Monitoring and Evaluating Progress on IITA Key Performance Indicators (KPIs):

Projects Survey, 2019 – 2021

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Monitoring Evaluation and Learning Unit
International Institute of Tropical Agriculture (IITA)

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Executive Summary

Introduction

This report describes the IITA key performance indicators (KPIs) survey conducted by the ME&L Unit in 2021. As a follow-up to the previous survey conducted in 2019, the scope of the current survey involved collecting data on KPIs from 2019 to 2021. The goals of the survey were two-fold: (1) to contribute to data aggregation and alignment functions of IITA's institutional KPIs and the CGIAR system-level outcomes (SLOs) and (2) to generate verifiable information for strategic decision-making through the aggregation of data from all projects.

Based on the goals, the following two objectives were formulated: (1) to monitor and evaluate the progress of the 13 KPIs, including poverty indicators in CRP and IITA strategic projects, (2) to recommend a method of working for project improvement and better data collection of data on KPIs. The survey attempted to answer two research questions: (1) What is the progress on the 13 KPIs so far? (2) What should change in terms of project improvement and collection of KPI data?

Methodology

A quantitative research method was applied to achieve these objectives and answer the questions posed. A survey was designed based on the 13 KPIs. Data from farm household surveys and project records were collected from project managers and CRP focal points for three months in 2021 through an online survey questionnaire, face-to-face interviews, and Skype calls. Of the 172 active projects in IITA (June 2021), 42 projects participated in the survey, about a 24% response rate. The data were cleaned and analyzed per indicator as aggregates and percentage changes in MS Excel and Stata.

The IITA M&E includes the KPI Poverty on the number of persons lifted out of poverty as an outcome indicator and 12 institutional KPIs.

Key results and conclusions

KPI 1 **Yield:** Based on the data so far collected from six projects, a high percentage change (175%) in the yield (1.1 t/ha) of cowpea in Mozambique was observed in 2020 compared to the baseline (0.4 t/ha) in 2019. In 2021, the yield increased to 1.2 t/ha resulting in a 200% change. Also, in Nigeria, maize recorded a 180% increase in yield (14 t/ha) in 2020 compared to the yield (5 t/ha) in 2019. Yield increase for maize was

due to a combination of better hybrids and crop management practices (e.g., maize intercropping with cassava). A negative percentage change (-19%) was observed in the yield of soybean in Mozambique in 2020. This contrasts with the positive increases in the percentage change in yield of soybean observed in Mozambique in 2017 and 2018 (see report on Monitoring IITA KPIs, 2017 to 2019).
We conclude that the direction of change in the yield of cowpea and maize is on the increase. Percentage change in yield could not be estimated for cassava, yam, and other IITA priority commodities because project managers did not provide data during the reporting period.

KPI 2: **Sustainable Land Use (SLU):** Based on the data contributed by 12 projects from the four hubs, the total area under SLU from 2019 to 2021 was 762,908.32 ha, representing a 10% increase in the target area under SLU in line with the IITA refreshed strategy. If we aggregate the land area under SLU (497,082 ha) from the previous KPIs survey of 2019 and the current survey of 2021, we will achieve a total area of 1,259,990.32 ha, representing 17% of the target area under SLU in line with IITA's refreshed strategy. This is a significant achievement so far. But it is important to mention that not all projects working on SLU practices provided data during the reporting period. We, therefore, recommend more investment in data collection and extensive study on land area under SLU practices in the new One CGIAR initiatives, especially those related to resilience in agri-food systems (RAFS).

KPI 3: **Adoption of IITA improved varieties, production technologies, and management practices**
Based on the adoption data so far provided by 13 projects, 1,005,845 farmers were reached and 269,612 adopted IITA improved varieties, production technologies, and management practices. We computed an overall adoption rate of 27% for all improved technologies. We observed an increase in the adoption rate (36%) in 2020 compared to 2019 and 2021. Most technologies adopted were improved crop varieties (122%) and production technologies (95%). This should translate into an increase in the yield of improved IITA priority commodities as postulated in the theory of change. We noticed a progressive increase in cowpea yields in Mozambique and maize in Nigeria. We can conclude that the direction of change for adopting IITA improved varieties and production technologies by African farmers and value chain actors is increasing. More data from the farm household survey will provide a better picture of the observed relationship between adoption and increase in yield for other commodities.

We observed a decrease in the adoption rates of management practices and postharvest technologies. More work is needed by IITA scientists, national agricultural research systems (NARS), and the private sector to support farmers to increase the adoption of both technologies.

KPI 4 **Number of beneficiaries of biofortified crops**

Four projects from Nigeria (Western Hub) and Malawi (Southern Hub) working on cassava, maize, cowpea, and soybean provided data on this indicator. A total of 89,182 farmers benefited directly and indirectly from fortified IITA in 2019 and 2021. More people benefited from biofortified maize (42,936) in Nigeria than the other crops. Most of the growers of biofortified crops were male farmers compared to women farmers. Therefore, we recommend that future scaling projects on biofortified crops be targeted at women and youth farmers.

KPI 5 **Number of innovations developed**

The number of technological innovations developed by IITA scientists has continued to increase. In total, 329 technology innovations were developed by 17 projects between 2019 and 2021 at different innovation phases. The most innovations developed were production technologies (160), new varieties (150), and few improved management practices (19). About 47 of the technologies were available for uptake and 29 of the technologies were taken up by the stakeholders to disseminate them to the end-users. This is an opportunity for IITA P4D and BIP to mobilize human and financial resources to scale up the technologies to end-users.

KPI 6 **Number of new jobs created:** In total, 11,190 jobs were created by five projects from 2019 to 2021, mostly around processing (7337), production (2344), and distribution (1509). This is a significant increase compared to the number of jobs created during the previous survey of KPIs in 2019. The IITA priority crop, cassava, attracted more jobs in 2021 than in other years and mostly along the processing, production, and distribution value chains. Most jobs were created in the cassava processing stage in Malawi.

KPI 7 **Number of agribusiness ventures scaled out**

A total of 76 stakeholders scaled out agribusiness ventures over the period under review by five projects. The highest number of agribusinesses scaled out was in

production (47), followed by processing (16) and distribution (13). In Nigeria, agribusiness ventures were mostly scaled out in cassava production in 2021. While in Malawi, stakeholders scaled out in all the value chains with the highest in processing in 2021. Stakeholders that scaled out agribusiness ventures in Malawi created more jobs in 2021 in cassava processing (see KPI 6). In Benin, cowpea was the major crop that was scaled out along all the stages of the value chain over the reporting period. This result indicates an improvement in the scaling up of agribusiness ventures in production and less in processing and distribution. We, therefore, recommend that future IITA projects focus more on scaling out agribusiness ventures in the value chain areas of processing and distribution.

KPI 8 **Number of people trained**

The total number of people trained between 2019 and 2021 was 75,599. In general, more men (66%) were trained than women (34%). More people were trained in 2020 (62,271) than in 2019 (11,278) and 2021 (2050). The number of people trained sharply declined in 2021. This may be because of the Covid-19 pandemic and because most IITA scientists were busy writing proposals for the One CGIAR initiatives.

KPI 9 **Number of partnerships formed**

A total of **2858** partnerships were formed with 35 projects from 2019 to 2021. More informal partnerships were formed than formal partnerships. An increase in the number of informal partnerships formed by IITA projects in 2020 and 2021 also increased the adoption rate of improved technologies, yield, agribusiness ventures, jobs, and training. This result is in line with our theory of change. More formal partnerships were formed in 2019, but we observed a low adoption rate, few agribusiness ventures scaled out, and fewer jobs in that year. We, therefore, conclude that increased informal and formal partnerships will lead to increased agribusiness ventures scaled out, thereby contributing to the increased adoption rate of commodities, yield, jobs, and income. We recommend, therefore, that the informal partnerships so far formed between IITA projects and other private, public, and CGIAR centers be formalized with MOUs.

KPI 10 **Number of Publications**

A total of 704 publications were produced, out of which 449 were made available on Open Access during the reporting period. Most publications were produced in 2020. We can conclude that more publications were produced due to an increase in other

indicators such as adoption rate, yield, partnerships formed, jobs created, training, research strategies, and agribusiness ventures scaled out, among others.

KPI 11 **Gender**

Available data from 11 projects indicate that the consideration of gender issues in projects occurred highly in IITA projects implemented in Mozambique (82%). The most gender-sensitive project was Sofala Province Water, Energy, and Food Security Project (SWEF) implemented in Mozambique. Projects implemented in Nigeria (69%), DR Congo (64%), Niger (55%), Burkina Faso (55%), and Cameroon (54%) were medium gender-sensitive. In contrast, those implemented in Ghana (46%), Mali (46%), and Tanzania (37) were fairly gender-sensitive.

KPI 12 **Number of research strategies developed**

A total of 18 research strategies were developed by IITA projects from 2019 to 2020 in Ghana and Nigeria (Western Hub), Tanzania (Eastern Hub), and DR Congo (Central Hub). Most research strategies were developed in the Western Hub (12). It will be useful to conduct a survey to find out to what extent those research strategies contributed to government agricultural policies at national and sub-national levels. This survey would likely take place during the current One CGIAR initiative on national policies.

KPI 13 **Poverty:** A cumulative number was achieved by 2020 of 7,421,053 persons lifted out of poverty out of the IITA target of 11,600,000 by 2020, or an achievement rate of 64%. The number of persons lifted out of poverty was associated with the adoption of technologies developed by IITA scientists and partners. No data was available in 2021.

Recommendations

To address the challenges and limitations of the study described in the methodology section, we propose the following recommendations:

- The inability of project managers to provide KPIs data consistently and timely
  Collecting data on KPIs consistently and timely from project managers (PMs) was a challenge for the M&E Unit. This challenge was partly resolved by conducting face-to-face interviews, using Microsoft Teams meetings and phone calls, and reviewing project documents to gather information on KPIs. Additionally, the IITA MEL Platform development was completed, and project managers and M&E officers were trained on using the system for KPIs data collection, analysis, and reporting.
- The willingness of PMs to populate the MEL database
  Project managers who received training on the MEL Platform were willing to populate the database compared to those who did not. Some PMs would prefer that their project M&E officers do the data entry. We, therefore, recommend continuous training of PMs and M&E officers to ensure timely and consistent data collection. We also recommend support in the recruitment of M&E officers or focal persons for each project and backstopping them. Continuous sensitization of PMs and scientists to use the developed M&E tools for project implementation is essential.

- The issues associated with the collection of data for more than one year
  Project managers may have difficulty recalling results from previous years, especially if the project indicators were not designed, based on, or linked to IITA KPIs. We, therefore, recommend that projects have databases and project indicators be mapped to IITA KPIs.

- Some project managers did not respond to calls for KPI data.
  Providing data on KPIs quarterly should be part of project planning in the Institute as a matter of policy. ME&L officers supporting projects will be required to comply with this policy.

- Difficulty in understanding the 13 KPIs by some project managers.
  This issue was addressed by providing training on the KPIs to project managers and their M&E officers. Continuous training and sensitization is recommended.

- Most projects could not provide baseline and target data on KPIs.
  This is a well-known problem with research project planning and implementation. Project managers will continuously be supported in designing well-structured results frameworks with baseline and target data. Where baseline data is missing, they will be encouraged to commission baseline studies before starting the project.

- .
  There are several data disaggregation criteria and items depending on the indicator, e.g., gender, value chain, and crop variety. This should be specified in the project indicators at the project planning stage to enable the actual results to be properly disaggregated. We recommend project managers make use of the IITA indicator handbook.

- Data were collected from project managers who completed the forms online; therefore, their accuracy could not be rejected during the survey except for obvious mistakes in data entry. If there were outliers in the data, we contacted the project managers to correct the data.

- The data collection tool needs fine-tuning.
  This issue was resolved with the development and implementation of the IITA-MEL systems. All KPIs have well-structured data collection forms, metrics, and formulas for data analysis and graphical visualization on a Dashboard.

General Conclusion

The institute-wide KPI survey is an important activity that has enabled the M&E Unit to collect, analyze, and aggregate valuable project-related M&E data and show how IITA key performance indicators are progressing towards impacts. The project KPI survey is planned to take place once a year and complemented with a farmers' household survey. The cooperation of the project managers and their M&E officers in providing quality data will be crucial in ensuring a smooth process of measuring the indicators to meet their strategic objectives and impact targets.

Contents

Acronyms

A4NH: Agriculture for Nutrition and Health
BIP: Business Incubation Platform
CCAFS: Climate Change Agriculture, and Food Security (CRP)
CGIAR: Consultative Group on International Agricultural Research
CRP: CGIAR Research Program

GLDC: Grain Legumes and Dryland Cereals (CRP)
IITA: International Institute of Tropical Agriculture
KPIs: Key Performance Indicators
M&E: Monitoring and Evaluation
ME&L: Monitoring, Evaluation, and Learning
MOU: Memorandum of understanding
NARES: National Agricultural Research and Extension Systems
NARS: National Agricultural Research Systems
P4D: Partnership for delivery
PIM: Policy Institution and Markets (CRP)
PMs: Project Managers
RTB: Roots, Tubers, and Banana (CRP)
SLO: System-Level Outcomes
SLU: Sustainable Land Use
TOC: Theory of Change

Tables

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1. Introduction

Background

The ME&L system at IITA is focused on results and performance-based management. It is based on the theory of change, emphasizing the contribution of research to development outcomes (results). It uses a mix of quantitative indicators (key performance indicators) and qualitative indicators (most significant change stories) to generate performance results for decision making and internal reporting to IITA program management and external reporting (accountability) to CGIAR/Donors.

In line with IITA's 2012–2020 refreshed strategy, the M&E strategy is aimed at building M&E capacity within IITA and to service scientists, project managers, and senior management on all aspects of M&E. For example, how to select the right performance measures within projects, at hub and Center levels; and how to make decisions regarding the funding of interventions that best contribute to IITA Strategic Objectives as well as the CGIAR System-Level Outcomes (SLOs):

SLO 1: Reduced Poverty

SLO 2: Improved Food and Nutrition Security for Health

SLO 3: Improved Natural Resources Systems and Ecosystems Services

The M&E Unit plays a key coordination role between IITA Senior Management, the hub directors, and project managers in terms of providing technical guidance and generating performance data to be used as evidence, not only to inform decision-making but also to demonstrate results achieved towards IITA results' performance targets.

IITA targets towards SLOs by 2020:

- Increasing the yield of major staple foods (cassava, yam, maize, banana/plantain, soybean, and cowpea) by 60%.
- Increasing average farm income by 50%.
- Lifting 15% of poor persons above the poverty line (11.6 million Africans).
- Reducing the number of malnourished children by 30%.
- Restoring 40% of these farms to sustainable resource management (revitalizing over 7.5 million hectares of degraded farmlands).

Based on these strategic objectives and impact target areas, which are very much aligned to CGIAR and UN Sustainable Development Goals, a set of 44 performance

indicators was formulated by the M&E Unit in collaboration with the IITA ME&L-CoP and project managers. After subsequent reviews, 13 key performance indicators (KPIs) were selected and approved by IITA management for performance measurement of all projects at the institutional level. This was in addition to the overall IITA KPI on lifting 11.6 million persons out of poverty by 2020, which was led by a team made of IITA socioeconomists referred to as the KPI Poverty Team. The next step in the process for the 13 KPIs was to conduct a survey to monitor and evaluate them and show how IITA is progressing towards achieving its strategic objectives and impacts/targets, along the impact pathway and theory of change (ToC). The ToC, which states that (1) national partners (NARES) in Africa will adopt IITA's research outputs (improved crop varieties, management practices, and livelihood options) if they collaborate with IITA and the research is designed based on farmers' preferences and consumers' demands; (2) farmers and value chain actors (end users) will grow or apply the research (outputs) products if they are involved in participatory field evaluation and selection (at least 50% of the participants are women and youth) and the products respond to their needs; (3) multiplication and dissemination of research products on a large scale will happen if multiple partners: public partners (NARES, governments, NGOs), and private partners (traders, seed companies, commercial farmers) are involved in product multiplication and dissemination (at least 50% of partners are women and youth); (4) if out-scaling mechanisms are developed and implemented, e.g., awareness campaigns, capacity building, business models (e.g., BIPs), and marketing for the private sector, then a large number of farmers and value chain actors will be reached with the research products; (5) if there are better policies for adoption and farmers see benefits, then a large number of farmers and value chain actors will adopt products (research outcomes); (6) increased adoption would lead to increased productivity (yield), income, jobs, improved nutrition/health, and improved natural resource management (intermediate development outcomes: IDOs); and subsequently, (7) all the IDOs would lead to (impacts: SLOs) improved food and nutrition security and poverty reduction in Africa.

This report presents results from the second survey in 2021 led by the ME&L Unit on the 13 KPIs.

Based on this background, the **goals** of the KPIs survey are two-fold:

1. To contribute to data aggregation and alignment functions of IITA's institutional key performance indicators and the CGIAR system-level outcomes (SLO).
2. To generate verifiable information for strategic decision-making by aggregating data from all projects.

Objectives

The objectives of the KPIs survey are:

- To monitor and evaluate the progress of the 13 KPIs, including poverty indicator in CRP and IITA strategic projects.
- To recommend a method of working for project improvement and better collection of data from KPIs.

Research Questions

The research will attempt to answer these questions:

- What is the progress (between 2019 and 2021) of the 13 KPIs, including poverty indicator in CRP and IITA strategic projects?
- What should change in terms of project improvement on the collection of data of KPIs?

Scope of the KPI Survey

This survey is a continuation of the previous survey, which was conducted in 2019 to capture KPIs data from 2017 to 2019. The data from that survey was analyzed and reported in 2020. We observed in the previous report that the data for 2019 was scanty. Based on this observation, a decision was made to broaden the scope of the current survey to collect KPIs data from 2019 to 2021 in line with the duration of the CGIAR research programs, which ended in 2021. The baseline for some indicators will be data from 2019. For two indicators and the number of trained persons and publications, data are already available in the IITA database.

Report Outline

The KPI survey report is divided into four sections and each consists of subsections. Section one of the report presents the introduction/background information about IITA's revised strategic objectives/targets and CGIAR system-level outcomes, IITA ME&L, goal, objectives, and research questions of the KPIs' monitoring survey.

Section two describes the research methodology, including an overview of active IITA projects, respondents (project managers), survey data collection, and data analysis methods used. Section three presents the analysis and discussion of the results of the 13 KPIs. Section four provides a set of conclusions and recommendations for management, project managers, and scientists making decisions on project improvement and future KPI surveys.

2. Methodology

A quantitative research method was applied to achieve the earlier-mentioned objectives. The topics covered on the 13 KPIs were as follows: yield of priority crops, sustainable land use practices, adoption of improved production technologies and management practices, adoption of biofortified crops, technological innovations developed, jobs created, agribusiness ventures scaled out, people trained, research partnerships formed, publications, gender, research strategies developed, and the poverty indicator. The respondents for the survey were IITA project managers and CRP focal points in the four hubs in Africa (Central, Eastern, Western, and Southern). The approach used was to collect secondary data on the 172 projects active in IITA in June 2021when the survey was conducted (Source: PROMIS database). The distribution of the projects per IITA hubs and CRP is shown in Figures 1 and 2.

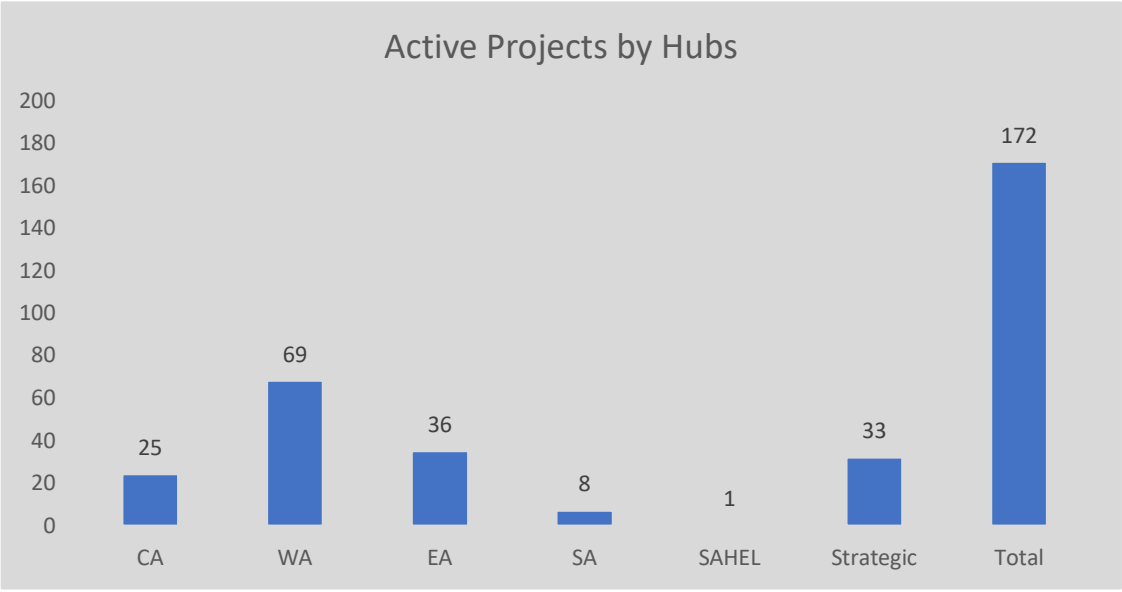

Figure 1. Number of active projects per IITA hub (June 2021).

Figure 1 indicates that the Western Hub had the most active projects, followed by the Eastern and Central hubs. Few projects were active in the Southern Africa and Sahel hubs.

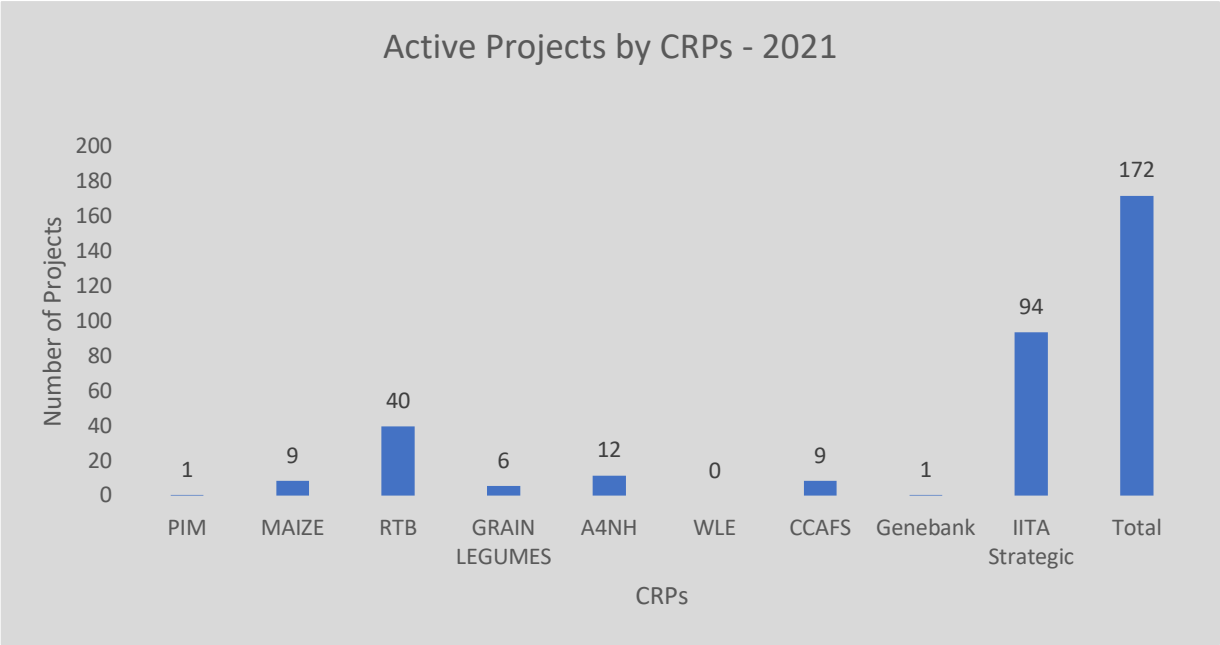

Figure 2. Distribution of active projects per CRP (June 2021).

Figure 2 indicates the breakdown of active projects by CGIAR research program (CRPs). The most active projects were IITA strategic projects followed by Roots, Tubers and Bananas (RTB). IITA Strategic includes projects that IITA could not house under any CRP. Moderately active projects were in A4NH, MAIZE, CCAFS, and grain legumes. The CRPs on Policies, Institutions and Markets (PIM), Genebank, and WLE had the least number of active projects.

Data collection instrument

The MEL Platform was used for data collection. The tool was pre-tested with IITA MEL-CoP and project managers and modified before actual data collection. After that, a two-day training was provided to the project managers. Due to the delay in collecting data from project managers through the MEL Platform, an Excel version of the questionnaire was designed to facilitate the process.

Data collection methods

Data from farm household surveys and project records were collected from project managers, CRP focal points for three months through the online MEL Platform, face-to-face interviews, and MS teams calls. The M&E Unit staff/head served as enumerators. Data were collected and diligently stored in Excel files. Where necessary, the enumerators and the Unit head contacted project managers to cross-check data to ensure good data quality.

Key challenges and limitations observed while conducting the survey:

- Inability of project managers to provide data on KPIs consistently and timely.
- Willingness of PMs to populate MEL database.
- Project managers have difficulty recalling results from previous years, especially if the project has no database and the project indicators were not mapped to IITA KPIs.
- Some project managers did not respond to calls for KPI data.
- Difficulty in understanding the 12 KPIs by some project managers.
- Most projects could not provide baseline and target data on KPIs.
- KPIs data were not properly disaggregated where necessary.
- Data were from project managers who completed; therefore, their accuracy could not be rejected during the survey except for obvious mistakes in data entry. If there were outliers in the data, we contacted the project managers to correct the data.

Response Rate of KPI Survey

Of the 172 active projects in IITA (June 2021), 42 projects participated in the survey, a 24% response rate. The distribution of project managers' responses per indicator is presented in Figure 3. The responses were particularly high on KPIs related to partnerships, technological innovations developed, and adoption of technologies, SLU, and gender. Fewer responses were observed on the other five KPIs (research strategy developed, yield, new jobs created, agribusiness models, and biofortification). Data on training and publication KPIs were obtained directly from the Capacity Development and Communication units in IITA.

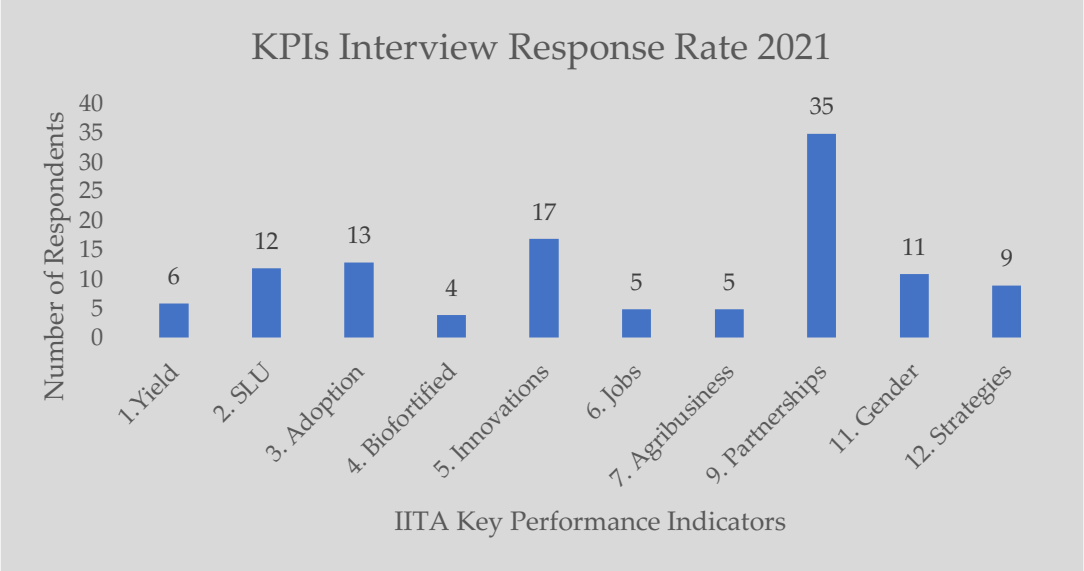

Figure 3. Distribution of project managers' responses per KPI.

Data Analyses

Data were cleaned and analyzed as aggregates, percent change. The analysis was performed using Microsoft Excel and STATA, and the findings were presented graphically and in tables.

3. Results and Analysis

In this section of the report, the findings from the KPI survey are presented and analyzed for each indicator.

3.1. Indicator 1: Yield of IITA priority commodities

Yield is an intermediate development outcome indicator. It measures the quantity of produce harvested in tons per hectare for crops annually. The actual yield (t/ha) is disaggregated by IITA priority crops: cassava, cowpea, soybean, yam, maize, plantain/banana, etc. The indicator is linked to CGIAR SLO2 Indicator 2.1: Improve the rate of yield increase for major food staples from current < 1% to 1.2–1.5% per year. Six of the 42 projects provided data on yield. The percent change in yield per crop was computed by subtracting the actual yield value of the year from the baseline yield (preceding year value), dividing by the baseline yield value, and then multiplying by 100.

Table 1. Percentage change in yield of IITA priority commodities.

Project	Crop(s)	Year	Location	Target yield (t/ha)	Actual yield (t/ha)	Variance (t/ha)	% Change in yield
3071	Cassava	2020	Nigeria	12	15	3	
3390				6	21	15	
			Tanzania	6	19	13	
2307	Cowpea	2019	Mozambique	1	0.4	-0.6	
		2020		1	1.1	0.1	175
3148		2021		1.2	1.2	0.0	200
2841		2019	Nigeria	2.5	0.8	-1.7	
2511	Maize	2020	Cameroon	1.8	4.0	2.2	
2841		2019	Nigeria	12	5	-6.9	
3390		2020		5	14	8.8	180
2307	Soybean	2019	Mozambique	1.8	1.6	-0.2	
		2020		1.8	1.3	-0.5	-19
2841		2019	Nigeria	4.4	1.5	-2.9	
2511	Plantain	2020	Cameroon	5.1	6.5	1.4	
	Yam	2020		11.3	10.0	-1.3	

The result in Table 1 shows a high percentage change (175%) in the yield (1.1 t/ha) of cowpea in Mozambique in 2020 compared to the baseline 0.4 t/ha in 2019. In 2021, the yield increased to 1.2 t/ha resulting in a 200% change. Also, in Nigeria, maize recorded a 180% increase in yield (14 t/ha) in 2020 compared to the yield (5 t/ha) in 2019. Yield increases for maize was due to a combination of better hybrids and crop management practices (e.g., maize intercropping with cassava). A negative percent change (–19%) was observed in the soybean yield in Mozambique in 2020. Percentage change in yield could not be estimated for cassava, yam, and other IITA priority commodities because project managers did not provide data annually. However, positive yield increases were observed when comparing the target and actual cassava yields in Nigeria and Tanzania in 2020. Plantain recorded a positive increase in yield in Cameroon in 2020, while a negative increase in yield was observed for yam in the same country in 2020.

3.2. Indicator 2: Land Area (ha) Under Sustainable Land-Use (SLU) practices

SLU is an outcome indicator, and it measures the total size (in hectares) of farmers' fields under sustainable land-use practices. SLU practices refer to a set of land

management practices necessary to keep land productive and protect it from degradation. This includes the use of nutrient sources (fertilizers, inoculum, lime, organic inputs, tillage practices, integration of legumes in cropping as an intercrop or in rotation with non-legume crops), use of soil conservation practices (mulching, hedgerow), and the management of crop residues after harvest (removing them or leaving them on the field). The number of projects that provided data for this indicator was 12 out of the 42 that participated in the survey. Data from two projects reported by the SLU team during the previous survey in November 2019 was added to the current survey data to estimate the total area under SLU for the 2019–2021 reporting period.

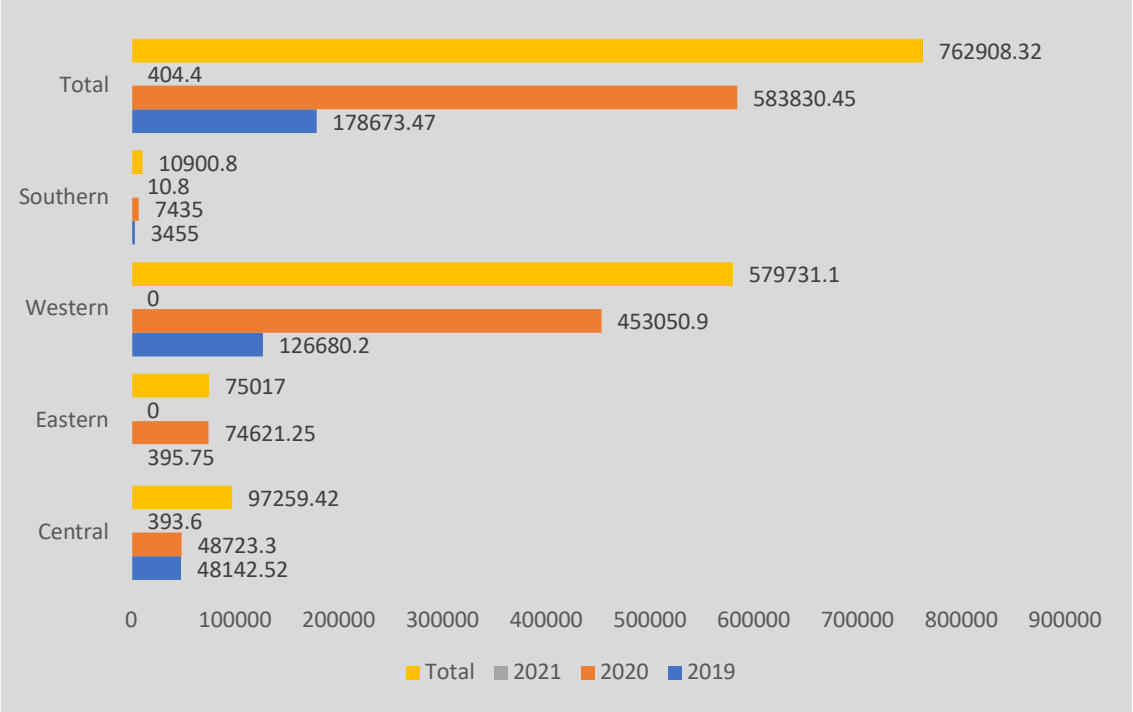

Figure 4. Land area under sustainable land-use practices per IITA Hub from 2019 to 2021.

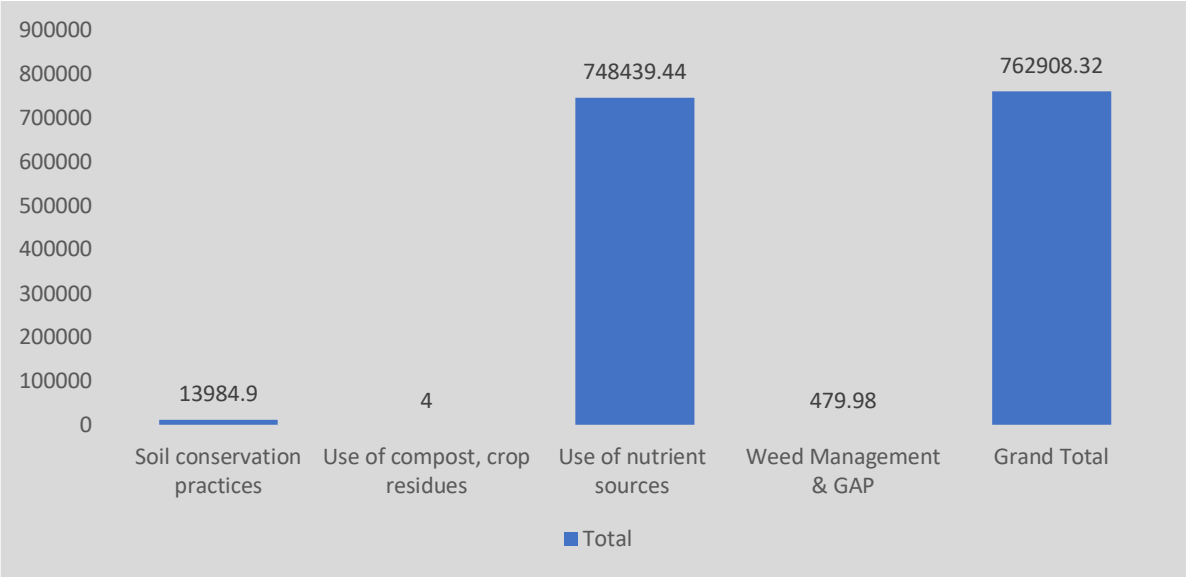

Figure 5. Land area under sustainable land-use practices from 2019 to 2021.

Figure 4 indicates high SLU practices among farmers in 2020 compared to 2019 and 2021. SLU was practiced more in the Western hub than Eastern, Southern, and Central hubs in 2020. Land area under SLU practices was very high in the use of nutrient sources compared to the other management practices (Fig. 5). The total land area under SLU from 2019 to 2021 was 762,908.32 ha, representing a 10% increase in the target area under SLU in line with IITA's refreshed strategy.

3.3. Indicator 3. Percentage of people (farmers, including women and youth) adopting improved crop varieties, production technologies, and management practices

The indicator measures the number of people who adopted improved crop varieties, production technologies, and management practices out of the total number reached through demonstrations. Adoption means farmers, including women and youth, using improved technologies/practices after guaranteeing their technical performance at the field scale. Percentage adoption was computed by dividing the total number of farmers who adopted the technology (numerator) by the total number of farmers reached (denominator) multiplied by 100.

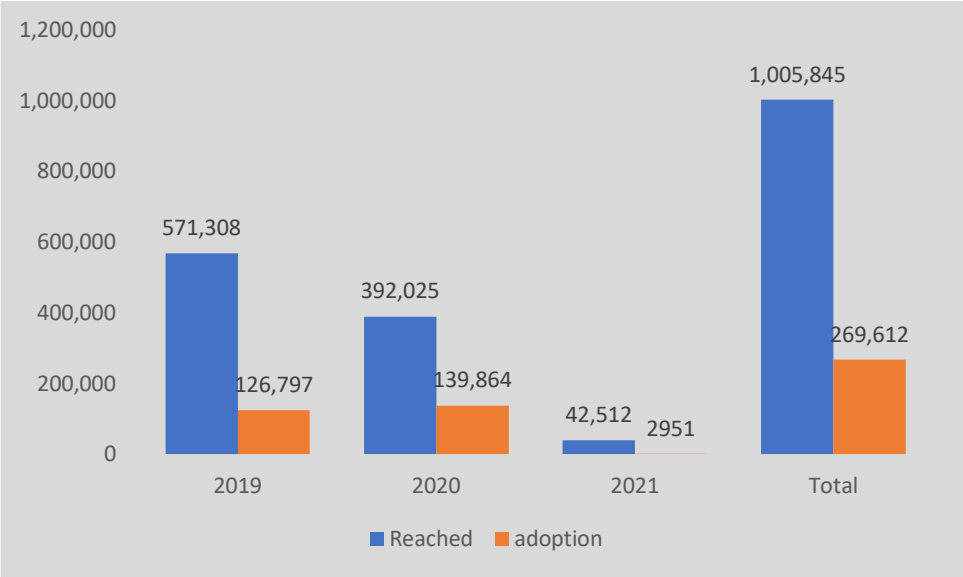

Figure 6. The number of farmers reached and who adopted IITA improved crop varieties, production technologies, and management practices per year.

Thirteen projects out of 42 provided data on the adoption indicator from 2019 to 2021. Figure 6 indicates that a total of 1,005,845 farmers were reached through on-farm demonstrations and a total of 269,612 farmers adopted IITA improved varieties, production technologies, and management practices, an overall adoption rate of 27% for all improved technologies between 2019 and 2022 (see Fig. 7 and Table 5 in the Annex for details). Figure 7 shows a higher adoption rate of 36% for all improved technologies in 2020 compared to 2019 and 2021.

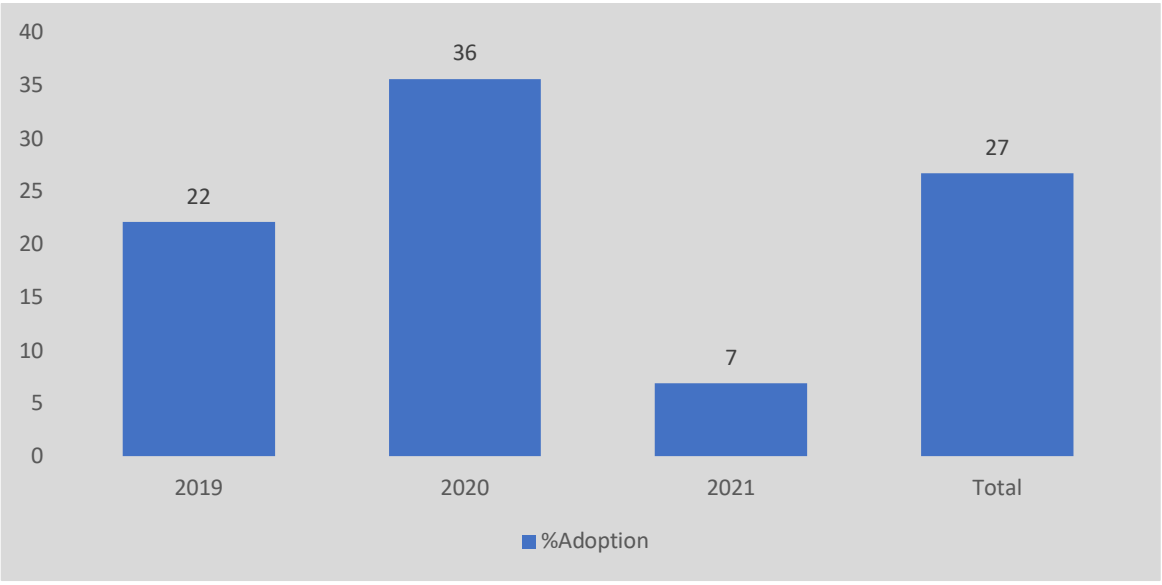

Figure 7. Percentage of farmers adopting IITA improved crop varieties, production technologies, and management practices per year.

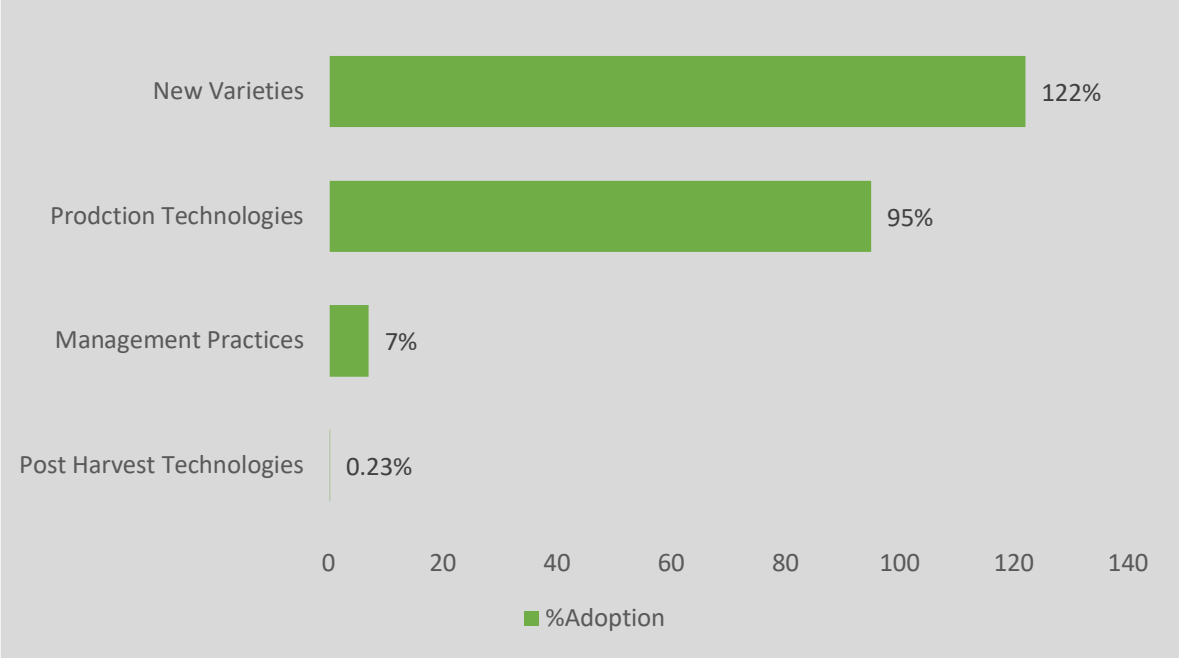

Figure 8. Percentage of farmers adopting IITA improved crop varieties, production technologies, and postharvest and management practices.

Figure 8 indicates that about 122% of farmers adopted new, improved crop varieties. Three projects provided data on the adoption of improved cassava and maize varieties in Malawi, Ghana, and Benin, respectively (see Table 5.2 in the Annex). In all, 95% of farmers adopted improved production technologies. Three projects provided data on the adoption of production technologies for maize, and soybean in Rwanda, Mozambique, and Nigeria, respectively (Table 5.3). Management practices (7%) and postharvest technologies (0.23%) were the least adopted technologies in the reporting period. Three projects provided data on adopting management practices for cassava in 10 countries in four IITA hubs (see Table 5.4). Table 5.5 indicates that two projects provided data on the adoption of postharvest technologies for cassava in Togo, Sierra Leone, Nigeria, Tanzania, Cameroon, and DR Congo. It is worth noting that most of the projects did not provide adoption data based on the disaggregation items of female, male, and youth. Most data provided were the number of farmers reached and the number of adopters of improved varieties, production technologies, and crop management technologies.

3.4. Indicator 4: Number of people benefiting from IITA priority commodities that have been biofortified

The indicator measures the total number of people (men and women farmers) growing (direct beneficiaries) or consuming (indirect beneficiaries) biofortified commodities such as cassava, maize, or banana/plantain among the IITA mandate

crops. Biofortified means improved varieties that were bred for higher micronutrient content or improved nutritional quality of food products. The survey was designed to collect disaggregated data by sex, commodity, country, direct and indirect beneficiaries. Four projects provided data on this indicator from two countries (Nigeria and Malawi) for four crops cassava, cowpea, maize, and soybean. A total of 89 182 people benefited directly and indirectly from four biofortified crops in 2019 and 2021. More people benefited from biofortified maize followed by cassava and cowpea.

Table 2. Number of farmers benefiting from IITA biofortified crops disaggregated by direct and indirect beneficiaries, gender, and country.

Project	Location	Year	Type of bio-fortified crop	Number of people benefitting from bio-fortified crops
3071	Nigeria	2021	Maize	19
3071	Nigeria	2021	Cassava	22
2665	Malawi	2021	Cassava	22 563
2841	Nigeria	2019	Maize	42 936
	Nigeria	2019	Cowpea	15 124
	Nigeria	2019	Soybean	8518
Total				89 182

3.5. Indicator 5: Number of technological innovations developed

This output indicator measures new or significantly improved research and development innovations for agricultural-related production, varieties, management practices, knowledge, or technologies in any of the four phases of the CGIAR research and development process. The four phases are (1) under research, (2) piloted and validated, (3) available for uptake, and (4) uptake.

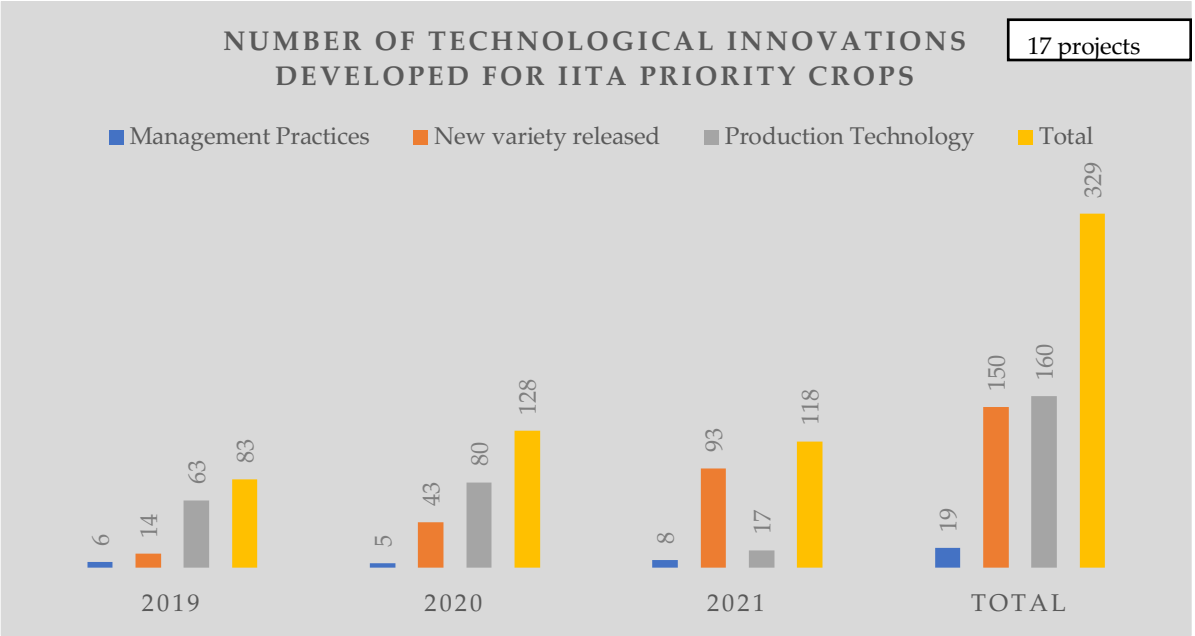

Figure 9. Number of technological innovations developed for IITA priority crops.

Figure 9 shows that between 2019 and 2021, 17 projects reported data on technological innovations developed for IITA priority commodities which measure new or significantly improved research and development innovations for agriculture-related management practices, knowledge, or technologies in any of the phases of the research and development process. The total number of technologies developed between 2019 and 2021 was 329. Technological innovations developed by IITA scientists continued to increase from 2019 to 2020 but slightly declined in 2021. Data available in Figure 9 show that the number of new varieties released continue to increase from 14 in 2019, to 43 in 2020, and 93 in 2021. Production technologies had grown from 63 in 2019 to 80 in 2020 and sharply declined to 17 in 2021. In addition, 19 technologies for management practices were documented during this reporting period.

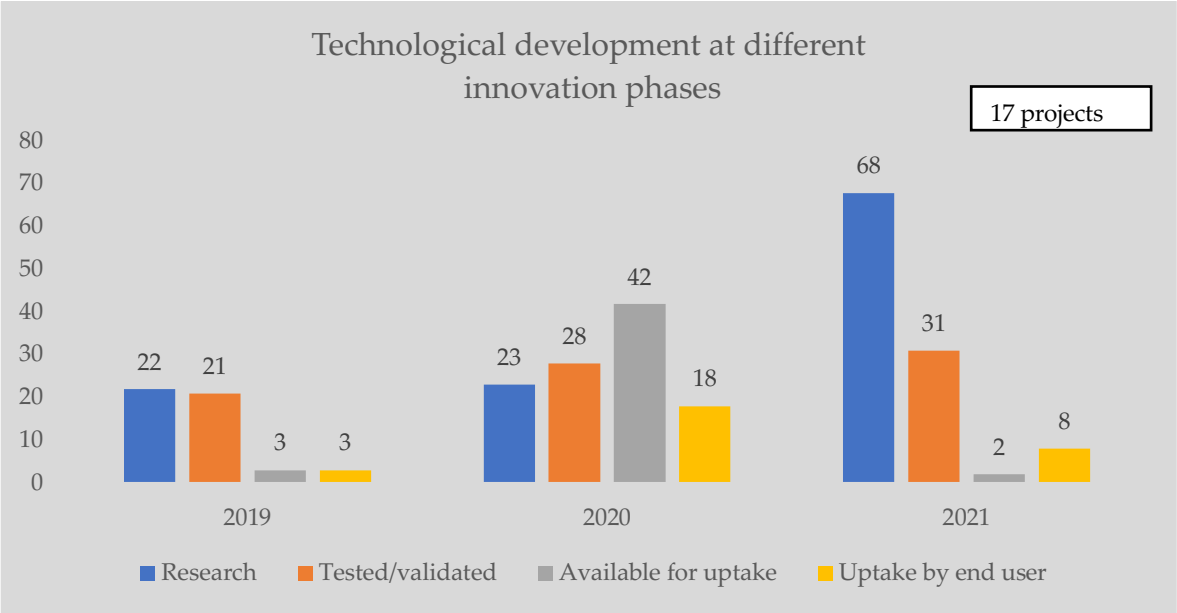

Figure 10. Number of technological developments at different innovation phases.

In Figure 10, we observe a steady increase in technological innovations developed at the research phase from 2019 to 2021. Innovations at the tested/validated phase also showed a similar pattern of increment over the years. However, innovations available for uptake were at a very high point (42) in 2020 and sharply declined to two in 2021. In total, about 29 innovations were taken up by end users during the reporting period.

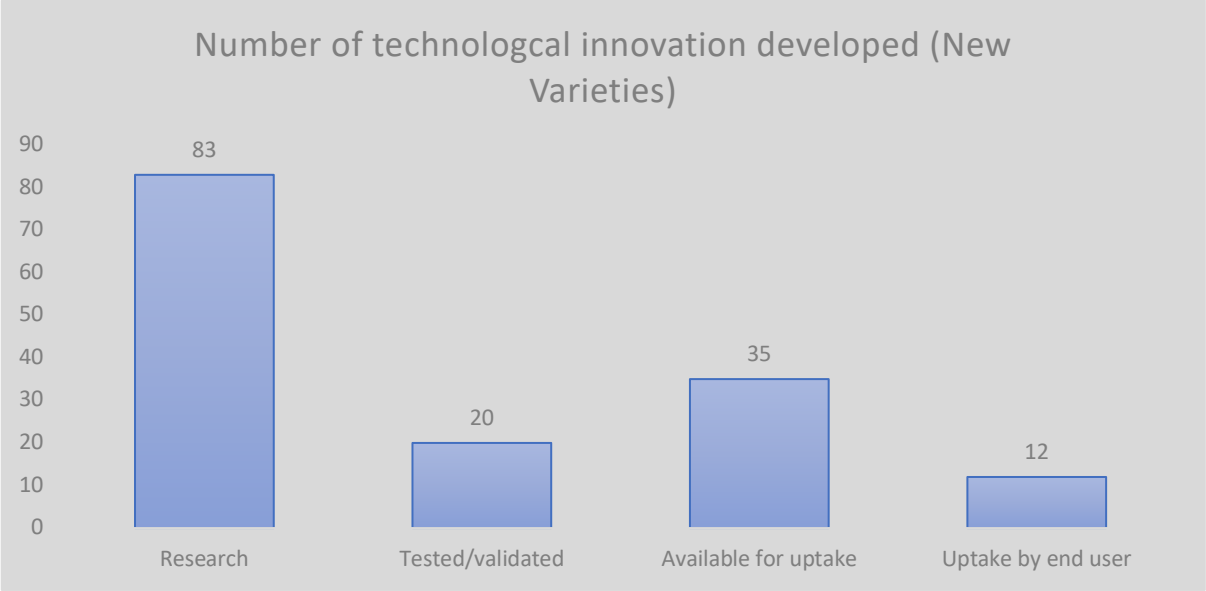

Figure 11. Total new varieties developed at different innovation phases.

Eight of these 17 projects provided data on the new varieties developed.
A total of 83 new varieties were at research or discovery stage, 20 undergoing field testing and validation, 35 were now available for uptake by the NARES, and 12 were disseminated to the end-users for uptake (Fig. 11).

The new varieties reported were mainly yam, cassava, and cowpea. A large proportion of the new yam varieties reported were at the research stage. Research into these varieties was more in 2021. Seven new yam varieties underwent field testing and validation in 2019, none in 2020, and five in 2021. Available for uptake by the NARES in 2020 were nine new yam varieties, while two were available in previous and proceeding years. In 2019, two new technologies were taken up and increased to five new varieties in 2020 and 2021, respectively. The data implied that seven new yam varieties were tested/validated in 2019, the same number may have been made available to the NARES in 2020, and five were taken up by the end-users in 2021 (Fig. 12).

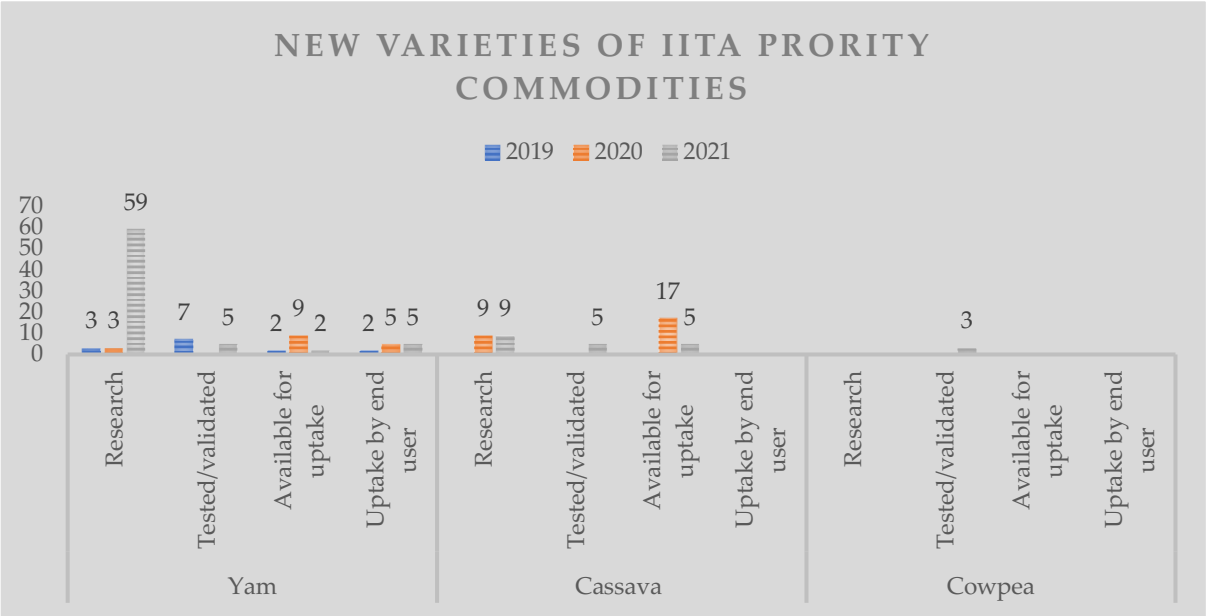

Figure 12. New varieties of cassava and yam at different innovation phases.

Figure 12 also shows the phases of development of cassava varieties from 2019 to 2021. In 2019, no new cassava was at the discovery stage, nine came into the discovery pipeline in 2020 and 2021. In 2019 and 2020, none were at the testing and validation phase; five new variety candidates were field-tested in 2021. Eight projects reported 17 and five new cassava varieties were made available to the NARES for uptake in 2020 and 2021, respectively. The data showed that there were no new cassava varieties taken up by end-users between 2019 and 2021. Three cowpea varieties were reported to be at field testing and validation stage in Mozambique.

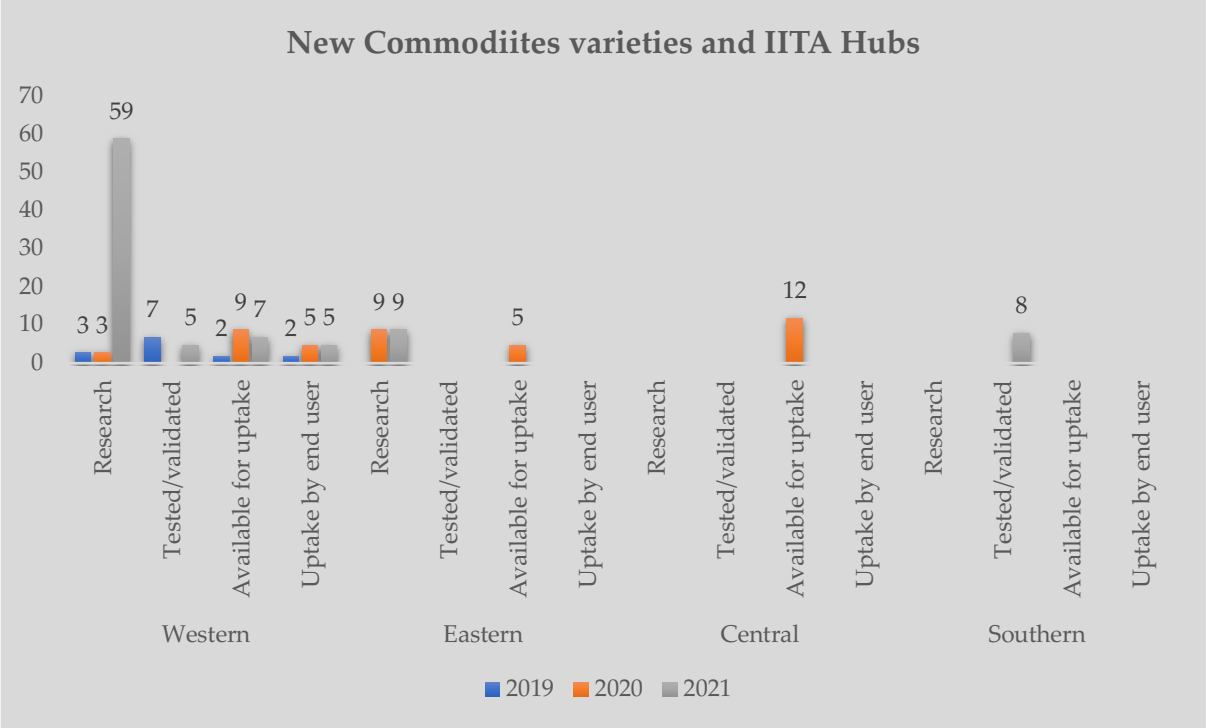

Figure 13. New crop varieties at different stages of innovation per IITA hub.

The developed technological innovations occur in 10 countries comprising four IITA hubs. In the Western Hub, the countries are Nigeria, Ghana, Cote d'Ivoire, and Benin; Tanzania in Eastern; DR Congo, Rwanda, and Burundi in the Central; and Malawi and Mozambique in the Southern Hub. New yam varieties were the main crops in the Western Hub. Cassava was only reported in Nigeria at new released varieties level. The new technological innovations in the Eastern, Central, and Southern hubs are focused on cassava varieties (see Fig. 13).

Figure 13 presents data on the developmental stages/phases of yam, cowpea, and cassava new varieties across the four IITA hubs. In the Western Hub, yam is the dominant crop; 59 new yam varieties are currently at the research stage across the four Western Hub countries. Three yam and nine cassava new varieties were at discovery stage in some countries in the Western Hub from 2019 to 2020. In the same hub, seven and five new yam varieties were at the field-tested and validation stage in 2019 and 2021, respectively; nine new yam and five new cassava technological innovations were released in 2020. New yam varieties (two in 2019, five in 2020, and five in 2021) were the main crop taken up by end-users across the years.

In the Eastern Hub, cassava was at either discovery or release stage. Nine new cassava technological innovations each in 2020 and 2021 were at research phase and five cassava varieties have been released to the NARES.

In the Central Hub comprising three countries, all the new cassava varieties (12) reported were available for the uptake stage. Based on the data available from 2019 to 2021, there were no breeding activities taking place and NARES have not disseminated any new varieties in the region.

In the Southern Hub comprising Malawi, as at the time of reporting, all the new cassava varieties (five) reported were at field testing and validation stage in 2021. Based on the data available from 2019 to 2021, there were no major breeding activities taking place and NARES have not disseminated any new varieties in the region.
On the agricultural production technologies, 11 projects submitted data for this part of Indicator 5 for the period under review.

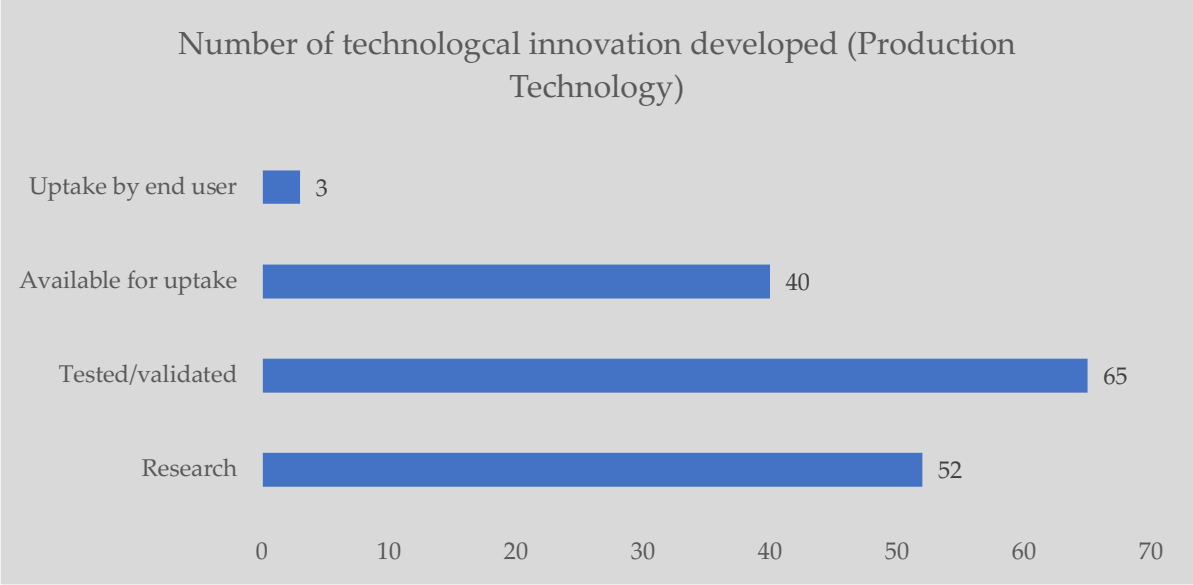

Figure 14. Number of new production technologies developed at different innovation phases.

Figure 14 indicates that 65 new production technologies were at the stage of field testing and validation, 40 have been released to NARES, 52 are in the research and discovery phase, and three have been taken up by the end-users.
Crop production technologies for maize, cowpea, cassava, yam, and banana were reported to be under review during this period. Figure 15 shows that in 2019, 41 new maize production technologies were in the early product development phase, seven in 2020, and one in 2021. Still, at product development, 13 in 2019 were at field testing and validation stage; this increased to 36 in 2020 and remained five in 2021. Thirty new maize production technologies entered the product deployment phase in 2020 and were released to NARES. In 2020, three maize production technologies were taken up by end-users (Figure 15). In 2019 and 2021, no new maize production technology was reported to have been taken up by end-users.
On the cowpea production technology, one cowpea line was at the research product development phase and three were field-tested and validated in 2019. The data provided revealed that no cowpea production technology was made available for uptake by the end-users.
On the cassava production technology, between 2019 and 2020, there were no new innovations at the research, testing, available for uptake, and uptake phases.

However, in 2021, 11 cassava production technology were reported at the production development phase of field testing and validation and one at the discovery phase. One banana and five yam new production technologies were reported to be available for uptake in 2019.

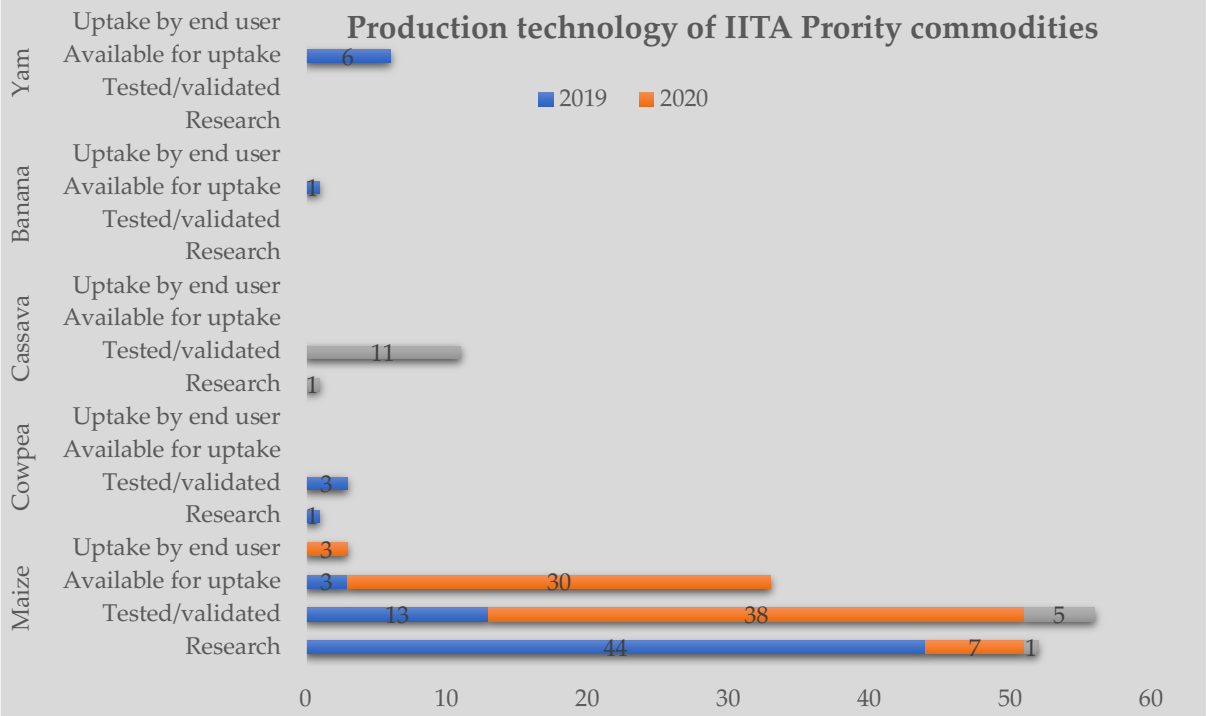

Figure 15. Number of new production technologies per IITA priority crops.

The countries in the Western Hub for crop production technology were Ghana, Mali, Nigeria, and Côte D'Ivoire; Tanzania and Ethiopia for the Eastern Hub; Malawi, Zambia, Mozambique, and Comoros for the Southern Hub, and Rwanda for the Central Hub. Technology innovation in crop production in the Western Hub was in maize, yam, cowpea, and cassava. In the Eastern and Southern hubs, the main crops were banana, maize, and cowpea. Figure 16 shows that in 2019 and 2020, technology innovations were directed at maize, yam, and banana, while in 2021, they were directed at maize, cassava, and cowpea across the hubs.

In 2019, 14 maize and yam production technologies were at product development research stage, 13 at the field testing and validation phase in the Western Hub. Thirteen and 16 maize product technologies were in the research stage in the Eastern and Southern hubs, respectively. Three of these maize technologies moved to the released stage in the Southern Hub.

In 2020, only maize production technologies were at different stages of development across all the mentioned countries in all the hubs. In the Western Hub, four were at research, nine testing and validated, and 12 have been released. In the Eastern Hub, 3, 26, 13 and 3 maize production technologies were at research, field-tested/validation,

available for uptake, and uptake by end-user, respectively. In the Central and Southern hubs, one and two are in field-tested/validated stages, respectively. Five maize production technologies were reported to have been released in the southern hub in 2020.

In 2021, one different line of cassava, maize, and cowpea production technology was under research and 11 different lines of cassava, maize, and cowpea production technologies were at product testing/validation stages in the Western Hub. Three cowpea production technologies were at product testing/validation stages in the Southern Hub. No production technology development was reported in 2021 in the Eastern Hub (Fig. 16).

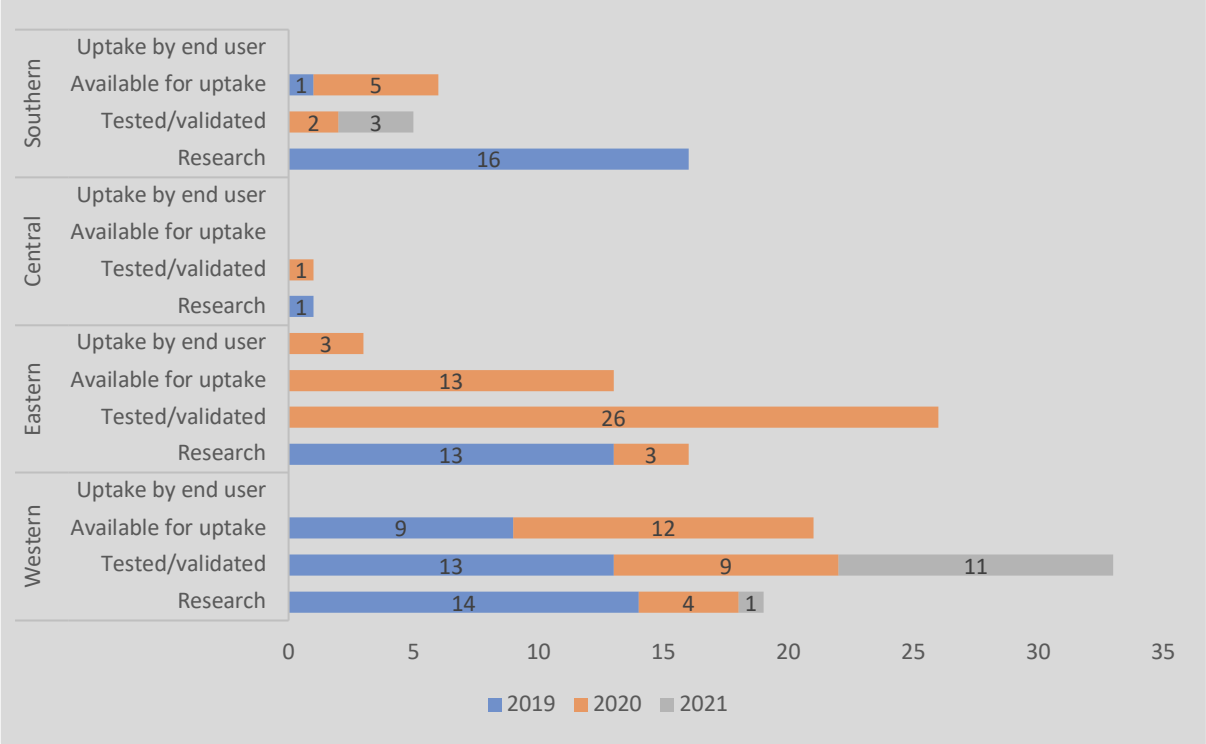

Figure 16. Number of new production technologies per IITA hubs.

Figure 17 represents the agricultural-related management practices of Indicator 5. Equal numbers (nine) of the management technological innovations developed were under research and in field-tested stages, respectively. Only Western and Southern hub projects provided data on management practices and technological innovation. In the Western Hub, three innovations each in 2019, 2020, and 2021, respectively, were in the research stage. Niger, Nigeria, and Burkina Faso in the Western Hub and Mozambique in the Southern Hub provided data. Projects in Niger have field-tested three management practice innovations each in 2019, 2020, and 2021 and two were reported to be under research for the same period. In Nigeria, all the data provided showed that three management practices and technological innovations were still at

the discovery stage in 2019, 2020, and 2021. In 2019, 2020, and 2021, the project in Burkina Faso reported that one management practice and technological innovation were at the discovery stage, respectively (Fig. 18).
In Mozambique, within the Southern Hub, three management practice technological innovations were reported to be at the tested and validation stage in 2021.

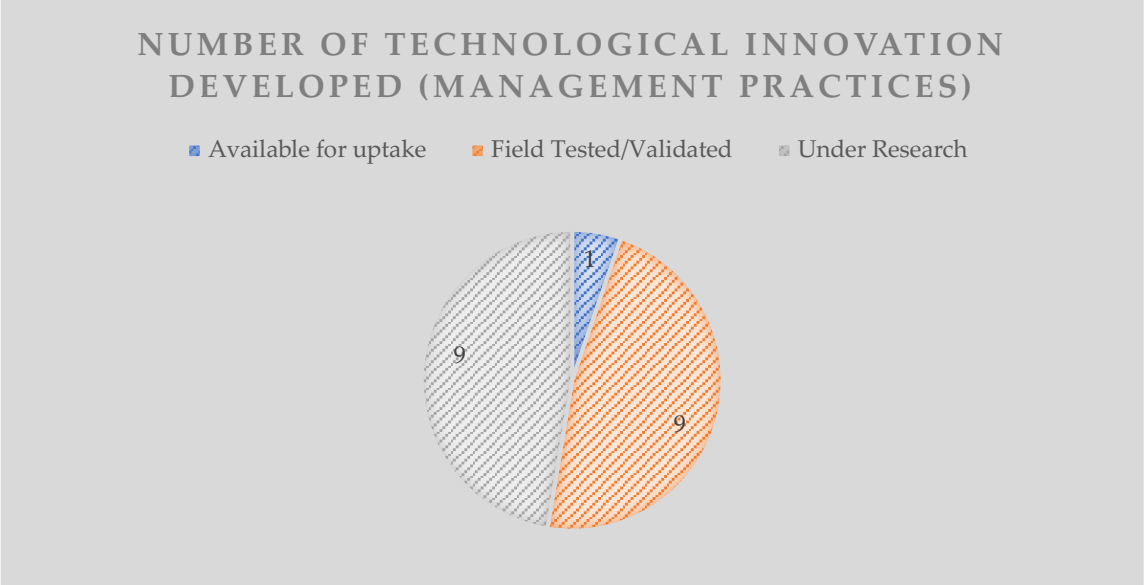

Figure 17. Number of management practices developed at different innovation phases.

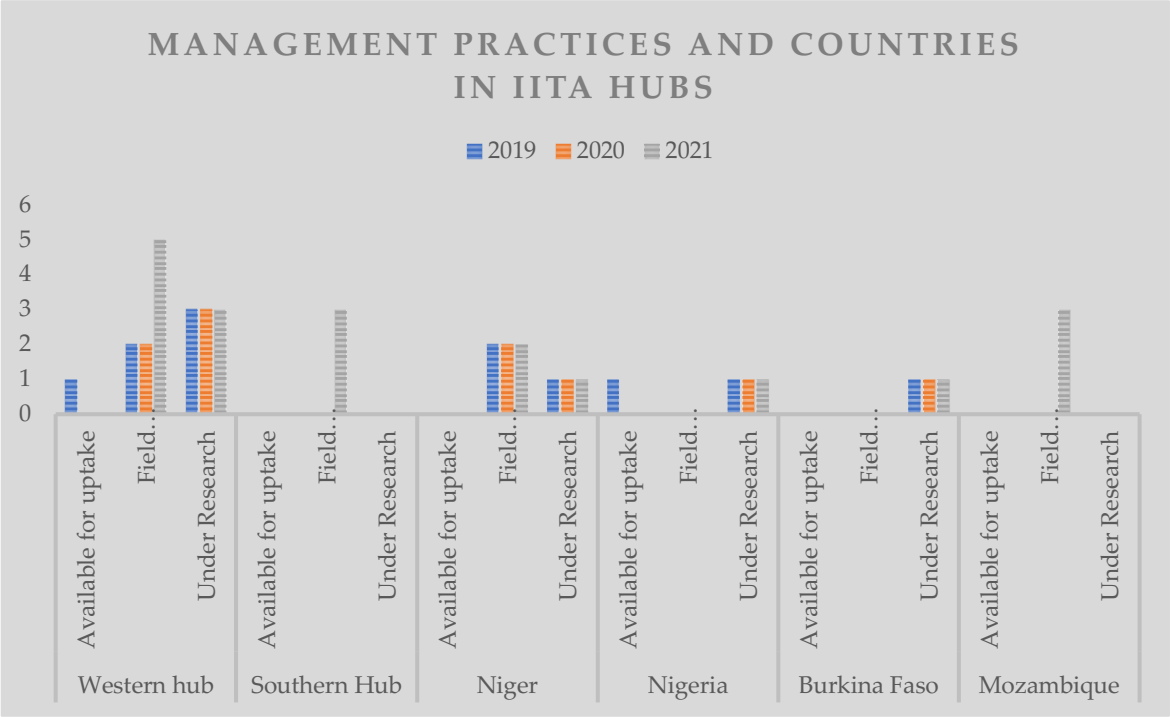

Figure 18. Number of management practices at different innovation phases per IITA Hub.

3.6. Indicator 6: Number of new jobs created in agribusiness models scaled out by value chain

This is a development outcome indicator. It reports on the total number of new jobs created in the agribusinesses scaled out by IITA. Scaled out means dissemination beyond target areas within countries and beyond.

A total of 11,190 jobs were created by five projects that reported on the new jobs created in the agribusiness models scaled out by value chain (Fig. 19). The number of jobs created grew with 58 in 2019, 178 in 2020, and 10,954 in 2021. The highest total number of jobs were created in the processing sector of the value chain, followed by the production and distribution stages (Fig. 20).

Figure 20 also shows the distribution of jobs created by the commodity value chain over the years. Most of the 2021 jobs created were in cassava value chain ranging from production (2137) to processing (7236) and distribution (1472) while in 2020, cassava jobs created were 40 each in production and processing, respectively. Out of 182 jobs created in the cowpea value chain, 58 each were in 2019 and 2020, respectively, and 66 in 2021. Cowpea jobs created in production were 98, in processing were 47, and in distribution there were 37. All the 40 jobs created in the plantain value chain were in production and in 2020. Agribusiness, including entrepreneurship in other value chains, were all created in production (20) and processing (14) in 2021. Nine jobs were created in the Maize value chain in 2021.

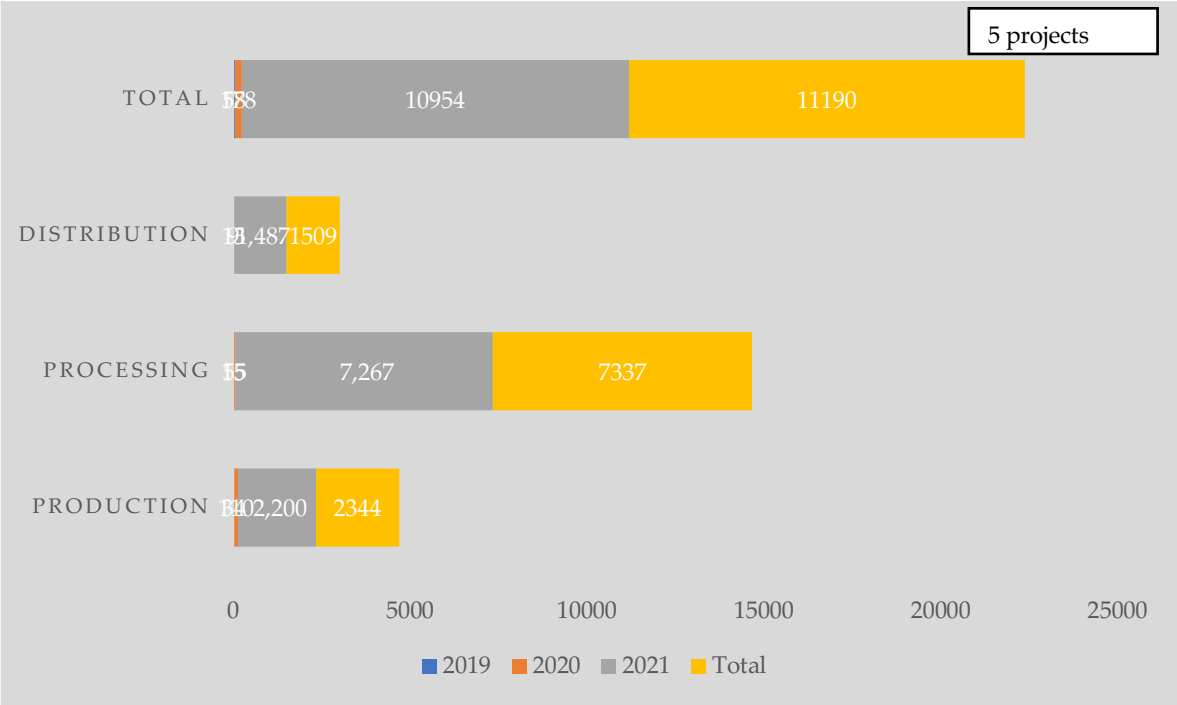

Figure 19. Number of new jobs created at different stages of the value chain.

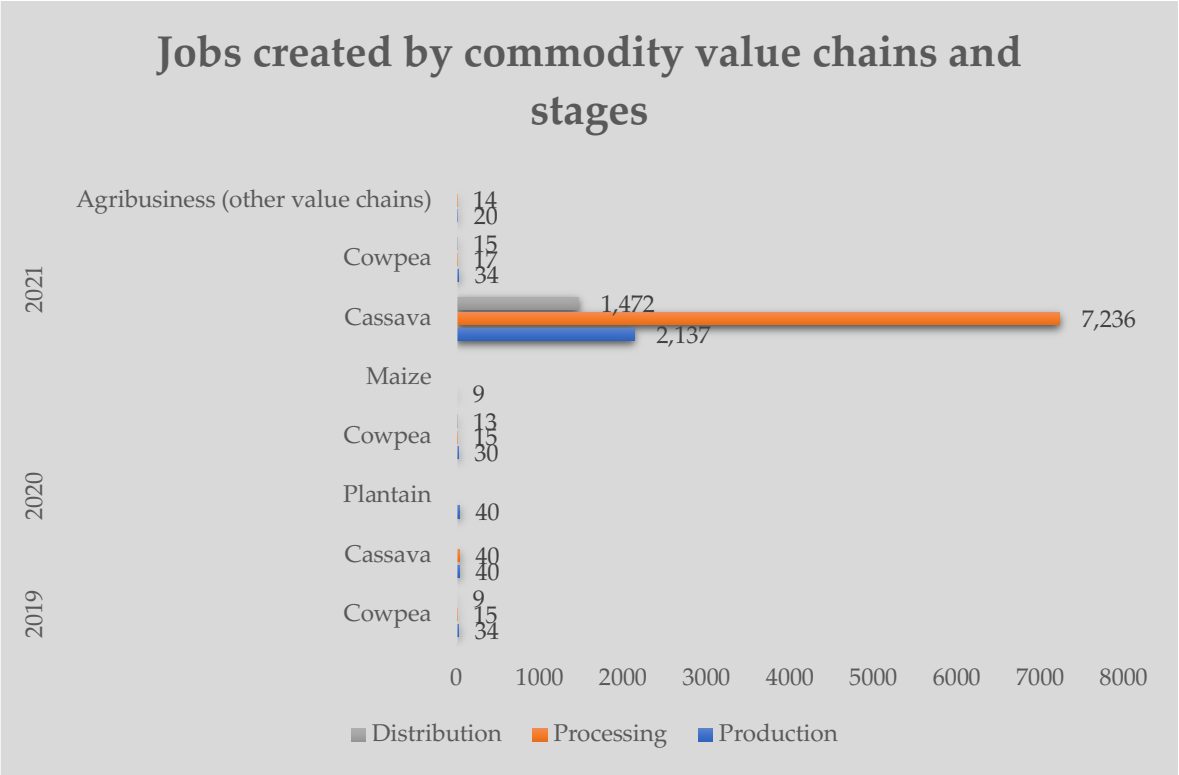

Figure 20. Number of jobs created by commodity value chains at different stages.

Figure 21 shows the distribution of jobs created by countries over the years. The cassava jobs were mostly created in Malawi and Nigeria while those of cowpea were all created in Benin. The nine maize and 40 plantain jobs were created in Nigeria.

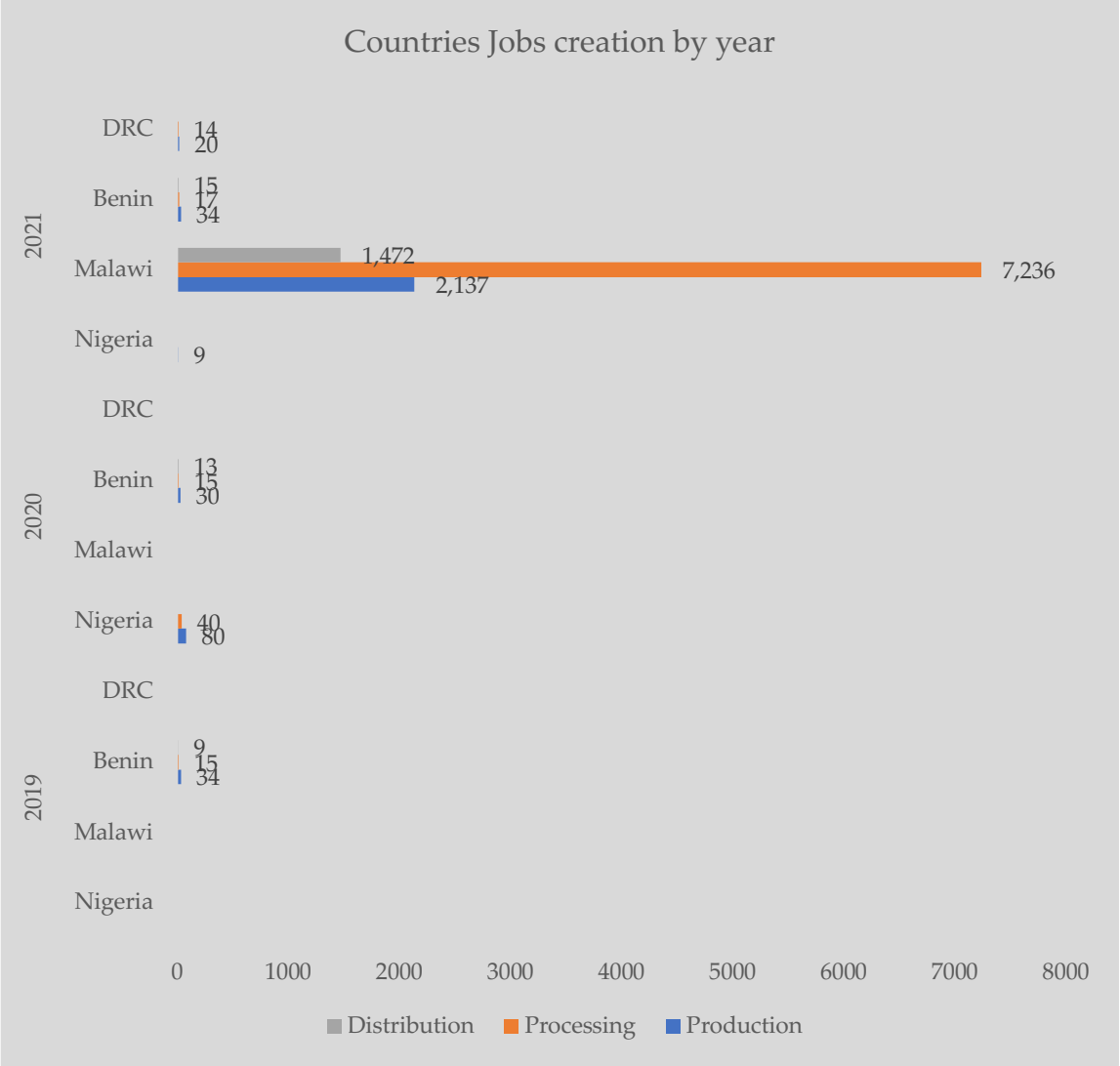

Figure 21. Distribution of jobs created by country per year.

3.7. Indicator 7: Number of agribusiness ventures (models) in the priority crops and livestock supported by IITA and scaled out by stakeholders

This is a development outcome indicator for job creation and poverty reduction. The number of agribusiness ventures in the priority crops and livestock supported by IITA scaled out by stakeholders and the number of jobs created as a result of the scaled-out activities by the agribusiness ventures will contribute to increased employment by beneficiaries. These will, in turn, increase the income and contribute to poverty reduction.

A total of 76 stakeholders scaled out agribusiness ventures over the period under review by five projects. These numbers increased from nine in 2019 to 16 in 2020 and

51 in 2021. The highest total numbers of agribusinesses scaled out were in production, followed by processing and distribution (Fig. 22).

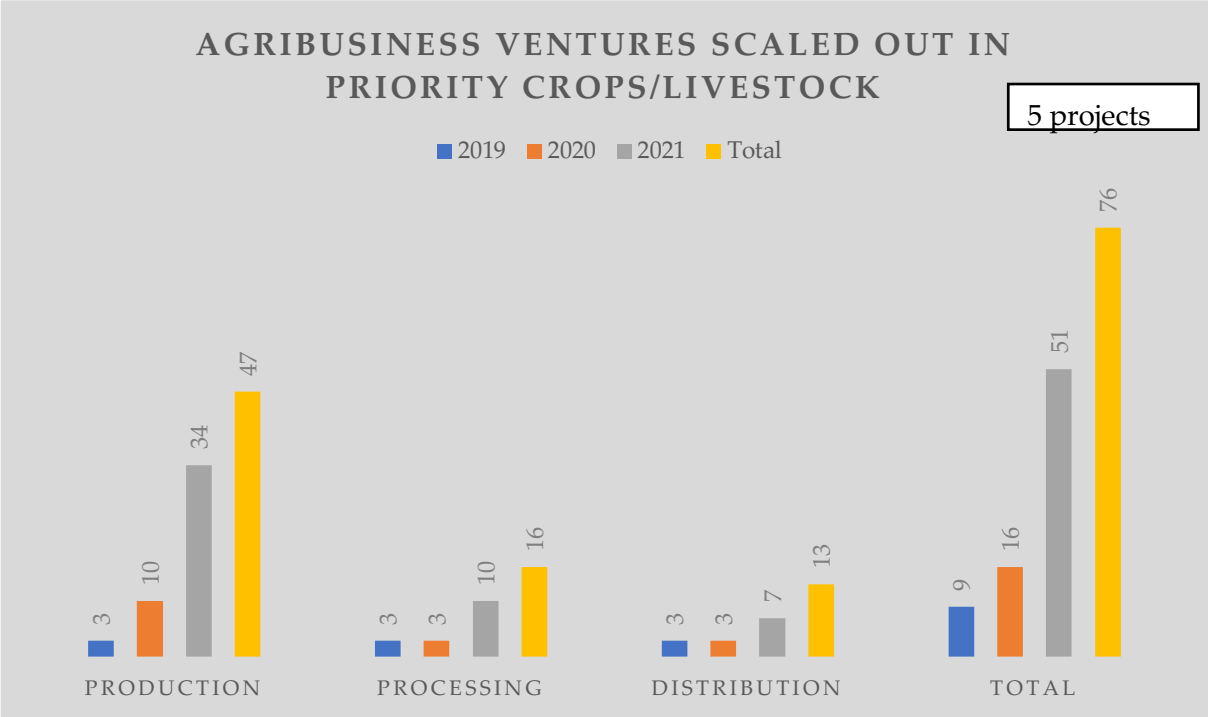

Figure 22. Number of agribusiness ventures scaled out in priority crops/livestock.

Figure 23 shows the distribution of stakeholders who scaled out agribusiness ventures by commodity value chain and over the years. Most of the 2021 stakeholders who scaled out agribusiness ventures were in the cassava value chain ranging from production (26) to processing (5) and distribution (2) while in 2020, cassava scaled out agribusinesses were 5. Of the 33 scaled out agribusinesses in the cowpea value chain, nine each were in 2019 and 2020, respectively, and 15 in 2021. Stakeholders who scaled out agribusiness in cowpea were 11 each in production, processing, and distribution, respectively. In 2020, two stakeholders scaled out agribusiness in plantain production. In 2021, three stakeholders scaled out agribusiness in maize production.

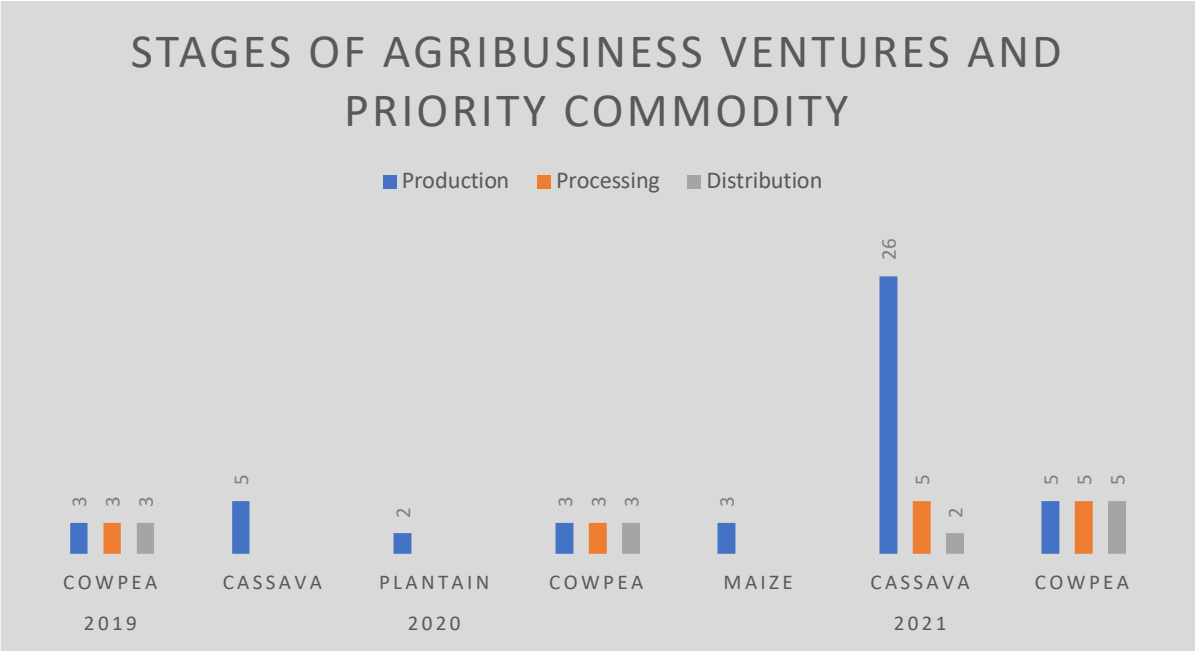

Figure 23. Distribution of the agribusiness ventures per crop.

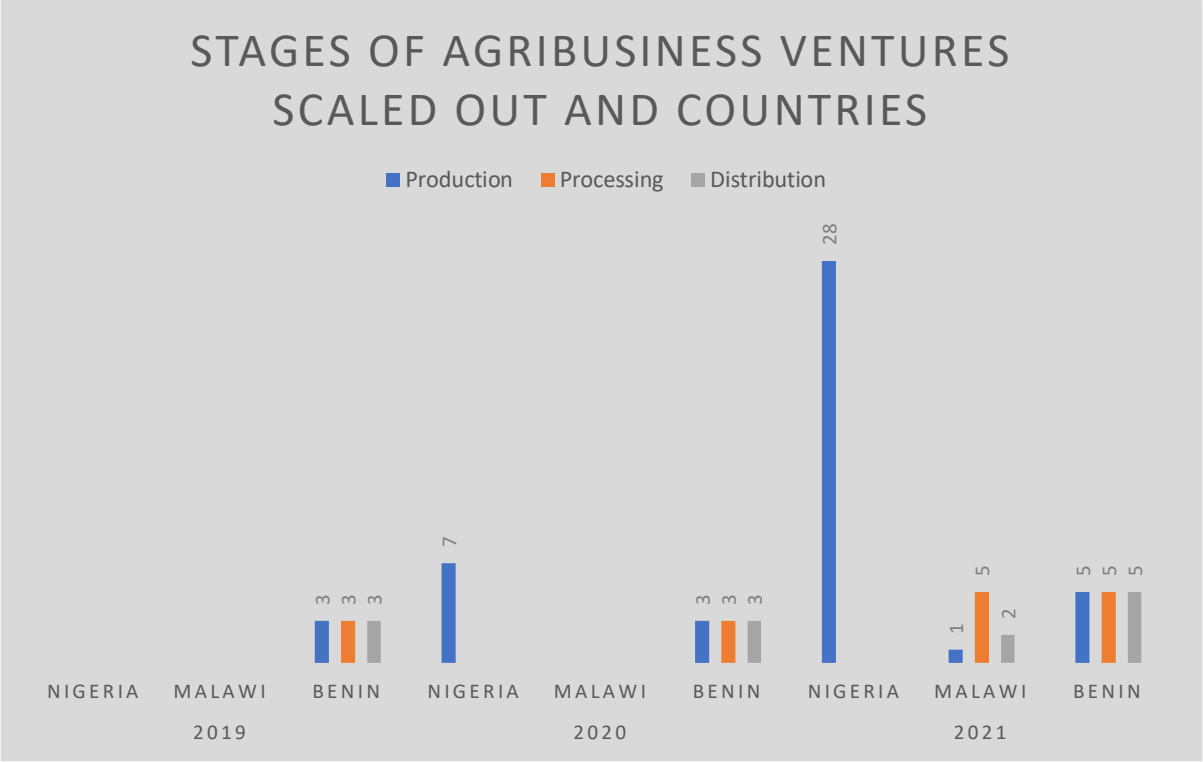

Figure 24. Distribution of the agribusiness ventures per country.

Figure 24 shows the distribution of stakeholders who scaled out agribusiness by countries over the years. In Nigeria, stakeholders who scaled out agribusiness in

production grew from 7 in 2020 to 28 in 2021. These agribusinesses were scaled out in cassava, maize, and plantain value chains. In Malawi, stakeholders who scaled out agribusiness were in all the value chains with the highest of five in processing in 2021. Stakeholders who scaled out agribusiness in cowpea were all in Benin. These agribusinesses were three and five each in production, processing, and distribution in 2019 and 2021, respectively.

3.8. Indicator 8: Number of people trained

This indicator measures the number of people trained as part of IITA interventions. Trained means subjected to new tools, skills, or knowledge among others, at Masters, PhD, and Postdoctoral level. The data for this indicator was obtained from the Capacity Development Office (CDO) of IITA.

Table 3. Distribution of group training by gender (IITA CDO).

Year	Male	Female	Total	%Male	%Female
2019	7328	3,950	11,278	65%	35%
2020	41177	21,094	62,271	66%	34%
2021	1500	550	2,050	70%	27%
Total	50,005	25,594	75,599	66%	34%

The Capacity Development Unit of IITA collects data on group training held in the Institute irrespective of projects, which could be seen in Table 3 for the years 2019–2021.

The data was disaggregated by gender (male, female). The total number of people trained for the three years was 75 599. More people were trained in 2020 compared to 2019 and 2021. In general, more men (66%) were trained compared to women (34%). The number of people trained declined in 2021, probably because of the Covid-19 pandemic and scientists actively engaged in preparing proposals for the One CGIAR initiatives.

3.9. Indicator 9: Number of formal and informal research partnerships formed with other CGIAR and non-CGIAR partners (e.g., small and medium enterprises (SMEs), farmer organizations, community-based organizations, women, and youth groups)

This indicator measures the number of both formal and informal collaborations on IITA interventions to achieve mutually agreed upon research objectives.
Formal partnership: Where there is a signed contract, agreement, or memorandum of understanding outlining the roles and responsibilities of each partner.
Informal partnership: Where there is no signed contract, but both parties have agreed to work together to achieve the set goals.

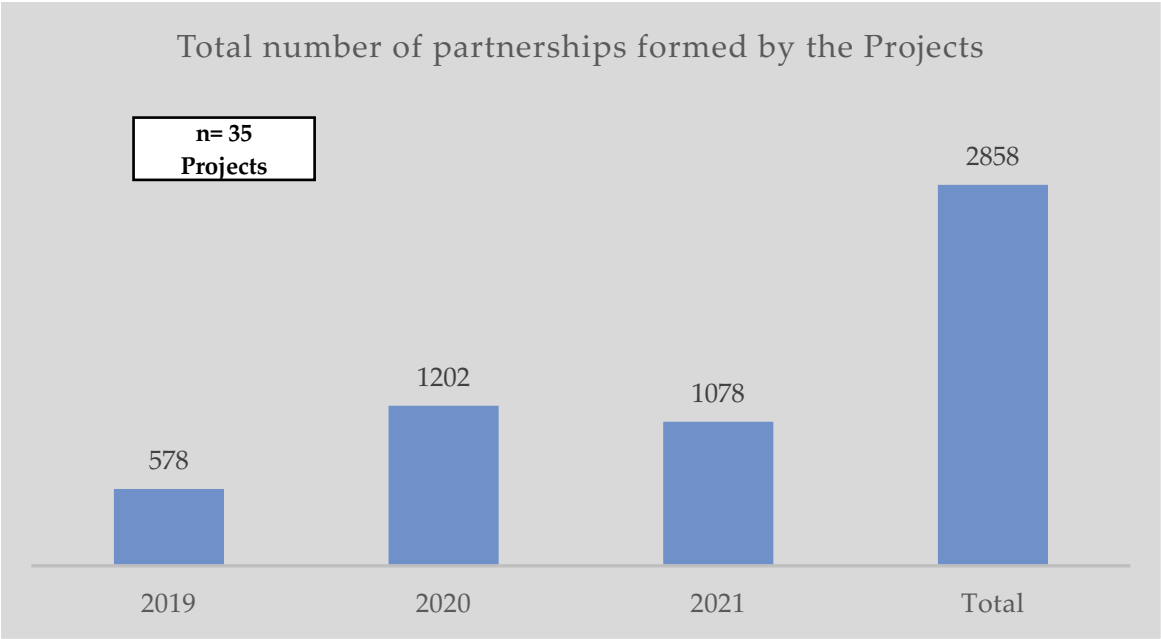

Figure 25. Total number of partnerships formed by the projects.

A total of 2858 partnerships were formed from data provided by 35 projects across the years 2019–2021. Figure 25 shows that more partners collaborated with IITA projects in 2020 compared to 2019 and 2021.

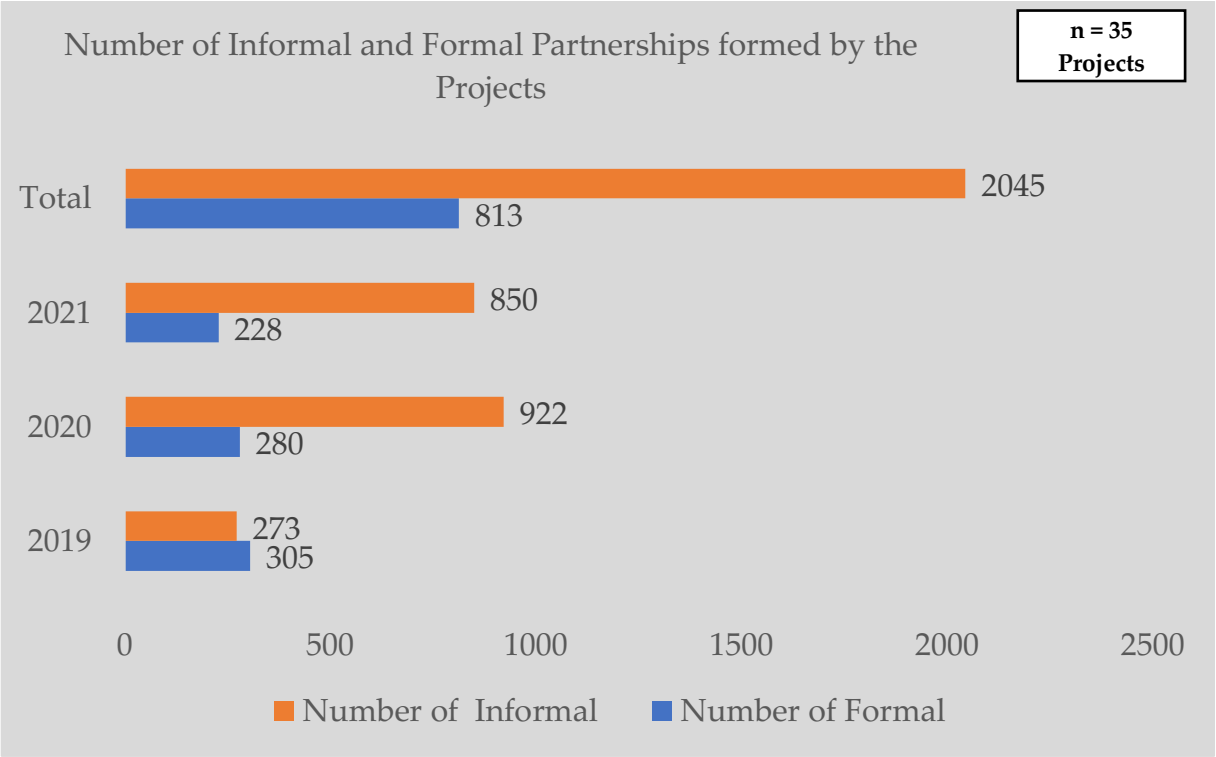

Figure 26. Number of formal and informal partnerships formed per year.

Figure 26 indicates that more informal partnerships were formed by the projects during the reporting period and the most informal partnerships were formed in 2020 and 2021. The number of formal partnerships formed was slightly higher in 2019 compared to informal partnerships. However, 2020 witnessed a sharp increase in informal partnerships.

3.10. Indicator 10: Number of peer-reviewed publications produced and made available on Open Access repositories by IITA scientists

This indicator measures the total number of peer-reviewed publications that comply with Open Access goals. It is an output indicator that links well with CGIAR indicator C5: Number of CGIAR research papers peer-reviewed. The data for this indicator was obtained from the Knowledge Center of IITA.

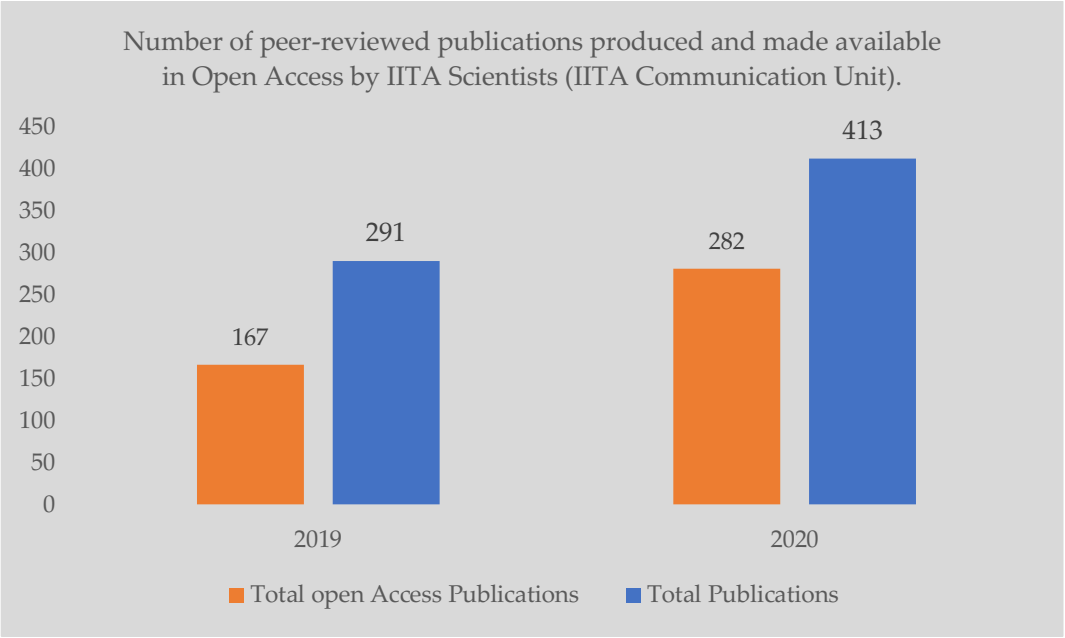

Figure 27. Number of peer-reviewed publications produced and made available in Open Access by IITA scientists (IITA Communication Office).

Figure 27 shows the number of publications produced by IITA scientists and made available on Open Access in different science areas such as biometrics, biotechnology & plant breeding, natural resource management (NRM), nutrition & human health, plant production & plant health, and social science & agribusiness. The graph revealed that 704 publications were produced, out of which 449 were made available on Open Access during the reporting period. The achievement in terms of open access is therefore 64% and 36% not achieved. Most publications were produced in 2020 compared with 2019. No data was available for 2021 at the time of reporting.

3.11. Indicator 11: Number of IITA interventions/innovations that have considered gender in their research activities

Gender consideration is assessing the implications of planned actions, legislations, policies, programs, and projects for women and men. This indicator measures the number of IITA-supported research that considered gender issues in the project priority setting, design & budget, implementation, and evaluation to ensure women and men equally participate and benefit from the research.

Eleven projects provided data on this indicator: (1) Science-driven and farmer-oriented insect pest management for cowpea agro-ecosystems in West Africa, (2) Sustainable Intensification: West Africa, (3) ENABLE Youth Cameroon - Agricultural

value chain development project (PD-CVA/ACV-DP), (4) An innovative approach to agribusiness training and start-up for Nigeria young people within the Young Africa Works Program, (5) CBI School for Indigenous Knowledge, (6) Sofala Province (Mozambique) Water, Energy, and Food Security Project (SWEF), (7) Contribution to GENDER Platform resource center, (8) Next Generation Cassava Breeding (Phase II), (9) Breeding RTB products for end-user preferences (RTBfoods), (10) African Cassava Agronomy Initiative (ACAI), and (11) Feed the Future Nigeria Integrated Agriculture Activity.

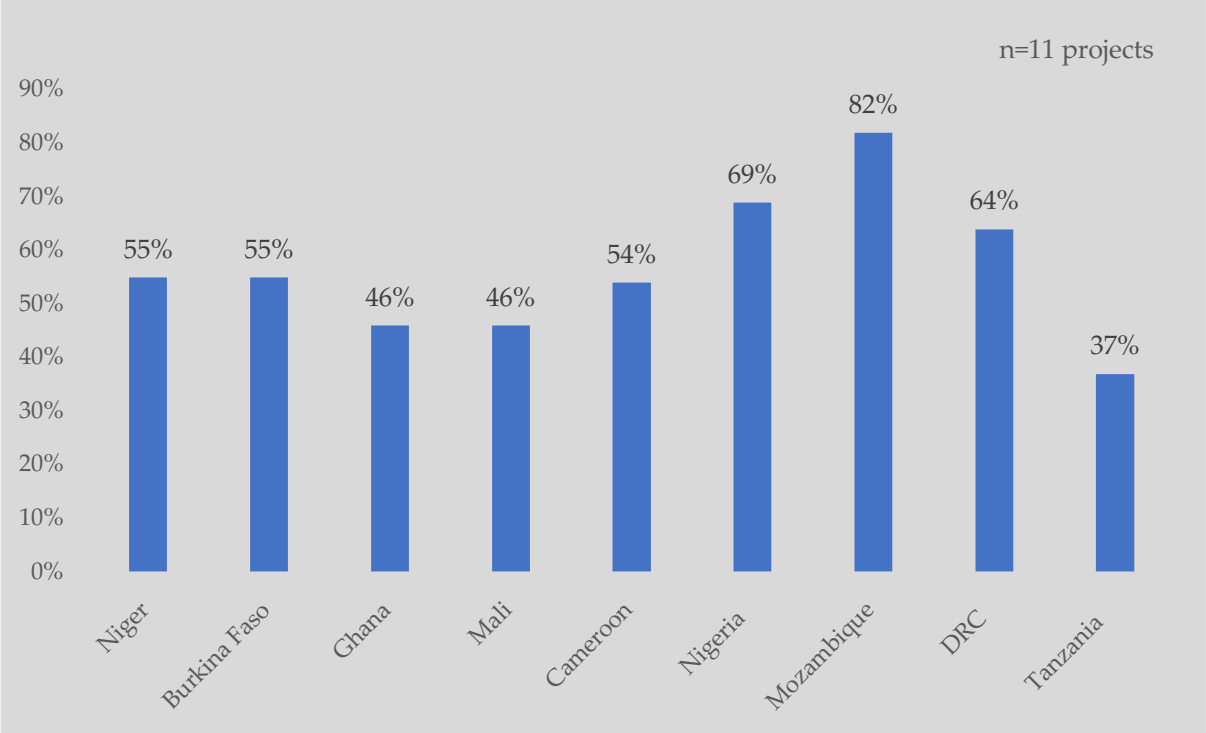

Figure 28. Score of consideration of gender issues in projects.

The percentage of gender consideration in projects was computed using the method described following:

(a) Gender-strategic research:

"Research that studies gender as the primary topic in a social analysis designed to understand what the implications of gender are for agriculture" (CGIAR Gender and Agriculture Research Network 2015)

Definitions of gender research for CRP gender budgets. Guidance Note: The cost of gender research corresponds to 100% of the total cost because gender analysis is the primary focus of the study (or cluster of activities). (Score: Yes = 3, No = 0).

(b) Integrated gender research:
"Research that integrates consideration of gender into technical research of the principal topic of study" (e.g., plant breeding, postharvest technology development) (CGIAR Gender and Agriculture Research Network 2015), i.e., where the cost of gender research corresponds to less than 100% and does not exceed 30% of the cost of the study (or cluster of activities) because gender analysis is not the primary objective of the research. (Score: Yes = 2, No = 0).

(c) Not gender research, but the research result is disaggregated by gender (men, women) (Score: Yes = 1, No = 0).

(d) Not gender research, i.e., where the cost of gender research corresponds to 0% of the total cost because gender is neither the primary focus nor integrated into the study (or cluster of activities). (Score: 0).

If the score of gender consideration is 3 or 2, meaning gender analysis is the primary focus or integrated into the project, then respondents can proceed to answer the questions on gender consideration in the project cycle of priority setting, research design, implementation and monitoring & evaluation, and dissemination of outputs. There are 11 questions in the stages of the project cycle. Each positively answered question scores one point. At the end of the interview, the total score of positively answered questions is divided by 11 and multiplied by 100 to obtain the percentage of gender consideration in projects. The most gender-sensitive projects score between the range of 80 to 100%. The scores between 50 and 79% are medium gender-sensitive projects. Those below the score of 50% are fair gender-sensitive projects.

Figure 28 indicates that consideration of gender issues in projects occurred highly in the IITA project implemented in Mozambique (82%). The most gender-sensitive project was Sofala Province Water, Energy, and Food Security Project (SWEF) implemented in Mozambique. Projects implemented in Nigeria (69%), DR Congo (64%), Niger (55%), Burkina Faso (55%), and Cameroon (54%) were medium gender-sensitive. In contrast, those implemented in Ghana (46%), Mali (46%), and Tanzania (37) were fair gender-sensitive projects.

3.12. Indicator 12: Number of research strategies developed by IITA Projects

Research strategies development relates to subsector analyses and research activities carried out by projects to identify policy constraints and opportunities along the value chain of IITA priority commodities. This indicator measures the number of research strategies developed disaggregated by country and value chain. Nine projects provided data on this indicator.

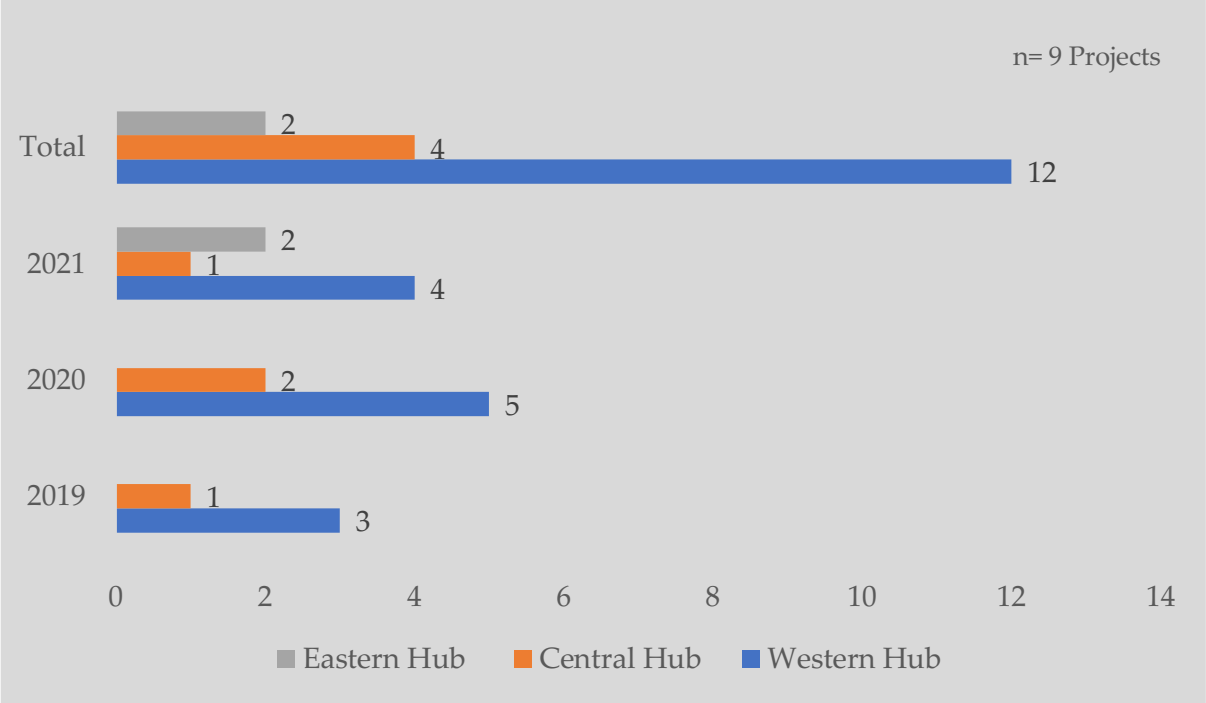

Figure 29. Number of research strategies developed by IITA-supported projects that inform government policy and institutions at national and sub-national levels.

Figure 29 indicates that a total number of 18 research strategies were developed in three IITA hubs (Central, Eastern, and Western) combined. Most research strategy developments that informed government policies were developed in the Western Hub between 2019 and 2021. Projects implemented in countries such as Ghana and Nigeria (Western Hub), were responsible for the development of the strategies. Relatively few research strategies were developed in the Central Hub by DR Congo, Rwanda between 2019 and 2021. Projects in Tanzania (Eastern Hub) developed two research strategies in 2021 and none in 2019 and 2020.

3.13. Outcome Indicator 13: Number of persons lifted out of poverty

The poverty indicator monitors the number of people who were lifted above the poverty line after using improved technologies developed by IITA and its partners

over past years. The benefits of improved varieties can't occur in the same year of development and release of a new technology. Very often a longer period is required for adopters and their family members to fully reap the benefits of the new technologies. The assessment of this indicator requires very complex and rigorous methodologies that required IITA to put in place a special team of experts in economics to lead this work at the Institute. The team is referred to as the IITA KPI Poverty Team. So far, the team has completed nine poverty studies between 2014 and 2019 (Table 4). A cumulative number was achieved by 2020 of 7,421,053 persons lifted out of poverty out of the IITA target of 11,600,000 by 2020, or an achievement rate of 64% (Fig. 30). No data is available for the research year 2021.

Table 4. Number of persons lifted out of poverty associated with benefits from adopting IITA technologies.

Study description and year of study	**Number of people lifted out of poverty**
Study 1: Cassava SARD-SC/4 countries (2014)	194,469
Study 2: CIALCA project/GLR (2014)	559,911
Study 3: Cowpea-Kano/N-Nigeria (2015)	884,241
Study 4: DTMV-Maize/Nigeria (2015)	2,100,000
Study 5: Cassava/Nigeria (2016)	1,800,000
Study 6: SIP-N/Ghana (2017)	422,037
Study 7: Soybean in Malawi, cowpea 2 in far-north Nigeria, yam in Ghana & Nigeria (2018)	1,223,697
Study 8: Cassava in Uganda (2019)	30 448
Study 9: Biotechnology for DNA identification of crop varieties (2020)	206,250
Total	**7,421,053**

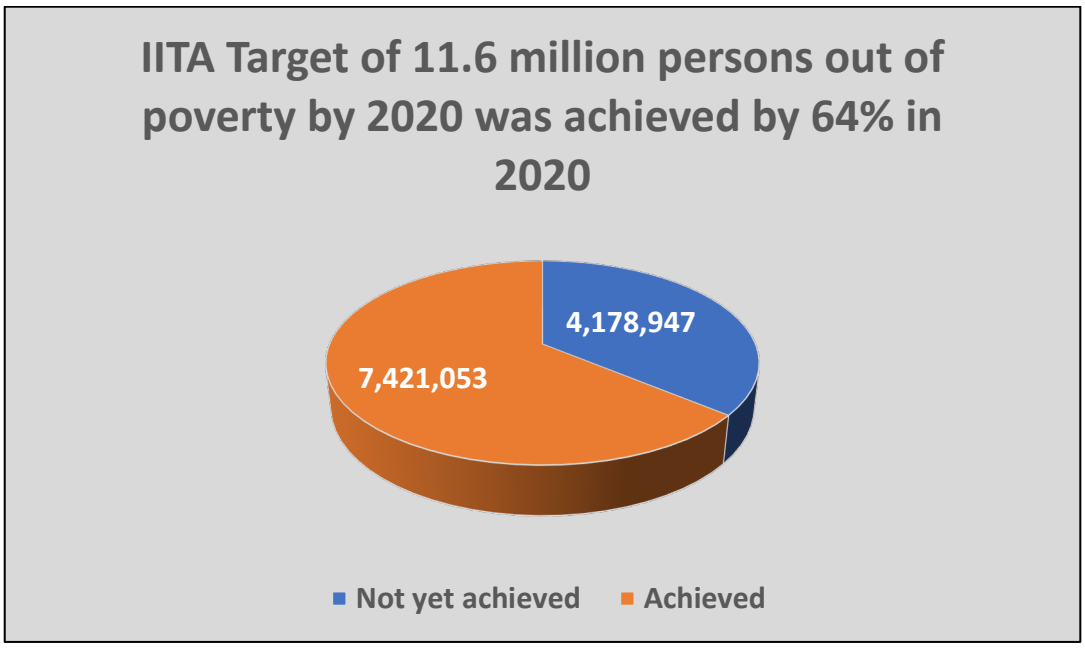

Figure 30. Number of people lifted out of poverty.

4. Conclusions

This section of the report presents the conclusions drawn from the analysis of the results and recommendations for improving the projects and KPI data.

KPI 1 **Yield**: Based on the data so far collected from six projects, a high percentage change (175%) in the yield (1.1 t/ha) of cowpea in Mozambique was observed in 2020 compared to the baseline (0.4 t/ha) in 2019. In 2021, the yield increased to 1.2 t/ha resulting in a 200% change. Also, in Nigeria, maize recorded a 180% increase in yield (14 t/ha) in 2020 compared to the yield (5 t/ha) in 2019. Yield increases for maize were due to a combination of better hybrids and crop management practices (e.g., maize intercropping with cassava). A negative percentage change (–19%) was observed in the soybean yield in Mozambique in 2020. This contrasts with the positive increases in percentage change in soybean yield observed in Mozambique in 2017 and 2018 (see report on Monitoring IITA KPIs, 2017 to 2019).
We conclude that the direction of change in the yield of cowpea and maize is on the increase. The percentage change in yield could not be estimated for cassava, yam, and other IITA priority commodities because project managers did not provide data during the reporting period.

KPI 2: **Sustainable Land Use (SLU):** Based on the data contributed by 12 projects from the four hubs, the total area under SLU from 2019 to 2021 was 762,908.32 ha, representing a 10% increase in the target area under SLU in line with IITA refreshed strategy. If we aggregate the land area under SLU (497,082 ha) from the previous KPIs survey of 2019 and the current survey of 2021, we will achieve a total area of 1,259,990.32 ha, representing 17% of the target area under SLU in line with IITA refreshed strategy. This is a significant achievement so far. However, it is important to mention that not all projects working on SLU practices provided data during the reporting period. We, therefore, recommend that more investment in data collection and extensive study on the land area under SLU practices be implemented in the new One CGIAR initiatives, especially those related to resilience in agri-food systems (RAFS).

KPI 3: **Adoption of IITA improved varieties, production technologies, and management practices:**

Based on the adoption data so far provided by 13 projects, 1,005,845 farmers were reached and 269,612 adopted IITA improved varieties, production technologies, and management practices. We computed an overall adoption rate of 27% for all improved technologies. We observed an increase in the adoption rate (36%) in 2020 compared to 2019 and 2021. Most technologies adopted were improved crop varieties (122%) and production technologies (95%). This should translate into an increase in the yield of improved IITA priority commodities as postulated in the theory of change. We noticed a progressive increase in cowpea yields in Mozambique and maize in Nigeria. We can conclude that the direction of change for adopting IITA improved varieties and production technologies by African farmers and value chain actors is on the increase. More data from the farm household survey will provide a better picture of the observed relationship between adoption and an increase in yield for other commodities. We observed a decrease in the adoption rates of management practices and postharvest technologies. More work is needed by IITA scientists, NARS, and the private sector to support farmers to increase the adoption of both technologies.

KPI 4 **Number of beneficiaries of biofortified crops**

Four projects from Nigeria (Western Hub) and Malawi (Southern Hub) working on cassava, maize, cowpea, and soybean provided data on this indicator. A total of 89,182 farmers benefited directly and indirectly from IITA priority crops that have been biofortified in 2019 and 2021. More people benefited from biofortified maize (42,936)

in Nigeria compared to the other crops. Most of the growers of biofortified crops were male farmers compared to women farmers. We, therefore, recommend that future scaling projects on biofortified crops be targeted toward women and youth farmers.

KPI 5 **Number of innovations developed**

The number of technological innovations developed by IITA scientists continued to increase over the years. In total, 329 technology innovations were developed by 17 projects between 2019 and 2021 at different innovation phases. The most innovations developed were production technologies (160), new varieties (150), and a few management practices (19). About 47 of the technologies were available for uptake and 29 of the technologies were taken up by the stakeholders to disseminate them to the end-users. This is actually an opportunity for IITA P4D and BIP to mobilize human and financial resources to scale up the technologies to end-users.

KPI 6 **Number of new jobs created:** In total, 11,190 jobs were created by five projects from 2019 to 2021, mostly around processing (7337), production (2344), and distribution (1509). This is a significant increase compared to the number of jobs created during the previous KPIs survey of 2019. The IITA priority crop (cassava) attracted more jobs in 2021 than in other years and mostly along the processing, production, and distribution value chain. Most jobs were created in the cassava processing stage in Malawi.

KPI 7 **Number of agribusiness ventures scaled out**

A total of 76 stakeholders scaled out agribusiness ventures over the period under review by five projects. The highest number of agribusinesses scaled out were in production (47), followed by processing (16) and distribution (13). In Nigeria, agribusiness ventures were mostly scaled out in cassava production in 2021. While in Malawi, stakeholders scaled out in all the value chains with the highest in processing in 2021. Stakeholders that scaled out agribusiness ventures in Malawi created more jobs in 2021 in cassava processing (see KPI 6). In Benin, cowpea was the major crop that was scaled out along all the stages of the value chain over the reporting period of 2019 to 2021. This result indicates an improvement in the scaling up of agribusiness ventures in production and less in processing and distribution. We, therefore, recommend that future IITA projects focus more on scaling out agribusiness ventures in the value chain areas of processing and distribution.

KPI 8 **Number of people trained**

The total number of people trained between 2019 and 2021 was 75 599. In general, more men (66%) were trained than women (34%). More people were trained in 2020 (62 271) compared to 2019 (11 278) and 2021 (2050). The number of people trained sharply declined in 2021. This may be because of the Covid-19 pandemic and because most IITA scientists were busy writing proposals for the One CGIAR initiatives.

KPI 9 **Number of partnerships formed**

A total of 2858 partnerships were formed with 35 projects from 2019 to 2021. More informal partnerships were formed than formal partnerships. An increase in the number of informal partnerships formed by IITA projects in 2020 and 2021 also increased the adoption rate of improved technologies, yield, agribusiness ventures, jobs, and training. This result is in line with our theory of change. More formal partnerships were formed in 2019, but we observed a low adoption rate, few agribusiness ventures scaled out, and fewer jobs in that year. We, therefore, conclude that increased informal and formal partnerships will lead to increased agribusiness ventures scaled out, thereby contributing to the increased adoption rate of commodities, yield, jobs, and income. We recommend, therefore, that the informal partnerships so far formed between IITA projects and other private, public, and CGIAR centers be formalized with MOUs.

KPI 10 **Number of Publications**

A total of 704 publications were produced, out of which 449 were made available on Open Access during the reporting period. Most publications were produced in 2020. We can conclude that more publications were produced due to an increase in other indicators such as adoption rate, yield, partnerships formed, jobs created, training, research strategies, and agribusiness ventures scaled out.

KPI 11 **Gender**

Available data from 11 projects indicate that consideration of gender issues in projects occurred highly in the IITA project implemented in Mozambique (82%). The most gender-sensitive project was Sofala Province Water, Energy, and Food Security Project (SWEF) implemented in Mozambique. Projects implemented in Nigeria (69%), DR Congo (64%), Niger (55%), Burkina Faso (55%), and Cameroon (54%) were medium gender-sensitive. In contrast, those implemented in Ghana (46%), Mali (46%), and Tanzania (37) were fair gender-sensitive projects.

KPI 12 **Number of research strategies developed**

A total of 18 research strategies were developed by IITA projects from 2019 to 2020 in Ghana and Nigeria (Western Hub), Tanzania (Eastern Hub), and DR Congo (Central Hub). Most research strategies were developed in the Western Hub (12). It will be useful to conduct a survey to find out to what extent those research strategies contributed to government agricultural policies at national and sub-national levels. This survey would likely take place in the current One CGIAR initiative on national policies.

KPI **Poverty:** A cumulative number was achieved by 2020 of 7,421,053 persons lifted out of poverty out of the IITA target of 11,600,000 by 2020, or an achievement rate of 64%. The number of persons lifted out of poverty was associated with the adoption of technologies developed by IITA scientists and partners. No data was available in 2021.

4.1. Recommendations

To address the challenges and limitations of the study described in the methodology section, we propose the following recommendations:

- Inability of project managers to provide KPIs data consistently and timely.
  Collecting KPIs data consistently and timely from project managers (PMs) was a challenge for the M&E Unit. This challenge was partly resolved by conducting face-to-face interviews, use of Microsoft Teams meetings, phone calls, and review of project documents to gather KPIs information. Additionally, the IITA MEL Platform development was completed, and project managers and M&E officers were trained on using the system for KPIs data collection, analysis, and reporting.
- Willingness of PMs to populate MEL database.
  Project managers who received training on the MEL Platform were willing to populate the database compared to those who did not. Some PMs would prefer that their project M&E officers do the data entry. We, therefore, recommend continuous training of PMs and M&E officers to ensure timely and consistent data collection. We also recommend providing support in the recruitment of M&E officers or focal persons for each project and backstopping them. Continuous sensitization of PMs and scientists to use the developed M&E tools for project implementation.

- The issues associated with collection of data for more than one year.
  Project managers may have difficulty recalling results from previous years, especially if the project indicators were not designed, based on, or linked to IITA KPIs. We, therefore, recommend projects to have databases and project indicators should be mapped to IITA KPIs.

- Some project managers did not respond to calls for KPI data.
  Providing KPIs data every quarter should be part of project planning in the Institute as a matter of policy. ME&L officers supporting projects will be required to comply with this policy.

- Difficulty in understanding the 13 KPIs by some project managers.
  This issue was addressed by providing training on the KPIs to project managers and their M&E officers. However, continuous training and sensitization is recommended.

- Most projects could not provide baseline and target data on KPIs.
  This is a well-known problem with research project planning and implementation. Project managers will continuously be supported to design well-structured results frameworks with baseline and target data. Where baseline data is missing, they will be encouraged to commission baseline studies before starting the project.

- KPIs data were not properly disaggregated where necessary.
  There are several data disaggregation criteria and items depending on the indicator, e.g., gender, value chain, and crop varieties. This should be specified in the project indicators at the project planning stage so as to enable the actual results to be properly disaggregated. We recommend that project managers make use of the IITA indicator handbook.

- Data were from project managers who completed the questionnaire; therefore, their accuracy could not be rejected in the survey except for obvious mistakes in data entry. If there are outliers in the data, we contacted the project managers to correct the data.

- The data collection tool needs fine-tuning.
  This issue was resolved with the development and implementation of the IITA-MEL systems. All KPIs have a well-structured data collection form, metrics and formulas for data analysis, and graphical visualization on a Dashboard.

General Conclusion

The institute-wide KPI survey is an important activity that has enabled the M&E Unit to collect, analyze, and aggregate valuable project-related M&E data and show how IITA key performance indicators are progressing towards impacts. The project KPI survey is planned to take place once per year and complemented with a farmers' household survey. The cooperation of the project managers and their M&E officers in providing quality data will be crucial in ensuring a smooth process of measuring the indicators to meet the project's strategic objectives and impact targets.

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Annex

Table 5. Percent of people adopting improved new crop varieties, production technologies, and management practices (n = 5 projects).

Table 6. Overall adoption rate per year.

Year	Reached	Adoption	% Adoption
2019	571,308	126,797	22
2020	392,025	139,864	36
2021	42,512	2951	7
Total	1,005,845	269,612	27

Table 7. Percent of farmers adopting new crop varieties.

Project	Crop(s)	Reporting year	Location	Total reached	Total adopted	% Adoption
2665	Cassava	2019	Malawi	8380	8380	100
		2020		5558	9023	162
3315	Maize	2020	Ghana	200	104	52
3315		2020	Benin	518	311	60
				14,656	17,818	
			Overall Adoption %			**122**

Table 8. Percent of farmers adopting production technologies.

Project	Crop(s)	Reporting year	Location	Total reached	Total adopted	% adoption
2919	Maize	2019	Rwanda	388	388	100
		2020	Rwanda	156	156	100
2307		2019	Mozambique	95,713	95,652	100
		2020	Mozambique	86,111	76,728	89
3262	**Soybean**	**2021**	Nigeria	140	140	100
				182,508	173,064	
			Overall Adoption %			**95**

Table 9. Percent of farmers adopting postharvest technologies.

Project	Crop(s)	Reporting year	Location	Total reached	Total adopted	% adoption
2957	**Cassava**	**2019**	Togo	104,855	629	1
			Sierra Leone	29 609	61	0
			Nigeria	361,822	59	0
			Tanzania	184,090	15	0
2957	**Cassava**	**2020**	Togo	90 362	487	1
			Sierra Leone	122,233	335	0
			Nigeria	151,599	664	0
			Tanzania	109458	533	0
			Cameroon	6588	4	0
			DRC	116,473	90	0
				1,277,089	2877	
			Overall adoption%			**0.23**

Table 10. Percentage of farmers adopting management practices.

Project	Crop(s)	Reporting year	Location	Total reached	Total adopted	% adoption
2957	Cassava	2019	Nigeria	361,822	21648	6
			Togo	104,855	2120	2
			Benin	73 642	1618	2
			Tanzania	184,090	8400	5
			Sierra Leone	29 609	3014	10
			DRC	139,967	3714	3
			Rwanda	1355	3652	270
			Burundi	122,200	4102	3
			Zambia	213,432	10,105	5
2957		2020	Nigeria	151,599	6828	5
			Togo	90 362	5670	6
			Benin	10 260	896	9
			Tanzania	109,458	11,099	10
			Sierra Leone	122,233	6844	6
			DRC	116,473	1212	1
			Uganda	17 017	2712	16
			Zambia	206,294	6135	3
			Cameroon	6588	1127	17
			Rwanda	29,961	1322	4
2957		2021	Nigeria	39,545	1198	3
			Togo	62,275	1603	3
			Tanzania	33,553	2066	6
			Sierra Leone	21,228	185	1
			DRC	64,895	2211	3
3052		2019	Niger	150	100	67
		2020	Niger	1150	1127	98
		2021	Niger	1400	899	64
3390		2020	Nigeria	56,357	45,086	80
				2,371,770	156,693	
			Overall Adoption %			**7**

Table 11. Land area under sustainable land use practices (2019–2021).

Project	Crop(s)	Year	Land area in hectares under sustainable land use			Hub	Location	Type of sustainable land-use practices
			Baseline	Target	Actual			
2316	maize	2019	3830.5 ha	115,089.30	115,089.3		Nigeria	Use of nutrient sources (fertilizers, inoculum, lime, organic inputs, tillage practices, integration of legumes)
		2020		367,625.25	367,625.2		Nigeria	Use of nutrient sources (fertilizers, inoculum, lime, organic inputs, tillage practices, integration of legumes)
1503	Mazie	2019		1108	1147.9		Ghana	Use of soil conservation practices (mulching, hedgerow)
		2020		1242	1196.3			
1504	Mazie	2019		2600	2179		Malawi	Soil conservation practices
		2020		3220	2760			Soil conservation practices
		2021		6150				Soil conservation practices
		2019		483.96	354.766		Tanzania	Soil conservation practices
		2020		464.37	261.525			Soil conservation practices
		2021		624.599				Soil conservation practices
		2019		1600	1276		Zambia	Soil conservation practices
		2020		1760	4675			Soil conservation practices
		2021		1936				Soil conservation practices
2919	Maize	**2019**		10	40.98		Rwanda	

		2020		**10**	**20**			
		2021		1000				
2511	plantain	**2020**	1	1	1		Cameroon	Use of compost, crop residues
	cassava	**2020**	1	1	1			Use of compost, crop residues
	yam	**2020**	1	1	1			Use of compost, crop residues
	maize	**2020**	1	1	1			Use of compost, crop residues
2307	Cowpea	**2019**	2689.2	21,000	14,279.14			
	Soybean	**2019**	1160	31,500	33,863.375			
	Cowpea	**2020**		22,000	20,017.3598			
	Soybean	**2020**		33,000	28,552.9436			
	Cowpea	**2021**		2, 000				
	Soybean	**2021**		33,000				
2355	Cassava (EGS established)	2021			22			Weed Management and Good Agronomic Practices (GAP)
	Cassava (EGS established)	2021			117			Weed Management and Good Agronomic Practices (GAP)
	Cassava (breeder seed field with source material from new propagation method established)	2021			1			Weed Management and Good Agronomic Practices (GAP)
	Cassava (CSE fields established)	2021			110			Weed Management and Good Agronomic Practices (GAP)

3353		2021		123.6	123.6			Use of soil conservation practices
3148	Cowpea, sesame, vegetables	2021		10	10.8		Sofala province of Mozambique	Use of soil conservation practices
2461	Cassava	2020		400	149		DRC	Weed Management and Good Agronomic Practices (GAP)
	Cassava	2021		130	20			Weed Management and Good Agronomic Practices (GAP)
2841	Maize	2019	1443	3436	6735		Nigeria: Adamawa and Borno	Use of nutrient sources (fertilizers, inoculum, lime, organic inputs, tillage practices, integration of legumes)
	Cowpea (Beans)	2019	508	1210	2372		Nigeria: Adamawa and Borno	Use of nutrient sources (fertilizers, inoculum, lime, organic inputs, tillage practices, integration of legumes)
	Soybean	2019	286	682	1336		Nigeria: Adamawa and Borno	Use of nutrient sources (fertilizers, inoculum, lime, organic inputs, tillage practices, integration of legumes)
3390	Cassava	2020		6600	22,542.8		Nigeria	Use of nutrient sources (fertilizers, inoculum, lime, organic inputs, tillage practices, integration of legumes)
	Cassava			7500	2, 756.9		Tanzania	
	Cassava			41 550	32,357		Nigeria	
	Cassava			12 650	3, 915.7		Tanzania	
	Cassava and Maize			6300	13,192.4		Nigeria	

	Cassava and Sweet potato			11 250	6894.72		Tanzania	
	Cassava			4200	16,137.2		Nigeria	
	Cassava			5031	10,772.4		Tanzania	
		Total			**762,908.309**			