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Increasing Performance of the Cassava Industry in West and Central Africa Region (IPCI)

Agronomy training for cassava farmers using the farmer field fora approach in the Brong Ahafo and Ashanti Regions, Ghana

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Prepared by:

Joseph Yeboah, Private Training Expert

UNIVERSITY of GREENWICH | Natural Resources Institute

SNV

GASIP

FEDERAL UNIVERSITY OF AGRICULTURE, ABEOKUTA

IFAD- WEST AND CENTRAL AFRICA DIVISION

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1.0 Introduction

Cassava is a major food crop in Ghana. It is widely cultivated and used for preparation of many local dishes. It is also arguably the most processed root and tuber crop and finds use in several industrial applications. The crop is used for the production of industrial ethanol, Plywood Cassava Flour (PCF) for plywood binding and as additive for other industrial processes. Additionally, the cassava crop makes significant contributions to the country's economy. According to FAOSTATS, cassava constitutes 22 % of Ghana's Agricultural Gross Domestic Product (AGDP).

Cassava yields have generally been below expectation. According to the FAO (2013), cassava yields increased from 8 MT per hectare to 15MT per hectare between 1990 and 2010. However, several improved varieties with yield potentials exceeding 50 MT per hectare have been released into the system with the support of the Research and donor organisations such as IFAD. Sub-optimal management of land, labour, nutrients and water and reducing factors such as pests and diseases have been found to contribute to wide cassava yield gaps between the achievable and the actual yield figures.

1.1 Asueyi Gasification Project

The Asueyi gasification project is a modern integrated gari processing facility which combines environmental sustainability with cassava processing efficiency. The set up includes a 120KW Gasification Power Plant, Mechanical Gari Roasters and a Warehouse facility. The facilities were installed for five gari processing groups within the Asueyi community under the Global Environmental Facility (GEF) / International Fund for Agricultural Development (IFAD) grant project, ''Promoting A Value Chain Approach To Climate Change Adaptation in Agriculture in Ghana'' (ProVACCA). The ProVACCA project which was an off-shoot of the Root and Tuber Improvement and Marketing Programme was completed by the Ghana Agricultural Sector Investment Programme in June 2017.

Presently, the IFAD sponsored project titled, "Increasing the Performance of the Cassava Industry in West and Central Africa" (IPCI-WCA), is undertaking a number of activities to facilitate the smooth start-up and management of the facility. The IPCI-WCA project is a collaboration between the Natural Resources Institute of Greenwich University- UK, SNV Netherlands Development Organisation, the Government of Ghana through MOFA and the Federal University of Agriculture in Abeokuta (FUNAAB), Nigeria.

Among the work packages being undertaken by the PICI-WCA are training programmes in business management, food hygiene, environmental protection and agronomy.

1.2 Agronomy Training at Asueyi and Akomadan

Raw cassava roots are supplied to the Asueyi cassava processors by farmers within and outside the Asueyi area. The farmers have varying technical capacities in cassava production. Most of them employ irregular planting methods and plant at varying distances. They also do

not acquire their planting materials from good sources. Additionally, whereas some use improved planting materials, others do not. These challenges lead to poor yields and unreliable supply of raw cassava roots to the processors. The efficient and profitable operation of the gasification power plant and mechanical gari roasting equipment would however require effective planning and sustained processing capacity on the part of the processors supported by a reliable supply of raw cassava roots from farmers.

This agronomy training was therefore commissioned by the IPC1-WCA project to build the capacity of 100 cassava farmers who supply the roots to the Asueyi gari processors. The goal was to address their cassava production gaps and increase their productivity to meet the demand of the Asueyi gari processors. In order to ensure effective transfer of practical cassava agronomic knowledge to the farmers, the Farmer Field Fora (FFF) technique was employed for the training assignment

1.2.1 Farmer Field Fora Technique

The Farmer Field Fora (FFF) is an experiential learning route for agronomic knowledge transfer which lends itself to collective observation and evidence based conclusions. It allows adult learners like farmers to test their farming practices against research proven techniques in an open and interactive environment. The FFF methodology reforms and refines opinions of participants, promotes adoption of successful technologies which eventually leads to improved productivity.

The objectives for the training assignment were;

1. Develop training curriculum and manuals on agronomic practices for cassava farming
2. Train cassava farmers on the basis of curriculum and manuals developed
3. Assess the level of understanding of participating farmers relative to training offered

1.3 Scope

This report presents details on the agronomy training conducted for the Akomadan and Asueyi cassava farmers. It describes the processes used and the experiences and makes conclusions and recommendations for future agronomic training programmes. It also presents the results of the training evaluation.

2.0 Methodology and Structure of the Training

2.1 Task 1: Development of Training Curriculum, Modules and Manuals

2.1.1 Training Needs Assessment

A training needs assessment was conducted to assess the farmers' levels of skill and the existing gaps in undertaking the various agronomic practices. A Participatory Rural Appraisal methodology was employed in undertaking the needs assessment.

The findings from the needs assessment were used to develop the themes for the demonstrations and curriculum of the training modules **(See needs assessment report).**

As part of the preparatory arrangements for the training, a learning guide was developed in collaboration with the farmers. The guide outlined the different training sessions, dates and other associated details **(See needs assessment report).**

2.1.2 Training Materials

A training curriculum was developed for the assignment. The curriculum was divided into modules to structure the assignment and facilitate learning. The modules were structured in line with the main training sessions of the FFF which included Site selection, Land Clearing, Planting Material Sourcing/ Acquisition and Controlled burning among others. The training manuals were distributed to the farmers after each training session.

2.2 Task 2: Training using Farmer Filed Fora Approach

2.2.1 Farmer Field Fora Themes

In order to ensure that the issues identified at the needs assessment level were properly targeted and addressed in the course of the training, three main training themes were developed namely:-

1. Testing performance of Improved Varieties against Local Varieties.
2. Assessing the Impact of Planting Methods and Planting Distances on yields.
3. Assessing the effect of different Soil Moisture Conservation practices.

About 70 farmers from the Asueyi and Akomadan participated in the training programme (***Appendix A***).

2.2.2 Training Sessions and Module

The training assignment was structured into eight (8) FFF sessions delivered in eight modules. The main training sessions and modules were:-

Module 1: Site selection

Module 2: Land Clearing

Module 3: Planting Material Sourcing/ Acquisition and Controlled burning

Module 4: Field Layout

Module 5: Planting Material Preparation and Planting

Module 6: 1st weeding, Refilling & Fertilizer Application

Module 7: 2nd Weeding & Pests and diseases management

Module 8: Harvesting & Planting Material Conservation

Plate 1: Farmers clearing Land at Akomadan

Plate 2: Lining and Pegging at Asueyi

Plate 3: Construction of Ridges at Asueyi

Plate 4: Planting at Asueyi

Plate 5: Farmers weeding at Akomadan

Plate 6: Farmers observing cassava crops at Asueyi

2.2.3 FFF Demonstration Fields

Demonstration fields of approximately one acre each were established for the training at Asueyi and Akomadan respectively. The Asueyi field had five (5) cassava varieties including two (2) local varieties and three (3) improved varieties while the Akomadan field used one (1) local variety called 'Gye wo buor' and three (3) improved varieties. This was because the farmers were only interested in that particular local variety.

Table 1: Cassava Varieties Planted at Asueyi and Akomadan.

Community	**Asueyi**	**Akomadan**
Varieties (Local)	Ahenewa	Gye wo buor
	Dakware	
Varieties (Improved)	Bankye Hemaa	Bankye Hemaa
	Esam Bankye	Esam Bankye
	Nkabom	Nkabom

Three learning plots were established on each demonstration site. The plots were:-

1. ***Integrated Crop Management (ICM) Plot-*** The ICM treatment was set up to demonstrate best practices including optimum spacing i.e. 1m X 1m spacing, proper planting material preparation and planting methods as well as the effect of mulching on soil moisture conservation.

Plate 7: A mulched ICM Plot at Akomadan

2. ***Farmer Practice (FP) (Control) Plot -*** This plot was established by the farmers to demonstrate and compare the efficacy of their best practices (spacing, soil moisture conservation, to those recommended by the trainer.

Plate 2: A Farmer Practice Plot at Asueyi

3. ***Participatory Action Research Plot (PAR) -*** This treatment was set up to test the effect of improved mounding, fertilizer application and planting distances on cassava yield.

2.3 Task 3: Training Evaluation

An evaluation was carried out at the end of every training session to assess the extent of achievement of the training objectives and also to form the basis for adjustments in subsequent modules. A Participatory Rural Appraisal method was used due to the number of participants involved.

The responses from the two communities are presented in the tables below;

Table 2: Results of Training Evaluation at Asueyi

	Training Modules / **Evaluation Questions**	**Module 1 :** Site selection	**Module 2 :** Land Clearing	**Module 3:** Planting Material Sourcing/ Acquisition and Controlled burning	**Module 4 :** Field Layout	**Module 5 :** Planting Material Preparation and Planting	**Module 6:** 1st weeding, Refilling & Fertilizer Application	**Module 7 :** 2nd Weeding & Pests and diseases management	**Module 8:** Harvesting & Planting Material Conservation
1.	**Was the content relevant to your work as a cassava farmer?** **a. Yes b. No** **If no why?**	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2.	**Was the content appropriate for your level of knowledge or training in cassava production?** **a. Yes b. No** **If no why?**	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
3.	**What stood out for you as a cassava farmer?**	The physical	Nil	The pests and diseases	Nil The activity	Very small			

	Training Modules / Evaluation Questions	**Module 1 :** Site selection	**Module 2 :** Land Clearing	**Module 3:** Planting Material Sourcing/ Acquisition and Controlled burning	**Module 4 :** Field Layout	**Module 5 :** Planting Material Preparation and Planting	**Module 6:** 1st weeding, Refilling & Fertilizer Application	**Module 7 :** 2nd Weeding & Pests and diseases management	**Module 8:** Harvesting & Planting Material Conservation
	Please state	soil test		identification	was time consuming	quantity of planting material was able to plant the entire ICM plot			
4.	**Do you think the content achieved the learning objectives?** **a. Yes b. No** **If no why?**	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
5.	**Was the course delivered in a way that was easy to**	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

	Training Modules / Evaluation Questions	**Module 1 :** Site selection	**Module 2 :** Land Clearing	**Module 3:** Planting Material Sourcing/ Acquisition and Controlled burning	**Module 4 :** Field Layout	**Module 5 :** Planting Material Preparation and Planting	**Module 6:** 1st weeding, Refilling & Fertilizer Application	**Module 7 :** 2nd Weeding & Pests and diseases management	**Module 8:** Harvesting & Planting Material Conservation
	understand? **a.Yes b. No** **If no why?**								
6.	**Was the delivery in line with your expectation?** **a. Yes b. No** **If no why?**	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
7.	**Would you want the delivery style to be modified?** **a. Yes b. No** **If yes why?**	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
8.	**Is it ok for you that the training is being delivered**	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

	Training Modules / Evaluation Questions	**Module 1 :** Site selection	**Module 2 :** Land Clearing	**Module 3:** Planting Material Sourcing/ Acquisition and Controlled burning	**Module 4 :** Field Layout	**Module 5 :** Planting Material Preparation and Planting	**Module 6:** 1st weeding, Refilling & Fertilizer Application	**Module 7 :** 2nd Weeding & Pests and diseases management	**Module 8:** Harvesting & Planting Material Conservation
	on the field? **a. Yes b. No** **If no why?**	There could not have been a better place	There could not have been a better place	There could not have been a better place	There could not have been a better place	There could not have been a better place	There could not have been a better place	There could not have been a better place	There could not have been a better place
9.	**Do you find the course additional readings useful and recommend that we continue issuing them to you?** **a. Yes b. No** **If no why?**	Yes But most cannot read	Yes But most cannot read	Yes But most cannot read	Yes But most cannot read	Yes But most cannot read	Yes But most cannot read	Yes But most cannot read	Yes But most cannot read
10.	**Are there any learning materials you were**	No	Yes	No	No	No	Yes	No	No

	Training Modules / Evaluation Questions	**Module 1 :** Site selection	**Module 2 :** Land Clearing	**Module 3:** Planting Material Sourcing/ Acquisition and Controlled burning	**Module 4 :** Field Layout	**Module 5 :** Planting Material Preparation and Planting	**Module 6:** 1st weeding, Refilling & Fertilizer Application	**Module 7 :** 2nd Weeding & Pests and diseases management	**Module 8:** Harvesting & Planting Material Conservation
	expecting which did not show up? **a. Yes b. No** **If yes please indicate**		Cutlasses				Trainer should have brought more bags of fertilizer for distribution to participants		
11.	**What did you like about the training?** **Please state**	The physical test for loamy soil	The trainer is friendly						The sampling method and calculations
12.	**What didn't you like about the training?** **Please state**	Nil	Nil	Nil	The activity was too tedious and time	Nil	• Fetching the mulch was too much work. • A snake	Nil	Nil

	Training Modules / Evaluation Questions	**Module 1 :** Site selection	**Module 2 :** Land Clearing	**Module 3:** Planting Material Sourcing/ Acquisition and Controlled burning	**Module 4 :** Field Layout	**Module 5 :** Planting Material Preparation and Planting	**Module 6:** 1st weeding, Refilling & Fertilizer Application	**Module 7 :** 2nd Weeding & Pests and diseases management	**Module 8:** Harvesting & Planting Material Conservation
					demanding		nearly bit someone		

Table 3: Results of Training Evaluation at Akomadan

	Training Modules / **Evaluation Questions**	**Module 1 :** Site selection	**Module 2 :** Land Clearing	**Module 3:** Planting Material Sourcing/ Acquisition and Controlled burning	**Module 4 :** Field Layout	**Module 5 :** Planting Material Preparation and Planting	**Module 6:** 1st weeding, Refilling & Fertilizer Application	**Module 7 :** 2nd Weeding & Pests and diseases management	**Module 8:** Harvesting & Planting Material Conservation
13.	**Was the content relevant to your work as a cassava farmer?** **b. Yes b. No** **If no why?**	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
14.	**Was the content appropriate for your level of knowledge or training in cassava production?** **b. Yes b. No** **If no why?**	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
15.	**What stood out for you as a cassava farmer?**	The physical soil test					Farmers don't apply fertilizer to		

	Training Modules / Evaluation Questions	**Module 1 :** Site selection	**Module 2 :** Land Clearing	**Module 3:** Planting Material Sourcing/ Acquisition and Controlled burning	**Module 4 :** Field Layout	**Module 5 :** Planting Material Preparation and Planting	**Module 6:** 1st weeding, Refilling & Fertilizer Application	**Module 7 :** 2nd Weeding & Pests and diseases management	**Module 8:** Harvesting & Planting Material Conservation
	Please state						cassava		
16.	**Do you think the content achieved the learning objectives?** **b. Yes b. No** **If no why?**	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
17.	**Was the course delivered in a way that was easy to understand?** **a.Yes b. No** **If no why?**	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
18.	**Was the delivery in line with your expectation?** **b. Yes b. No**	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

	Training Modules / Evaluation Questions	**Module 1 :** Site selection	**Module 2 :** Land Clearing	**Module 3:** Planting Material Sourcing/ Acquisition and Controlled burning	**Module 4 :** Field Layout	**Module 5 :** Planting Material Preparation and Planting	**Module 6:** 1st weeding, Refilling & Fertilizer Application	**Module 7 :** 2nd Weeding & Pests and diseases management	**Module 8:** Harvesting & Planting Material Conservation
	If no why?								
19.	**Would you want the delivery style to be modified?** **b. Yes b. No** **If yes why?**	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
20.	**Is it ok for you that the training is being delivered on the field?** **b. Yes b. No** **If no why?**	Yes There could not have been a better place	Yes There could not have been a better	Yes There could not have been a better place	Yes There could not have been a better place	Yes There could not have been a better place	Yes There could not have been a better place	Yes There could not have been a better place	Yes There could not have been a better place

	Training Modules / Evaluation Questions	**Module 1 :** Site selection	**Module 2 :** Land Clearing	**Module 3:** Planting Material Sourcing/ Acquisition and Controlled burning	**Module 4 :** Field Layout	**Module 5 :** Planting Material Preparation and Planting	**Module 6:** 1st weeding, Refilling & Fertilizer Application	**Module 7 :** 2nd Weeding & Pests and diseases management	**Module 8:** Harvesting & Planting Material Conservation
			place						
21.	**Do you find the course additional readings useful and recommend that we continue issuing them to you?** **b. Yes b. No** **If no why?**	Yes But most cannot read	Yes But most cannot read	Yes But most cannot read	Yes But most cannot read	Yes But most cannot read	Yes But most cannot read	Yes But most cannot read	Yes But most cannot read
22.	**Are there any learning materials you were expecting which did not show up?** **b. Yes b. No** **If yes please indicate**	No	Yes Cutlasses and Wellington boots	No	No	No	No	No	No

	Training Modules / Evaluation Questions	**Module 1 :** Site selection	**Module 2 :** Land Clearing	**Module 3:** Planting Material Sourcing/ Acquisition and Controlled burning	**Module 4 :** Field Layout	**Module 5 :** Planting Material Preparation and Planting	**Module 6:** 1st weeding, Refilling & Fertilizer Application	**Module 7 :** 2nd Weeding & Pests and diseases management	**Module 8:** Harvesting & Planting Material Conservation
23.	**What did you like about the training?** **Please state**	The video coverage	Nil		Nil		Nil		
24.	**What didn't you like about the training?** **Please state**	Nil	We were expecting to have labourers do the weeding	Nil	The activity was too tedious and time consuming	The preparation of the planting material before planting was needless	The activity took too long	Nil	Nil

3.0 Conclusions and Recommendations

1. The farmers knowledge of improved cassava varieties and the improved cassava production techniques has generally increased. They now have a better understanding of the economics of regular cassava spacing and the benefit of using high yielding varieties.
2. The farmers were excited about the general performance of the crops on the ICM plots and have promised to replicate the techniques on their private farms.
3. The improved varieties on all the fields performed better than the local varieties.
4. Though the farmers scrambled for the training materials, most of them could not read them.
5. Some of the farmers were expecting to be given stipend, wellington boots and cutlasses for participating in the training programme.
6. The farmers' participation in the training was encouraging though they rescheduled the agreed meeting days on several occasions.

Appendix 1: Training attendance lists