI WHIT -1 (SERI M82)
Location (name and GPS coordinates in UTM or degrees)	Lake Chad Research Institute, KM 6 Gamburu Ngala Road, P. M. B. 1293, Maiduguri, Borno State
Intervention areas (regional/province/district/…)	Low land of Sahel, Sudan savannah
IP webpage:	
Participating villages	
Date IP establishment	
Institutions setting up the IP	
Funding agents	Federal Government
Number of years activities on the ground	
IP is still active or not	
Facilitators(names and contacts)	Dr. O.G. Olabanji – HOD Cereals Email: Olabanji006@yahoo.com Mobile number: 08082421290
IP members (regrouped by VC actors and sectors)	
Opportunities addressed	Improved Food Quality: Fat (1.4%) Carbohydrate (74.3%) Protein (13.7%) Gluten Content (13.5%) Scaling up: Northern Guinea savannah zone
Achievements to date	• High yielding (average 2 - 3 tons/ha) • Early maturing (85-90 days after sowing) • Moderately tolerant to stem borer

Challenges	Funding
Sustainability issues	• Continuous breeding research programs to develop new varieties • On -station and on -farm research activities • Training and retraining of researchers for better performance. • Continuous and sustained support eg funding by government to the research institutes
Phase in IP process (initial, maturity, independent)	

IP Name	**Millet value chain**
Entry Point or value chain (VC)	Breeding for yield improvement, striga tolerance early maturity, and better tillering
Innovations (technical or social and economic innovations)	Technical Improved Variety : LCIC –MV1 (SOSAT C88)
Location (name and GPS coordinates in UTM or degrees)	Lake Chad Research Institute, KM 6 Gamburu Ngala Road, P. M. B. 1293, Maiduguri, Borno State
Intervention areas (regional/province/district/…)	Sahel, Sudan savannah and northern guinea savannah
IP webpage:	
Participating villages	
Date IP establishment	
Institutions setting up the IP	
Funding agents	Federal Government
Number of years activities on the ground	
IP is still active or not	
Facilitators(names and contacts)	Dr. K. W. Gwadi – Millet Program Leader Email: kalesongwadi@ yahoo.co.uk Mobile number: 08032437128
IP members (regrouped by VC actors and sectors)	
Opportunities addressed	Scaling out: Southern guinea savannah zone Improved food quality:

	- Fat (5.6%) - Carbohydrate (77.40%) - Protein (9.0%)
Achievements to date	• Yields higher than ex Borno • Tillers better • Better seed setting • Average yield of 2 – 2.5 tons/ha • Early maturing (85-95 days after sowing) • Moderately tolerant to Striga
Challenges	Funding
Sustainability issues	• Continuous breeding research programs to develop new varieties • On -station and on -farm research activities • Training and retraining of researchers for better performance. • Continuous and sustained support eg funding by government to the research institutes
Phase in IP process (initial, maturity, independent)	

IP Name	**Fish value chain**
Entry Point or value chain (VC)	Reduction in post-harvest loses in fish
Innovations (technical or social and economic innovations)	Technical NIOMR Fish Smoking Equipment
Location (name and GPS coordinates in UTM or degrees)	Nigerian Institute for Oceanography and Marine Research (NIOMR), Lagos E-mail: Info@niomr.org
Intervention areas (regional/province/district/…)	All ecological zones of Nigeria Scaling out: Cameroon, Ghana, and Benin republic
IP webpage:	
Participating villages	
Date IP establishment	
Institutions setting up the IP	
Funding agents	Federal Government
Number of years activities on the ground	
IP is still active or not	
Facilitators(names and contacts)	Dr. Gbola Akande, Phone: 08023041060 Email: akandegra@yahoo.com

IP members (regrouped by VC actors and sectors)	
Opportunities addressed	
Achievements to date	100kg capacity smokes 200kg of fish per day while 250kg capacity smokes 500kg of fish per day
Challenges	Funding
Sustainability issues	Further research to reduce the weight of the equipment, thereby making it easy to be dismantled and assembled; the need for research towards good packaging of the equipment
Phase in IP process (initial, maturity, independent)	

IP Name	**Rice /Maize value chain**
Entry Point or value chain (VC)	Improved yield through better intercrop arrangements
Innovations (technical or social and economic innovations)	Social (improved practice) Improved upland rice/Maize spatial arrangement
Location (name and GPS coordinates in UTM or degrees)	N.C.R.I, Badeggi Email: ncribadeggi@yaoo.com
Intervention areas (regional/province/district/…)	All Agro-ecological Zones Scaling out: Sub-saharan Africa (SSA)
IP webpage:	
Participating villages	
Date IP establishment	
Institutions setting up the IP	
Funding agents	Federal Government
Number of years activities on the ground	
IP is still active or not	
Facilitators(names and contacts)	Dr. S.O. Bakare Phone: 08065717650 Email: oladelebakare@yahoo.co.uk

IP members (regrouped by VC actors and sectors)	
Opportunities addressed	
Achievements to date	Yield: 2.0 to 3.5 tons/ha (150 % Maize or Sorghum increase) Yield: 1.0 to 2.0 tons/ha (100 % for upland Rice)
Challenges	Funding
Sustainability issues	Multi-locational trials and aggressive extension efforts
Phase in IP process (initial, maturity, independent)	

IP Name	**Soya bean value chain**
Entry Point or value chain (VC)	Breeding for early maturing soya bean variety
Innovations (technical or social and economic innovations)	Technical Variety name: TGE 1987-62 F . TGX 1987- 1 DF, TGX 1904- 6 F, TGX 1835- 10 E
Location (name and GPS coordinates in UTM or degrees)	NCRI, Badeggi Email: ncribadeggi@yaoo.com
Intervention areas (regional/province/district/…)	Drought prone Agro-ecology Scaling up: Guinea & Sahel Savannah
IP webpage:	
Participating villages	
Date IP establishment	
Institutions setting up the IP	
Funding agents	Federal Government
Number of years activities on the ground	
IP is still active or not	
Facilitators(names and contacts)	Dr. M.N.Ishaq Email: mnishaq2003@yahoo.com
IP members (regrouped by VC actors and sectors)	

Opportunities addressed	
Achievements to date	
Challenges	Funding
Sustainability issues	Continuous breeding and selection to come out with improved varieties; Continuous cultivation of the improved varieties.
Phase in IP process (initial, maturity, independent)	

IP Name	**Sugar cane value chain**
Entry Point or value chain (VC)	Development of medium maturing varieties
Innovations (technical or social and economic innovations)	Technical Variety: NCS – 001,NCS- 002, NCS- 003, NCS – 005, NCS – 006, NCS- 007 and NCS - 008
Location (name and GPS coordinates in UTM or degrees)	NCRI, Badeggi Email: ncribadeggi@yaoo.com
Intervention areas (regional/province/district/…)	Sudan and Guinea savanna Agro-ecologies of Nigeria
IP webpage:	
Participating villages	
Date IP establishment	
Institutions setting up the IP	
Funding agents	
Number of years activities on the ground	
IP is still active or not	
Facilitators(names and contacts)	Dr. M.N.Ishaq Email: mnishaq2003@yahoo.com
IP members (regrouped by VC actors and sectors)	
Opportunities addressed	

Achievements to date	Yield improved: 100 – 110 t/ha
Challenges	
Sustainability issues	Continuous breeding and selection of improved varieties
Phase in IP process (initial, maturity, independent)	

IP Name	**Rice value chain**
Entry Point or value chain (VC)	See study 1
Innovations (technical or social and economic innovations)	Technical Variety: FARO 52, 44, 57, 35, and 51; FARO 46, 55, and 56
Location (name and GPS coordinates in UTM or degrees)	NCRI, Badeggi Email: ncribadeggi@yaoo.com
Intervention areas (regional/province/district/…)	Variety: FARO 52, 44, 57, 35, and 51; well adapted and cultivated improved rice varieties for rainfed and irrigated lowland rice ecologies of Nigeria FARO 46, 55, and 56 well adopted or cultivated improved upland rice varieties for moist and semi-arid agricultural zones of Nigeria
IP webpage:	
Participating villages	
Date IP establishment	
Institutions setting up the IP	
Funding agents	Federal Government
Number of years activities on the ground	
IP is still active or not	
Facilitators(names and contacts)	Dr. A.T. Maji Phone: 08030727786 Email: tswako@gmail.com

IP members (regrouped by VC actors and sectors)	
Opportunities addressed	See study 1
Achievements to date	see study 1
Challenges	Funding; Non-renewal of seed slides periodically, leading to dilution and loss of identify of this variety.
Sustainability issues	Breeder/foundation seed multiplication and dissemination; More extension work to spread the varieties to species rice growing ecologies; Continuous breeding effort to reinforce the varieties with stress genes from other cultivars; Farm need to be encourages to re-new seed slides periodically to avoid dilution and loss of identify of these varieties; Crop protection practice where necessary.
Phase in IP process (initial, maturity, independent)	

IP Name	**Rice value chain**
Entry Point or value chain (VC)	Rice processing for value addition
Innovations (technical or social and economic innovations)	Technical Rice processing machines
Location (name and GPS coordinates in UTM or degrees)	NCRI, Badeggi Email: ncribadeggi@yaoo.com
Intervention areas (regional/province/district/…)	Rice growing ecologies; possibly owned by cooperative Organizations
IP webpage:	
Participating villages	
Date IP establishment	
Institutions setting up the IP	
Funding agents	Federal Government
Number of years activities on the ground	

IP is still active or not	
Facilitators(names and contacts)	Dr. Gbabo Agidi Phone: 08036772988
IP members (regrouped by VC actors and sectors)	
Opportunities addressed	Rice processing technology consists of a sets of machines namely, Thresher, Winnower, Wet Cleaners, Rice Parboiler, Rotary Dryer, Rice Mills and Pneumatic Cleaners that are efficient and reliable to produce milled rice that is of very high quality and compares favourably with the imported
Achievements to date	Processing efficiency is about 90%
Challenges	Funding
Sustainability issues	Partnership approach, effective marketing channels, Functional credit facilities
Phase in IP process (initial, maturity, independent)	

IP Name	**Cowpea value chain**
Entry Point or value chain (VC)	Varietal improvement for high yield, day length neutral, upright podding habit and fast cooking
Innovations (technical or social and economic innovations)	Technical Improved Cowpea Variety (Ife Brown)
Location (name and GPS coordinates in UTM or degrees)	Institute of Agricultural Research & Training, Obafemi Awolowo University, Moor Plantation, Ibadan
Intervention areas (regional/province/district/…)	Forest and savannah agro-ecologies of Nigeria
IP webpage:	
Participating villages	
Date IP establishment	
Institutions setting up the IP	
Funding agents	

Number of years activities on the ground	
IP is still active or not	
Facilitators(names and contacts)	Dr. (Mrs.) S.R. Akande Email: remiajibade2002@yahoo.com Phone: 08073722622
IP members (regrouped by VC actors and sectors)	
Opportunities addressed	Grown in the forest and savanna agro-ecologies of Nigeria, West African countries
Achievements to date	Yield up to over 30% in the savanna and 25% in the forest ecologies higher than existing varieties
Challenges	Funding
Sustainability issues	Continuous dissemination of the technology by the extension agents, human capacity building, and creation of awareness
Phase in IP process (initial, maturity, independent)	

IP Name	**Maize value chain**
Entry Point or value chain (VC)	Development of improved variety of maize ART-98-SW6-OB (Faralokun)
Innovations (technical or social and economic innovations)	
Location (name and GPS coordinates in UTM or degrees)	Institute of Agricultural Research & Training. Obafemi Awolowo University, Moor Plantation, Ibadan Email: baogunbodede@iartng.org
Intervention areas (regional/province/district/…)	High Rain Forest, Derived Savannah, Southern Guinea Savannah, Northern Guinea Savannah Scaling up: Middle Belt, North Central, South-East in Nigeria, Niger Republic, Benin, Togo, Ivory Coast and Ghana
IP webpage:	
Participating villages	
Date IP establishment	
Institutions setting up the IP	

Funding agents	
Number of years activities on the ground	
IP is still active or not	
Facilitators(names and contacts)	Email: Dr. S. A. saolakojo@yahoo.co.uk Phone: 08051408802 or 08034671714
IP members (regrouped by VC actors and sectors)	
Opportunities addressed	This variety of maize has a high quality protein with high level of Lysine 3.67% and tryptophan 0.87%.
Achievements to date	Yield advantage of between 4.6-4.8 tons per hectare over the existing varieties yielding 2.5 tons/ha.
Challenges	
Sustainability issues	Continuous dissemination of the technologies by the extension agents, human capacity building, and creation of awareness
Phase in IP process (initial, maturity, independent)	

IP Name	**Maize value chain**
Entry Point or value chain (VC)	Development of improved variety of maize ILE-1-OB (Mayowa)
Innovations (technical or social and economic innovations)	Technical Improved variety of maize ILE-1-OB (Mayowa)
Location (name and GPS coordinates in UTM or degrees)	Institute of Agricultural Research & Training. Obafemi Awolowo University, Moor Plantation, Ibadan
Intervention areas (regional/province/district/…)	High Rain Forest, Derived Savannah, Southern Guinea Savannah, Northern Guinea Savannah Scaling up: Middle Belt, North Central, South-East in Nigeria, Niger Republic, Benin, Togo, Ivory Coast and Ghana
IP webpage:	
Participating villages	
Date IP establishment	

Institutions setting up the IP	
Funding agents	
Number of years activities on the ground	
IP is still active or not	
Facilitators(names and contacts)	Email: Dr. S. A. saolakojo@yahoo.co.uk Phone: 08051408802 or 08034671714
IP members (regrouped by VC actors and sectors)	
Opportunities addressed	This variety of maize has a high quality protein with high level of Lysine 3.72% and tryptophan 3.87%.
Achievements to date	Yield advantage of 3.87 tons per hectare across Oyo, Ogun, Kaduna and Bauchi; and 4.70-4.96 per hectare in other states over the existing 2.5 tons per hectare.
Challenges	
Sustainability issues	Continuous dissemination of the technologies by the extension agents, human capacity building, and creation of awareness
Phase in IP process (initial, maturity, independent)	

IP Name	**Tomato value chain**
Entry Point or value chain (VC)	Breeding for early maturity, bacterial wilt tolerance and high yield
Innovations (technical or social and economic innovations)	Technical Improved Tomato Variety JM94/54
Location (name and GPS coordinates in UTM or degrees)	National Horticultural Research Institute (NIHORT), Ibadan E-mail: nihortinfo@yahoo.com
Intervention areas (regional/province/district/…)	Rain forest and derived savannah
IP webpage:	
Participating villages	
Date IP establishment	
Institutions setting up the IP	

Funding agents	Federal Government
Number of years activities on the ground	
IP is still active or not	
Facilitators(names and contacts)	Dr O.A. Adetula Telephone: 08030789314/08023326946 Email: olagorite@yahoo.com
IP members (regrouped by VC actors and sectors)	
Opportunities addressed	
Achievements to date	Yield: 12 – 15 ton/ha (derived savannah)
Challenges	Funding
Sustainability issues	Institutionalization of multi-stakeholder platforms for technology development and adoption, impact assessment, multiplication and distribution of seeds
Phase in IP process (initial, maturity, independent)	

IP Name	**Okra value chain**
Entry Point or value chain (VC)	Breeding for improved draw quality; tolerance to root-knot nematode and viral disease and resistant to virus infection; early flowering,(40-50 days),stout deep green, spiny fruits; high yield.
Innovations (technical or social and economic innovations)	Technical Improved Okra variety NHAe 47
Location (name and GPS coordinates in UTM or degrees)	National Horticultural Research Institute (NIHORT), Ibadan Email: nihortinfo@yahoo.com
Intervention areas (regional/province/district/…)	Rain forest and derived savannah
IP webpage:	
Participating villages	
Date IP establishment	
Institutions setting up the IP	
Funding agents	Federal Government
Number of years activities on the ground	
IP is still active or not	
Facilitators(names and contacts)	Mrs F.M. Tairu, Telephone: 08034006194/07055302911
IP members (regrouped by VC actors and sectors)	

Opportunities addressed	
Achievements to date	Yield: 0.8 – 1.2 tons/ha (rainforest), 1.2tons/ha (derived savannah)
Challenges	Funding
Sustainability issues	Institutionalization of multi-stakeholder platforms for technology development and adoption, impact assessment
Phase in IP process (initial, maturity, independent)	

IP Name	**Okra value chain**
Entry Point or value chain (VC)	Breeding to improve reduction in days to flowering; tolerance to leaf curl mosaic virus; deep green smooth fruits with good draw quality.
Innovations (technical or social and economic innovations)	Technological NHAe LD 88 okra variety
Location (name and GPS coordinates in UTM or degrees)	National Horticultural Research Institute (NIHORT), Ibadan Email: nihortinfo@yahoo.com
Intervention areas (regional/province/district/…)	Rain forest and derived savannah
IP webpage:	
Participating villages	
Date IP establishment	
Institutions setting up the IP	
Funding agents	Federal Government
Number of years activities on the ground	
IP is still active or not	
Facilitators(names and contacts)	Mrs F.M. Tairu Telephone: 08034006194/0705530291 Email: folatairu@yahoo.com
IP members (regrouped by VC actors and sectors)	
Opportunities addressed	
Achievements to date	Yield: 0.58 tons/ha rainforest, 1.1 ton/ha (derived savannah)
Challenges	Funding
Sustainability issues	Institutionalization of multi-stakeholder platforms for technology development and adoption, impact assessment, availability of planting /materials
Phase in IP process (initial, maturity, independent)	

IP Name	Tomato value chain
Entry Point or value chain (VC)	Breeding for early maturity (56-60 days); bacterial wilt tolerance and high yield
Innovations (technical or social and economic innovations)	Technical Tomato MPWT-6
Location (name and GPS coordinates in UTM or degrees)	National Horticultural Research Institute (NIHORT), Ibadan Email: nihortinfo@yahoo.com
Intervention areas (regional/province/district/…)	Rain forest and derived savannah
IP webpage:	
Participating villages	
Date IP establishment	
Institutions setting up the IP	
Funding agents	
Number of years activities on the ground	
IP is still active or not	
Facilitators(names and contacts)	Dr O.A. Adetula Telephone: 08030789314/08023326946 Email: olagorite@yahoo.com
IP members (regrouped by VC actors and sectors)	
Opportunities addressed	
Achievements to date	Yield: 10 – 15 ton/ha (derived savannah)
Challenges	

Sustainability issues	Institutionalization of multi-stakeholder platforms for technology development and adoption, impact assessment, multiplication and distribution of seeds
Phase in IP process (initial, maturity, independent)	

IP Name	Poultry value change
Entry Point or value chain (VC)	Low input and affordable egg hatching equipment
Innovations (technical or social and economic innovations)	Technical Kerosene Incubator
Location (name and GPS coordinates in UTM or degrees)	National Veterinary Research Institute, Vom Email: nvri1924@yahoo.com
Intervention areas (regional/province/district/…)	All the six agro-ecological zones in Nigeria Scaling up: Central and West African sub-region
IP webpage:	
Participating villages	
Date IP establishment	
Institutions setting up the IP	
Funding agents	
Number of years activities on the ground	
IP is still active or not	
Facilitators(names and contacts)	Dr. J. U. Molokwu (Director, Planning) Email: nvri1924@yahoo.com Phone: 08033899983 07055578878

IP members (regrouped by VC actors and sectors)	
Opportunities addressed	It is a means for hatching eggs, especially in areas that have no electricity or urban centres where power supply is irregular. Suitable for rural areas, more rugged and affordable for small scale farmers. T
Achievements to date	Incubators available in 150, 300 and 500 hatchable egg capacity brands. There is early hatchability. It takes between 14-17 days for quails, 18 – 21days for chicken and 25-28 for turkey. Hatchability is 95%.
Challenges	
Sustainability issues	Specialized training Favourable government policies towards animal disease research, livestock health monitoring and livestock production (adequate funding, commercialization), Motivation.
Phase in IP process (initial, maturity, independent)	

IP Name	Poultry value chain
Entry Point or value chain (VC)	Development of Bacterial and Viral Vaccines for Poultry
Innovations (technical or social and economic innovations)	Technical Poultry Vaccines
Location (name and GPS coordinates in UTM or degrees)	National Veterinary Research Institute, Vom Email: nvri1924@yahoo.com
Intervention areas (regional/province/district/…)	All the six agro-ecological zones in Nigeria Scaling up: Central and West African sub-region
IP webpage:	
Participating villages	

Date IP establishment	
Institutions setting up the IP	
Funding agents	
Number of years activities on the ground	
IP is still active or not	
Facilitators(names and contacts)	Dr. J. U. Molokwu (Director, Planning) Email: nvri1924@yahoo.com Phone: 08033899983 07055578878
IP members (regrouped by VC actors and sectors)	
Opportunities addressed	Cover 35% of poultry vaccines demand for the nation
Achievements to date	Bacterial Vaccines: Fowl Cholera Vaccine (FCV): Liquid and killed Viral Vaccines: Newcastle Disease Vaccine (NDV): Infectious Bursal Disease Vaccine (IBDV) Gumboro
Challenges	
Sustainability issues	i. Production of Vaccine Master Seeds ii. Production of Vaccine Antigen Concentrates iii. Specialized equipment iv. Specialized training v. Favourable government policies towards animal vi. Disease research, livestock health monitoring and livestock production (adequate funding, commercialization), Motivation.

Phase in IP process (initial, maturity, independent)	

IP Name	Assorted crop value chain
Entry Point or value chain (VC)	Development of crop drying equipment
Innovations (technical or social and economic innovations)	Technical Email: HYBRID CROP DRYER
Location (name and GPS coordinates in UTM or degrees)	NIGERIAN STORED PRODUCTS RESEARCH INSTITUTE. Email: nspriheadquarters@yahoo.com
Intervention areas (regional/province/district/…)	All the six agro-ecological zones in Nigeria
IP webpage:	
Participating villages	
Date IP establishment	
Institutions setting up the IP	
Funding agents	
Number of years activities on the ground	
IP is still active or not	
Facilitators(names and contacts)	Engr. F.A. Babarinsa, Tel. 08033769653 E-mail: fababarinsa@yahoo.com
IP members (regrouped by VC actors and sectors)	
Opportunities addressed	The dryer is useful in rural communities as it uses thermal and solar energies as sources of heat. It is a permanent structure made of metal with low maintenance cost. The

IP Name	Assorted crop value chain
	thermal heat is generated from kerosene stove
Achievements to date	Can dry 50kg of produce within 8 hours or more depending on type of produce.
Challenges	
Sustainability issues	Incorporation of fan to produce forced ventilation.
Phase in IP process (initial, maturity, independent)	

IP Name	Assorted crop value
Entry Point or value chain (VC)	Improved seed storage and germinability using Inert Atmosphere Storage Silo
Innovations (technical or social and economic innovations)	Technical Inert Atmosphere Storage Silo
Location (name and GPS coordinates in UTM or degrees)	NIGERIAN STORED PRODUCTS RESEARCH INSTITUTE Email: nspriheadquarters@yahoo.com
Intervention areas (regional/province/district/…)	Tropical climate
IP webpage:	
Participating villages	
Date IP establishment	
Institutions setting up the IP	
Funding agents	

IP Name	Assorted crop value
Number of years activities on the ground	
IP is still active or not	
Facilitators(names and contacts)	Engr. F.A. Babarinsa Tel: 08033769653 E-mail: fababarinsa@yahoo.com
IP members (regrouped by VC actors and sectors)	
Opportunities addressed	Temperature and pressure kept constant during night and day thus avoiding pressure build up which results in moisture condensation. Caking and cracking of grains are avoided and grains are kept for any period of time nitrogen is retained inside the silo.
Achievements to date	Quality of grains is retained. Over 90% germinability have been recorded depending on type of grain
Challenges	
Sustainability issues	Extraction of Nitrogen from atmosphere to achieve low cost, availability and direct purging. Research into use of smaller containers like plastic water tanks, small bins, brick silos etc for accessibility of small holders. This technology should be incorporated into governmental and non-governmental food storage systems like Strategic Grains Reserve Programme to demonstrate and compare its efficiency with imported technologies, that are meant for temperate climate
Phase in IP process (initial, maturity, independent)	

IP Name	Fish value chain
Entry Point or value chain (VC)	Improvement in fish smoking equipment

IP Name	Fish value chain
Innovations (technical or social and economic innovations)	Technical Fish smoking Kiln
Location (name and GPS coordinates in UTM or degrees)	NIGERIAN STORED PRODUCTS RESEARCH INSTITUTE Email: nspsriheadquarters@yahoo.com
Intervention areas (regional/province/district/…)	
IP webpage:	
Participating villages	
Date IP establishment	
Institutions setting up the IP	
Funding agents	
Number of years activities on the ground	
IP is still active or not	
Facilitators(names and contacts)	S.I. Roberts Phone: 0803783394 Email: rbtsimon@yahoo.com
IP members (regrouped by VC actors and sectors)	
Opportunities addressed	The fish smoking kiln is capable of drying up to 50kg of fish. It uses firewood or charcoal as sources of heat
Achievements to date	The kiln can dry 50kg of fish within 4 hours
Challenges	Funding
Sustainability issues	Use of other sources of heat like gas, electricity.

IP Name	Fish value chain
Phase in IP process (initial, maturity, independent)	

IP Name	Maize value chain
Entry Point or value chain (VC)	Varietal improvement for early maturity and high yield
Innovations (technical or social and economic innovations)	Technical Sammaz 28 and 29 are extra early maturing Sammaz 18,20,21,27 are early maturing Sammaz 17, 19, 26 are intermediate maturing Sammaz 30, 31 are late maturing, Low N tolerant Sammaz 22, 23, 24 and 25 are drought tolerant hybrids, late maturing
Location (name and GPS coordinates in UTM or degrees)	Institute for Agricultural Research, Samaru, Zaria Email: iar20002001@yahoo.com or iarsamaru@abu.edu.ng
Intervention areas (regional/province/district/…)	Sudan Savanna, Northern and Southern Guinea Savanna and Forest zone Scaling up: West and Central Africa as shown by IITA Regional Uniform Variety Trial
IP webpage:	
Participating villages	
Date IP establishment	
Institutions setting up the IP	
Funding agents	

IP Name	Maize value chain
Number of years activities on the ground	
IP is still active or not	
Facilitators(names and contacts)	Email: iar20002001@yahoo.com or iarsamaru@abu.edu.ng
IP members (regrouped by VC actors and sectors)	
Opportunities addressed	
Achievements to date	Sammaz 17 4,500 Sammaz 25 5,500 Sammaz 18 4,000 Sammaz 26 3,500 Sammaz 19 4,500 Sammaz 27 4,500 Sammaz 20 4,000 Sammaz 28 3,500 Sammaz 21 4,500 Sammaz 29 3,500 Sammaz 22 5,000 Sammaz 30 3,500 Sammaz 23 5,000 Sammaz 31 3,500 Sammaz 24 5,000
Challenges	
Sustainability issues	Adequate funding, research infrastructure and consumable inputs
Phase in IP process (initial, maturity, independent)	

IP Name	Sorghum value chain
Entry Point or value chain (VC)	High yielding, good for malting
Innovations (technical or social and economic innovations)	Technical SAMSORG 17
Location (name and GPS coordinates in UTM or degrees)	Institute for Agricultural Research, A.B.U. Zaria Email: iar20002001@yahoo.com
Intervention areas (regional/province/district/…)	Northern Guinea and Southern Guinea Savannah Scaling up: Nigeria, Ghana and Cameroon
IP webpage:	
Participating villages	
Date IP establishment	
Institutions setting up the IP	
Funding agents	
Number of years activities on the ground	
IP is still active or not	
Facilitators(names and contacts)	Prof. D.A. Aba Email: danafangdan@yahoo.com Phone: 08035044260
IP members (regrouped by VC actors and sectors)	
Opportunities addressed	Good for food, Industrial use (confectionary) and for malting.
Achievements to date	
Challenges	

IP Name	Sorghum value chain
Sustainability issues	Funds needed for farmer training in seed production/farmer participatory seed production/seed companies
Phase in IP process (initial, maturity, independent)	

IP Name	Sorghum value chain
Entry Point or value chain (VC)	Medium maturing variety, good height and good yield.
Innovations (technical or social and economic innovations)	Technical SAMSORG 8
Location (name and GPS coordinates in UTM or degrees)	Institute for Agricultural Research, A.B.U. Zaria Email: iar20002001@yahoo.com
Intervention areas (regional/province/district/…)	Sudan and Northern Guinea Scaling up: Nigeria, Ghana, Cameroon, Niger, Burkina Faso and Mali
IP webpage:	
Participating villages	
Date IP establishment	
Institutions setting up the IP	
Funding agents	
Number of years activities on the ground	
IP is still active or not	
Facilitators(names and contacts)	Prof. D.A. Aba Email: danafangdan@yahoo.com

IP Name	Sorghum value chain
	Phone: 08035044260
IP members (regrouped by VC actors and sectors)	
Opportunities addressed	Good for food, Industrial use (confectionary) and for malting.
Achievements to date	
Challenges	
Sustainability issues	Funds needed for farmer training in seed production/farmer participatory seed production/seed companies
Phase in IP process (initial, maturity, independent)	

IP Name	Sorghum value chain
Entry Point or value chain (VC)	Tolerant to Striga
Innovations (technical or social and economic innovations)	Technical SAMSORG 14
Location (name and GPS coordinates in UTM or degrees)	Institute for Agricultural Research, A.B.U. Zaria Email: iar20002001@yahoo.com
Intervention areas (regional/province/district/…)	Sudan/Guinea Savannah Scaling up: Nigeria, Ghana, Cameroon, Mali, Burkina Faso and Niger
IP webpage:	
Participating villages	
Date IP establishment	

IP Name	Sorghum value chain
Institutions setting up the IP	
Funding agents	
Number of years activities on the ground	
IP is still active or not	
Facilitators(names and contacts)	Prof. D.A. Aba Email: danafangdan@yahoo.com Phone: 08035044260
IP members (regrouped by VC actors and sectors)	
Opportunities addressed	Good for food, Industrial use (confectionary) and for malting.
Achievements to date	
Challenges	
Sustainability issues	Funds needed for farmer training in seed production/farmer participatory seed production/seed companies
Phase in IP process (initial, maturity, independent)	

IP Name	Sorghum value chain
Entry Point or value chain (VC)	Very Early Maturing Variety, Dwarf Sorghum.
Innovations (technical or social and economic innovations)	Technical SAMSORG 5
Location (name and GPS coordinates in UTM or degrees)	Institute for Agricultural Research, A.B.U. Zaria

IP Name	Sorghum value chain
	Email: iar20002001@yahoo.com
Intervention areas (regional/province/district/…)	Sudan and Sahel Savannah Scaling up: Nigeria, Cameroon, Niger, Mali and Burkina Faso
IP webpage:	
Participating villages	
Date IP establishment	
Institutions setting up the IP	
Funding agents	
Number of years activities on the ground	
IP is still active or not	
Facilitators(names and contacts)	Prof. D.A. Aba Email: danafangdan@yahoo.com Phone: 08035044260
IP members (regrouped by VC actors and sectors)	
Opportunities addressed	Good for food, Industrial use (confectionary) and for malting.
Achievements to date	
Challenges	
Sustainability issues	Funds needed for farmer training in seed production/farmer participatory seed production/seed companies

IP Name	Sorghum value chain
Phase in IP process (initial, maturity, independent)	

IP Name	Sorghum value chain
Entry Point or value chain (VC)	Non lodging, drought tolerant, variety with good response to fertilizers, grains have good food and malting
Innovations (technical or social and economic innovations)	Technical SAMSORG 40
Location (name and GPS coordinates in UTM or degrees)	Institute for Agricultural Research, A.B.U. Zaria Email: iar20002001@yahoo.com
Intervention areas (regional/province/district/…)	Sudan and Sahel Savannah Scaling up: Nigeria, Ghana, Niger, Mali and Burkina Faso
IP webpage:	
Participating villages	
Date IP establishment	
Institutions setting up the IP	
Funding agents	
Number of years activities on the ground	
IP is still active or not	
Facilitators(names and contacts)	Prof. D.A. Aba Email: danafangdan@yahoo.com Phone: 08035044260

IP Name	Sorghum value chain
IP members (regrouped by VC actors and sectors)	
Opportunities addressed	Good for food, Industrial use (confectionary) and for malting.
Achievements to date	
Challenges	
Sustainability issues	Funds needed for farmer training in seed production/farmer participatory seed production/seed companies
Phase in IP process (initial, maturity, independent)	

IP Name	Sorghum value chain
Entry Point or value chain (VC)	Hard grains with good local food quality, high yield and drought tolerant.
Innovations (technical or social and economic innovations)	Technical SAMSORG 41
Location (name and GPS coordinates in UTM or degrees)	Institute for Agricultural Research, A.B.U. Zaria Email: iar20002001@yahoo.com
Intervention areas (regional/province/district/…)	Sudan and Sahel Savannah Scaling up: Nigeria, Ghana, Cameroon, Niger, Burkina Faso and Mali
IP webpage:	
Participating villages	
Date IP establishment	

IP Name	Sorghum value chain
Institutions setting up the IP	
Funding agents	
Number of years activities on the ground	
IP is still active or not	
Facilitators(names and contacts)	Prof. D.A. Aba Email: danafangdan@yahoo.com Phone: 08035044260
IP members (regrouped by VC actors and sectors)	
Opportunities addressed	Good for food quality and drought tolerance
Achievements to date	
Challenges	
Sustainability issues	Funds needed for farmer training in seed production/farmer participatory seed production/seed companies
Phase in IP process (initial, maturity, independent)	

IP Name	Sorghum value chain
Entry Point or value chain (VC)	Semi-dwarf, Medium Maturing Variety
Innovations (technical or social and economic innovations)	Technical SAMSORG 13
Location (name and GPS coordinates in UTM or degrees)	Institute for Agricultural Research, A.B.U. Zaria

IP Name	Sorghum value chain
	Email: iar20002001@yahoo.com
Intervention areas (regional/province/district/…)	Sudan and Guinea Savannah Scaling up: Nigeria, Cameroon, Ghana, Niger and Burkina Faso
IP webpage:	
Participating villages	
Date IP establishment	
Institutions setting up the IP	
Funding agents	
Number of years activities on the ground	
IP is still active or not	
Facilitators(names and contacts)	Prof. D.A. Aba Email: danafangdan@yahoo.com Phone: 08035044260
IP members (regrouped by VC actors and sectors)	
Opportunities addressed	Good for food and for Industrial use
Achievements to date	
Challenges	
Sustainability issues	Funds needed for farmer training in seed production/farmer participatory seed production/seed companies

IP Name	Sorghum value chain
Phase in IP process (initial, maturity, independent)	

IP Name	Sorghum value chain
Entry Point or value chain (VC)	High Yielding, Early Maturing
Innovations (technical or social and economic innovations)	Technical SAMSORG 38
Location (name and GPS coordinates in UTM or degrees)	Institute for Agricultural Research, A.B.U. Zaria Email: iar20002001@yahoo.com
Intervention areas (regional/province/district/…)	Sudan Savannah Scaling up: Nigeria, Ghana, Niger, Burkina Faso and Mali
IP webpage:	
Participating villages	
Date IP establishment	
Institutions setting up the IP	
Funding agents	
Number of years activities on the ground	
IP is still active or not	
Facilitators(names and contacts)	Prof. D.A. Aba Email: danafangdan@yahoo.com Phone: 08035044260

IP Name	Sorghum value chain
IP members (regrouped by VC actors and sectors)	
Opportunities addressed	Good for food and hybrid crosses
Achievements to date	
Challenges	
Sustainability issues	Funds needed for farmer training in seed production/farmer participatory seed production/seed companies
Phase in IP process (initial, maturity, independent)	

IP Name	Sorghum value chain
Entry Point or value chain (VC)	Early Maturing, tolerant to Striga, and good palatability.
Innovations (technical or social and economic innovations)	Technical SAMSORG 3
Location (name and GPS coordinates in UTM or degrees)	Institute for Agricultural Research, A.B.U. Zaria Email: iar20002001@yahoo.com
Intervention areas (regional/province/district/…)	Sudan Savannah Scaling up: Nigeria, Ghana, Cameroon, Niger, Burkina Faso and Mali
IP webpage:	
Participating villages	
Date IP establishment	
Institutions setting up the IP	

IP Name	Sorghum value chain
Funding agents	
Number of years activities on the ground	
IP is still active or not	
Facilitators(names and contacts)	Prof. D.A. Aba Email: danafangdan@yahoo.com Phone: 08035044260
IP members (regrouped by VC actors and sectors)	
Opportunities addressed	Good for food and Industrial use
Achievements to date	
Challenges	
Sustainability issues	Funds needed for farmer training in seed production/farmer participatory seed production/seed companies
Phase in IP process (initial, maturity, independent)	

IP Name	Sorghum value chain
Entry Point or value chain (VC)	High yielding late maturing variety
Innovations (technical or social and economic innovations)	Technical SAMSORG 16
Location (name and GPS coordinates in UTM or degrees)	Institute for Agricultural Research, A.B.U. Zaria Email: iar20002001@yahoo.com

IP Name	Sorghum value chain
Intervention areas (regional/province/district/…)	Southern and Northern Guinea savannah Scaling up: Nigeria, Ghana, Cameroon, Niger, Burkina Faso and Mali
IP webpage:	
Participating villages	
Date IP establishment	
Institutions setting up the IP	
Funding agents	
Number of years activities on the ground	
IP is still active or not	
Facilitators(names and contacts)	Prof. D.A. Aba Email: danafangdan@yahoo.com Phone: 08035044260
IP members (regrouped by VC actors and sectors)	
Opportunities addressed	High yielding, good for confectionaries
Achievements to date	
Challenges	
Sustainability issues	Funds needed for farmer training in seed production/farmer participatory seed production/seed companies
Phase in IP process (initial, maturity, independent)	

IP Name	Cowpea value chain
Entry Point or value chain (VC)	SAMPEA-8 (Extra-early maturing) for production in all the Savanna agro-ecological zones of Nigeria. SAMPEA-9 (Medium maturing) for production in the Sudan, Northern Guinea Savanna and Forest agro-ecological zones of Nigeria. SAMPEA-10 (Early maturing) for production in the Sudan, Northern Guinea and Derived Savanna agro-ecological zones of Nigeria. SAMPEA-11 (Medium maturing) for production in all the Savanna agro-ecological zones of Nigeria. SAMPEA-12 (Medium maturing) for production in the Northern and Southern Guinea Savanna agro-ecological zones of Nigeria
Innovations (technical or social and economic innovations)	
Location (name and GPS coordinates in UTM or degrees)	
Intervention areas (regional/province/district/…)	SAMPEA-8 (Sudan and Northern Guinea Savanna) SAMPEA-9 (All Savanna zones) SAMPEA-10 (Northern Guinea Savanna) SAMPEA-11 (Northern Guinea Savanna) SAMPEA-12 (All Savanna zones) Scaling up: SAMPEA-8: 2.0 tons/ha in the Sudan and Northern Guinea Savanna of West Africa. SAMPEA-9: 2.3 tons/ha in the Northern Guinea Savanna of West Africa SAMPEA-10: 1.5 tons/ha in the Northern Guinea Savanna of West Africa SAMPEA-11: 1.6 tons/ha in the Northern Guinea Savanna

IP Name	Cowpea value chain
	of West Africa SAMPEA-12: 2.3 tons/ha in the Northern Guinea Savanna of West Africa
IP webpage:	
Participating villages	
Date IP establishment	
Institutions setting up the IP	
Funding agents	
Number of years activities on the ground	
IP is still active or not	
Facilitators(names and contacts)	E-mail: ogunwolejo@gmail.com
IP members (regrouped by VC actors and sectors)	
Opportunities addressed	SAMPEA-8: Good seed quality, insect pest tolerance and white seeded. SAMPEA-9: Dual purpose, resistant to common cowpea disease and good fodder quality. SAMPEA-10: Resistant to Striga and Bacteria SAMPEA-11: Photosensitive dual purpose, resistant to common disease SAMPEA-12: Medium brown seed
Achievements to date	
Challenges	
Sustainability issues	Improve cultural practices to improve yield and reduce pest incidence

IP Name	Cowpea value chain
Phase in IP process (initial, maturity, independent)	

IP Name	Oil palm value chain
Entry Point or value chain (VC)	Improved oil palm (tenera) variety, yielding 20 – 25 tonnes FFB/ha per year, Fusarium wilt resistant, drought tolerant, early maturing, coming to bearing 2 ½ - 3 years
Innovations (technical or social and economic innovations)	Technical NIFOR Tenera Hybrid Oil Palm variety
Location (name and GPS coordinates in UTM or degrees)	NIGERIAN INSTITUTE FOR OIL RESEARCH (NIFOR) E-mail: info@nifor.org
Intervention areas (regional/province/district/…)	The oil palm belt of Nigeria from the Rain Forest to the Forest savannah regions Scaling up: Cameroon, Ghana, Angola, Zaire, Togo, Gambia, etc. (Costal countries in West & Central Africa)
IP webpage:	www.nifor.org
Participating villages	
Date IP establishment	
Institutions setting up the IP	
Funding agents	
Number of years activities on the ground	

IP Name	Oil palm value chain
IP is still active or not	
Facilitators(names and contacts)	The Executive Director; info@nifor.org; The Head, Plant Breeding Division; breeding@nifor.org;
IP members (regrouped by VC actors and sectors)	
Opportunities addressed	
Achievements to date	
Challenges	
Sustainability issues	Sustained germplasm collection; conservation and exploitation; extension channels; soil fertility management across the oil palm belt
Phase in IP process (initial, maturity, independent)	

IP Name	Oil palm value chain
Entry Point or value chain (VC)	Development of simple cottage type small scale processing equipment suitable for small scale producers
Innovations (technical or social and economic innovations)	Technical NIFOR SSPE (Small Scale Processing Equipment
Location (name and GPS coordinates in UTM or degrees)	Nigerian Institute for Oil Palm Research (NIFOR) Email: info@nifor.org
Intervention areas (regional/province/district/…)	Rain-Forest Zone and Derived Savannah (Forest Savannah)
IP webpage:	www.nifor.org
Participating villages	

IP Name	Oil palm value chain
Date IP establishment	
Institutions setting up the IP	Extension services of States, Farmers, NGOs, processors; Adopted Villages and Agricultural Research Outreach Centers(AROCs)
Funding agents	
Number of years activities on the ground	
IP is still active or not	
Facilitators(names and contacts)	The Executive Director: info@nifor.org The Head, Agricultural Engineering Research Division: engineering@nifor.org
IP members (regrouped by VC actors and sectors)	
Opportunities addressed	Improved extraction of palm oil, 18% extraction against 10% by traditional; Methods or locally designed and fabricated mills, lower FFA, higher palm oil quality, reduced drudgery
Achievements to date	The NIFOR Large: 0.5 -1.0 tonne FFB/hr, capable of processing FFB from 50-100 hectare plantation The NIFOR Medium: 0.25 -0.5 tonne FFB/hr, designed for farmers with holding of 20 – 50 hectares. The NIFOR Mini: Designed for farmers with less than 20hectares, and appropriate for cottage palm oil production.
Challenges	
Sustainability issues	Improvement on bunch stripping and incorporation of low pressure sterilizer/cooker; integration of palm kernel recovery units
Phase in IP process (initial, maturity, independent)	

IP Name	Cassava value chain
Entry Point or value chain (VC)	Breeding of improved cassava varieties
Innovations (technical or social and economic innovations)	Technical TMS 97/2205,98/0581,98/0505,98/0510,TME 419,TM 92/0326,TMS 96/1632,TMS980002,TMS92/0057,NR 87184, NR 41044 ,TMS 30555, TMS 50395, TMS 30001, TMS 30572, TMS 4(2)1425, TMS 91934, NR 8208, NR 8083, NR 83107, NR 8212, NR 8082 , TMS 81/00110, TMS 90257, TMS 84537, TMS 82/00058, TMS 82/00661.
Location (name and GPS coordinates in UTM or degrees)	National Root Crops Research Institute (NRCRI), Umudike, Abia State, Nigeria Email: nrcriumudike@yahoo.com
Intervention areas (regional/province/district/…)	Rain Forest, Derived Savanna and Guinea Savanna ecologies Scaling up: Sudan and Sahel savanna ecologies
IP webpage:	www.nrcri.gov.ng
Participating villages	
Date IP establishment	
Institutions setting up the IP	
Funding agents	
Number of years activities on the ground	
IP is still active or not	
Facilitators(names and contacts)	Dr. Eke-okoro O. N. Email: nrcriumudike@yahoo.com
IP members (regrouped by VC actors and sectors)	

IP Name	Cassava value chain
Opportunities addressed	Gradual replacement of low yielding cassava varieties from farmers' fields by the improved varieties
Achievements to date	High fresh root yield, high quality of cassava products , such as cassava flour, high resistant/tolerant to major cassava pests and diseases and wide ecological adaptation
Challenges	
Sustainability issues	There is need to develop effective means of preserving the cassava cutting after harvest. There is also the need to further research on prolonging storage of cassava tubers in the field and after harvest.
Phase in IP process (initial, maturity, independent)	

IP Name	Cassava value chain
Entry Point or value chain (VC)	
Innovations (technical or social and economic innovations)	Technical Cassava stem multiplication Technology (CSMT)
Location (name and GPS coordinates in UTM or degrees)	National Root Crops Research Institute (NRCRI), Umudike, Abia State, Nigeria. Email: nrcriumudike@yahoo.com
Intervention areas (regional/province/district/…)	All the cassava growing ecologies-Nigeria especially, the Rainforest, derived savannah, Guinea savannah ecologies Scaling up: The cassava growing countries in Africa, Nigeria, Congo, Malawi, Tanzania as well as rainforest and guinea savannah ecologies.
IP webpage:	www.nrcri.gov.ng
Participating villages	
Date IP establishment	

IP Name	Cassava value chain
Institutions setting up the IP	
Funding agents	
Number of years activities on the ground	
IP is still active or not	
Facilitators(names and contacts)	Dr. Eke-okoro O. N. Email: nrcriumudike@yahoo.com
IP members (regrouped by VC actors and sectors)	the States' ADPs, Farmers, NGOs, Universities, Rural Farm groups, Agric Research Outreach Centres (AROCs), NRCRI project farms
Opportunities addressed	The CSM Technology produces an average of 800 cassava stem bundles/ha from initial 50bundles/ha planted at the onset of the cropping year
Achievements to date	Rapidly multiplying stems of choice cassava variety into several bundles within one cropping year; Allows the harvest of stems of choice variety twice within a cropping year; Facilitates the multiplication, availability and dissemination of elite cassava varieties developed by NRCRI and IITA; Supports farmers' capacity to provide own planting materials; Supports stem production and marketing enterprises for income generation.
Challenges	
Sustainability issues	Critical production inputs such as fertilizer, agro-chemicals should be readily available and affordable to the farmers to facilitate adoption of the technology
Phase in IP process (initial, maturity, independent)	

IP Name	Maize value chain
Entry Point or value chain (VC)	Development of labour-saving, high capacity maize processing machine
Innovations (technical or social and economic innovations)	Technical Portable Maize Sheller
Location (name and GPS coordinates in UTM or degrees)	Federal College of Agriculture, Ibadan Email: fcaibadan@yahoo.com
Intervention areas (regional/province/district/…)	For small-scale farmers in all the agro-ecological zones in the country where maize is cultivated
IP webpage:	
Participating villages	
Date IP establishment	
Institutions setting up the IP	
Funding agents	
Number of years activities on the ground	
IP is still active or not	
Facilitators(names and contacts)	
IP members (regrouped by VC actors and sectors)	
Opportunities addressed	Prompt shelling; reduction in post-harvest losses
Achievements to date	The capacity is 500kg per hour. Farmers in Oyo and Ogun states who used the machines reported a reduction in losses of about 30% harvested product due to prompt shelling (and reduction in exposure to deterioration and disease/pest attack).
Challenges	

IP Name	Maize value chain
Sustainability issues	The prototype is in commercialisable stage. What is mainly needed is equipment to mass produce them at college level. Such machines are sheet metal cutting, bending and rolling machines. And regular electricity supply from the mains or generator.
Phase in IP process (initial, maturity, independent)	

IP Name	Maize value chain
Entry Point or value chain (VC)	Development of labour-saving, high capacity maize processing machine
Innovations (technical or social and economic innovations)	Technical Industrial Type Maize Sheller
Location (name and GPS coordinates in UTM or degrees)	Federal College of Agriculture, Ibadan
Intervention areas (regional/province/district/…)	For use by maize farmers in all zones suitable for maize production. It is intended for farms of from 5 hectares and above. Has been sold to farms such as Long Acres farms, Ondo state and many others Scaling up: All the countries in Sub-Sahara Africa where maize is cultivated on large scale
IP webpage:	
Participating villages	
Date IP establishment	
Institutions setting up the IP	
Funding agents	
Number of years activities on the ground	
IP is still active or not	

IP Name	Maize value chain
Facilitators(names and contacts)	Dr. T. A. Adegbulugbe Email: thomasadegbulugbe@yahoo.com
IP members (regrouped by VC actors and sectors)	
Opportunities addressed	
Achievements to date	Industrial Type Maize Sheller; high capacity (1,500kg per hr); with two major advantage over existing imported equivalent types in that if incorporates tractor lifting attachment. It is also of dual-operation (can be operated by any engine type-diesel, petrol or electric motor and also directly by a tractor through the latter's PTO shaft) Feedback from users indicate it could shell 12tons conveniently in an 8hours working day. Among the economic (i.) A lot of savings due to reduction in labour requirements (ii.) Quick shelling achieved resulting in elimination of about 30% losses due to pest and mould attack during storage of unshelled maize (iii.) Faster drying achieved for the (less bulky and easier to handle) shelled maize product.
Challenges	
Sustainability issues	The college needs more workshop equipment such as Lathe Machine, Sheet Metal Cutting, Rolling and Bending Machines to facilitate more research into the above equipment.
Phase in IP process (initial, maturity, independent)	