KCSAP
Kenya Climate Smart Agriculture Project

KALRO
Kenya Agricultural & Livestock Research Organization

Climate Smart Agricultural Technologies, Innovations and Management Practices for Cassava Value Chain

TRAINING OF TRAINERS' MANUAL

MARCH 2020

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Foreword

Kenya Climate-Smart Agriculture Project (KCSAP) tasked the Kenya Agricultural & Livestock Research Organization (KALRO) with the implementation of the project Component 2, on 'Strengthening Climate-Smart Agricultural Research and Seed Systems'. The component activities are geared towards the development, validation, adoption and delivery of context specific climate smart agriculture (CSA) technologies, innovation and management practices (TIMPS). The other responsibility was development of sustainable seed production and distribution systems for priority value chains to enhance availability and access to seed, breeds and fingerlings by target beneficiaries under Components 1 (Up scaling Climate-Smart Agricultural Practices). Against this background, KALRO and her NARS partners have developed, validated and availed CSA TIMPS for dissemination and adoption. The TIMPS have further been unpacked during the development of Training of Trainers (ToT) Manuals for use in training public and private extension service providers and lead farmers.

The ToT Manuals are instructional guides to be used for teaching and learning step-by-step procedures of implementing CSA innovations for each of the 13 value chains being addressed. The training content is drawn from the CSA TIMPS that support respective value chains. The content are arranged in progressive modules supported by extensive information from research information and background data drawn from the TIMPS. Their relevance are based on the needs teased out of the value chains and the project objectives. The ToT Manuals training design takes into consideration the delivery system, the partners and their roles, the duration of training and logical flow of the sessions. Similar content requiring similar delivery systems are grouped together while the roles of the partners are tapped in the training and planning of the training sessions.

The Manual is divided into modules, which have a uniform outline that ensures every aspect of the TIMPs are fully covered in way that the trainees can absorb and relate to. Various delivery methods are deployed and where possible demonstrations and practical work are incorporated to enable the trainees learn by participating in the actual field activities. Furthermore, to ensure that the training across various groups is standardized, trainers guidelines, detailed descriptions of the trainees, program, training methods and a training evaluation have been provided in the manual. Adhering to these guidelines, therefore, enables possibility to replicate the training in several locations without loss of details regardless of whether conducted by different trainers.

It is highly advised that the ToT Manuals should be used in conjunction with the respective value chains' TIMPs documents and facts sheets in order to provide valuable resource for both public and private extension service providers. The use of this Manual is expected to spur increased productivity and resilience by farmers, while mitigating climate change impacts in the value chains to deliver the envisaged 'Triple Wins'.

I am greatly indebted to the value chain leaders and all those who participated in the preparation of the Manual, which is expected to herald a new way of delivering training content in a changing agricultural environment.

Eliud K Kireger, PhD, OGW

Director General, KALRO

Preface

The Kenya Climate-Smart Agriculture Project (KCSAP) is a Government of Kenya project with support from both the World Bank and the government. It is a five-year project implemented in 24 counties, mainly in the arid and semi-arid lands (ASALs), at a cost of Ksh. 25B. The project development objective (PDO) is "*to increase agricultural productivity and build resilience to climate change risks in the targeted smallholder farming and pastoral communities, and in the event of an Eligible Crisis or Emergency, to provide immediate and effective response."* This objective is to be achieved through the implementation of five key components, which are 1) Up scaling Climate-Smart Agricultural Practices, 2) Strengthening Climate-Smart Agricultural Research and Seed Systems, 3) Supporting Agro-weather, Market, Climate, and Advisory Services, 4) Project Coordination and Management and 5) Contingency Emergency Response.

Component 1 involves facilitating the empowering of farmers and communities to adopt technologies, innovations and management practices (TIMPs) to achieve the Climate Smart Agriculture (CSA) triple-wins of; increased productivity, enhanced resilience (adaptation), and reduced Greenhouse gas (GHG) emissions (mitigation). Component 2 is charged with the responsibility of providing the TIMPs. Therefore, it supports the development, validation, and adoption of context specific CSA TIMPS to target beneficiaries under Components 1 and 3 as well as development of sustainable seed production and distribution systems.

To catalyze uptake of TIMPs, Kenya Agricultural & Livestock Research Organization (KALRO) in conjunction with partners in the National Agricultural Research Systems (NARS) and Consultative Group for International Agricultural Research (CGIAR) compiled inventories of TIMPs for each of the 13 prioritized value chains (cassava, green grams, sorghum, millet, pigeon peas, bananas, tomatoes, potatoes, apiculture, indigenous chicken (meat and eggs), dairy (cattle and camel), red meat (cattle, sheep and goats) and aquaculture and 3 cross cutting value chains (natural resource management, pastures and fodder and animal health). The TIMPs were categorized into those ready for upscaling, those that needed validation and gaps that required further research. Training of Trainers' (ToT) manuals focusing on TIMPs that are ready upscaling for each of the value chains were subsequently developed and form the basis of training county extension staff, service providers and lead farmers. They are in turn expected to cascade this training to beneficiaries in the targeted smallholder farming, agro-pastral and pastoral communities in the 24 project counties of Marsabit, Isiolo, Tana River, Garissa, Wajir, Mandera, West Pokot, Baringo, Laikipia, Machakos, Nyeri, Tharaka Nithi, Lamu, Taita Taveta, Kajiado, Busia, Siaya, Nyandarua, Bomet, Kericho, Kakamega, Uasin Gishu, Elgeyo Marakwet and Kisumu.

KALRO having the mandate of implementing of activities under Component 2, has been instrumental in using its information resources and those of partners and collaborators to come up with the inventories of TIMPs and corresponding ToT Manuals. The use of these information resources coupled with the accompanying training and the contribution of the other project components, will go a long way in enabling the KCSAP to meet its development objective.

The National Project Coordination Unit is grateful to all who participated in the development and production of this *Training of Trainers Manual for Climate Smart Agricultural Technologies, Innovations and Management Practices for Cassava Value Chain.* It is my hope that counties and other users will put this resource to good use as they transform and reorient their agricultural systems to make them more productive and resilient while minimizing GHG emissions under the new realities of a changing climate.

Francis Muthami

National Project Coordinator

Kenya Climate-Smart Agriculture Project

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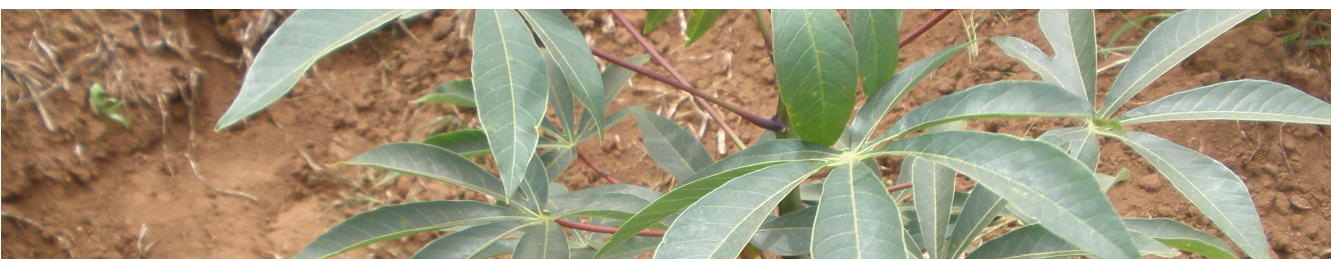
Acronyms

AEZ's	Agro – Ecological Zones
CBSD	Cassava Brown Streak Disease
CCT	County Coordination Technical Committee
CMD	Cassava Mosaic Disease
CTT	Core Team of Trainers
DAP	Double Ammonium Phosphate
DMC	Dry Matter Content
FFS	Farmer Field School
FGD	Focus Group Discussion
FSN	Food Security and Nutrition
GAP	Good Agricultural Practices
IPM	Integrated Pest Management
KALRO	Kenya Agriculture and Livestock Research Organization
KCSAP	Kenya Climate Smart Agriculture Project
LCD	Liquid- Crystal Display Projector
LF	Lead Farmers
pH	Hydronium Ions Concentration in Soil
PICD	Participatory Integrated County Developments
PPE	Personal Protective Equipment
SMART	Specific, Measurable, Achievable, Relevant and Time -Related
SWOT	Strength Weaknesses, Opportunities and Threats
TNA	Training Needs Assessment
TOT	Training of Trainers
VC	Value Chain

PART 1

This part consists of four sections: background, module training content, training design and facilitator guidelines.



SECTION 1: BACKGROUND

1.1 The role of Cassava Value Chain in Kenyan Economy

Cassava (*Manihot esculenta Crantz*), is the world's most widely grown starch storage root crop and accounts for a third of the total production of staple food crops in sub Saharan Africa. It is an important source of dietary energy for over 500 million people in developing countries within the tropics and sub-tropics. In Kenya production levels is estimated at 83,486 hectare, with annual production of 1,481,518 tons. The cassava value chain sub-sector employs 30% of the population indirectly and directly. However, between 2012 to 2016, cassava production in Kenya declined by 44% due to several constraints facing the commodity, a trend that needs to be reversed. The decline may be attributed to lack of high yielding varieties, susceptibility to cassava brown streak disease (CBSD), and cassava mosaic disease. Thus, development of climate smart technologies is the most effective and efficient strategy of reversing the declining productivity.

1.2 The Role of Cassava in Food and Nutrition Security

Cassava is the third most important food root crop in Kenya and supports the livelihood of over 2.5 million people. It is a major food security and an income-generating crop for millions of smallholder farmers. Cassava is an important source of dietary energy, it's grown mainly for its tuberous roots as food and eaten either raw, after boiling, or processed form. The roots are peeled, sundried and milled to flour for better storage. Flour is used make porridge, *Ugali*, local brews or mixed with wheat flour for home baking. Cassava leaves are used as vegetable among many African communities. Cassava is also used as animal feed. Cassava is used as raw material for; starch, brewing, pharmaceuticals, animal feed, textile and paper industries. In Kenya, cassava has high potential to alleviate food shortages and energy deficiencies.

1.3 Cassava as a climate Smart Innovation

Cassava produces more energy per unit area compared to most cereals and is the most resilient to climate change among major African crops (Jarvis *et al.*, 2012). Cassava can be produced in marginal and drought prone areas, which constitute over 80% of Kenya. It is mainly grown in western (60%), coastal (30%) and central (10%) regions of Kenya. Cassava is an ideal food security crop and a key industrial raw material because it can produce under adverse weather conditions, is available throughout the year, and is adaptable to various farming and food systems. The crop has potential for commercialization. This cab be viewed in terms of potential to reduce importation of wheat and maize by blending high-quality cassava flour (HQCF) in food and using it as an energy base in animal feeds. Cassava can contribute significantly towards Kenya's national goal for food and nutrition security, poverty alleviation, jobs creation, and industrial products.

1.4 Objectives of the training

This manual is designed for use in Training of Trainers (ToT). This training is to enhance the capacity of Farmer Trainers, in order to provide knowledge and skills to farmers for

increased productivity through adoption of cassava technologies and management practices. Specifically, the objectives of this training are to:

1. Enhance farmer trainer's with knowledge on the Cassava varieties suitable for their environment, for industrial use and tolerant to brown streak.
2. Provide farmers trainers with knowledge and skills on Community based clean seed production for cassava.
3. Enhance farmers trainers knowledge in Climate Smart Agronomic management (Fertilizer use, Intercropping, Conservation Agriculture, Spacing) practices for cassava.
4. Enhance farmer trainers knowledge in Climate Smart Integrated pest management(IPM).
5. Increase farmer trainers knowledge in good agricultural practices for Harvesting, Postharvest handling and storage.
6. Provide farmers trainers with knowledge and skills on Value addition in cassava.
7. Provide farmers trainers with knowledge and skills on business and Marketing of fresh Cassava and processed products.

SECTION 2: TRAINING CONTENT

2.1 Orientation of the Modules

The training content is organized into 13 modules spread over a period of 81 Hours 15 minutes. The modules are orientated to ensure adoption and upscaling of cassava TIMPs to improve productivity, resilience and mitigation of harmful greenhouse gases. The purpose of these modules is to enhance the knowledge and capacities of trainers in understanding and applying climate smart agricultural practices in cassava production.

2.2 Modules Outline

Each of the 13 modules have a similar outline consisting of 8 parts. These are:

1. Introduction to the module – context and background to training needs, knowledge and skills gaps being addressed
2. Module learning outcomes – what trainees are expected to learn
3. Module target group-trainee categories
4. Module users –facilitators
5. Module duration –minimum number of hours of exposure in training and materials
6. Module summary –sequence of sessions, training methods, materials and duration
7. Facilitators guideline –detailed sessions, training methods, materials and session guides
8. Participant's handouts – detailed notes and reference materials for trainees.

The outline for each of the 13 modules is presented in Table 1.

Table 1: Summary of outline for 13 modules of the Cassava value chain

No	Module Name	Need Addressed	Expected Training Outcomes	Duration
1	Climate Change and Climate Smart Agriculture	Insufficient knowledge on climate change and Climate Smart Agriculture	Principles of climate change and Climate Smart Agriculture effects understood	4 hours
2	Farmer Field Business school (FFBS) approach	Insufficient knowledge on Farmer Field Business school (FFBS) approach	Principles of Farmer Field Business school (FFBS) approach understood	7 hours
3	Cassava Production Niche and Ecological requirements	Insufficient knowledge on Cassava Production Niches	Information on cassava production niche and appropriate climatic conditions for optimal yield understood	3 hours and 30 minutes
4	Improved Cassava varieties	Suitable varieties in different AEZs for industrial use	Varieties suitable for Information on the available cassava varieties, their attributes, production and use niche understood	4 hours
5	Cassava Clean Seed Production	Availability of clean seed	Community clean seed production techniques understood	4 hours
6	Good Agronomic Practices	Low Cassava productivity and need for GAP	· Conservation Agriculture, Soil testing, Planting, Spacing, Fertilizer use and Intercropping understood	6 hours
7	Integrated Soil and Water Management (ISWM) Practices for Cassava production	Low Cassava productivity and need for ISWM	Soil water and fertility management practices for better crop production understood	9 hours
8	Crop Health	Infestation of Cassava by pest and diseases	Major pests and diseases identified Sustainable insect pest control strategies	7 hours

No	Module Name	Need Addressed	Expected Training Outcomes	Duration
9	Harvesting, postharvest management of Cassava	Maturity indices, Harvesting techniques Post-harvest handling Effective storage	Harvesting time for different markets identified Appropriate harvesting handling and storage technique identified	4 hours 30 minutes
10	Cassava Value Addition	Value addition to various cassava products	· Various cassava products identified	5 hours.
11	Mechanization of cassava production activities	Insufficient knowledge on Cassava mechanization and the available tools	Cassava mechanization and appropriate tools understood and appreciated	5 hours
12	Cassava Business and Marketing	Different markets, Marketing channels,	Different markets (local, export, possessing) identified Suitability of each market and challenges identified	6 hours 45 minutes
13	Cassava Cross cutting issues: (i) Innovation Platforms (ii) Gender mainstreaming and social inclusion (iii) Policy Issues	Limited group networks and cohesion among farmers Gender and VMGs inequality in project participation	Gender and VMGs inclusion strategies understood Development of strong and effective group networks understood and appreciated	3 hours 7 hours 5 hours 30 minutes
Total Duration				**81 Hours 15 minutes**

SECTION 3: TRAINING DESIGN

3.1 Delivery System

The delivery system designed for this training consists of two stages:

1. **Establishment of a team of facilitators**

⇒ A Core Team of Trainers (CTT) will be established as facilitators to train farmer trainers (County extension staff and service providers). The facilitators will be responsible for various modules during the TOT course and guided by this manual and modules contained therein.

⇒ Each of the Master trainers (County extension staff and service providers) will facilitate farmers to acquire knowledge and skills in facilitating Agricultural Innovation Platforms (IAPs) or Farmer-led Field & Business Schools (FFBS) through practical demonstrations.

2. **Upscaling –**This will be done by selecting lead farmers (LF) to be trained in facilitation skills.

3.2 Partners and their Roles

The partners envisioned in this training plan are:

1. **Core Team of Trainers** – Master trainers drawn from KALRO, Universities and the State Department of Agriculture will facilitate initial training of farmer trainers. They will also provide mentorship to farmers' trainers during the first year of lead farmer training. They should also be available in the evaluation of the first round of lead farmer training.

2. **County Government Department of Agriculture** –Master trainers and their supervisors referred to as County Coordination Teams (CCT) will take the role of lead farmer trainers, mentors and coordinators at sub-county level. They will assist AIPs or FFBS's to form partnership with other stakeholders for sustainability. They will also support LF's in the formation of their network.

3. **Lead Farmers** – Lead Farmers identified in the targeted counties will take up farmer training and upscaling in the future. Lead farmer networks and groups will conduct exchange visits to learn best practices in other project implementing counties.

4. **Private Sector Service Providers** – Inputs suppliers, financial and business development service providers, market players and processors to partner and support growth of individual or cassava farmer groups.

3.3 Training Duration

The proposed initial TOT course for Master trainers in 13 modules in the cassava value chain shall takes at least 81 Hours 15 minutes of training period. This does not include

'health' break hours of mid-morning, afternoon and lunch breaks. With a 12-day training plan, it is possible to have:

1. 12 days training consisting of 6 hours of training and 2 hours of mid-morning, afternoon and lunch breaks per day with the exception of weekends
2. ½ a day of the first day allocated for official opening and climate setting
3. ½ day of the last day for course evaluation, wrap up and closing ceremony.

3.4 Logic of Design and Flow of Session

The logic of design and flow of each module is that the facilitator, paying attention to the proposed methods and sessions guidelines shall:

1. Introduce the module
2. Determine the trainee's expectations
3. Relate trainees' expectations with module objectives or learning outcomes
4. Explore the concept and content, switching to different methods of delivery of the content (group exercise, brainstorming, excursions, plenary discussions, role plays and demonstrations) as the session progresses
5. Review the module at the end using participatory approaches
6. Distribute handouts to the trainees.

SECTION 4: GUIDELINES TO THE FACILITATOR

4.1 Preparation of training materials

The training materials suggested require adequate preparations and should be available before the actual training dates. Further:

a) The facilitators should familiarize themselves and internalize the guidelines provided by this manual early enough.

b) The stationery required should be available within the training institution 3 days before the training. These include name tags, writing materials, paper punch and medium size box files for participants' handouts filing.

c) Flip charts and good quality felt pens could be used interchangeably with LCD projections. Each trainee will require one felt pen while the trainers will require two sets of felt pens.

d) Visual aids like field equipment and tools should also be arranged in time before the sessions start.

e) There should be adequate copies of participants' hand outs (one per participant) to be distributed at the end of each session or as may be suitable.

f) Copies of the modules are distributed at the end of each module.

4.2 Venues and Sites

The training venue will include the training room, field demonstration sites and sites acting as markets.

1. **Training Room** – should have adequate space for 25 trainees seated in a semi-circle or U shape arrangement ensuring access and unobstructed view of the front. There should be adequate space for a desk and seats for 3 trainers preferably at the sides or at the back of the training room. There should also be a desk for the trainer, his /her materials and LCD projector, a flip charts holder and white wall to act as a projector screen.

2. **Demonstration Site** – should be within 5 minutes walking distance with Cassava for practicals on variety identification, fertilization, pests, diseases and safe use of pesticides.

3. **Market Sites** – these include Cassava retail outlets (Open air markets, community based cottage outlets, and supermarkets), whole sale and aggregation points and processing sites, if any. The operators should be informed in advance about the visits. These should not be very far away, preferably less than 20 minutes' drive distance.

4.3 The Trainees

The trainees who will participate are extension officers, lead farmers, educators/universities, and researchers who are subject matter specialist with an elaborate training background in extension and advisory services. They will be drawn from public and private sector based on considerable experience in training farmers but with minimal facilitative advisory or technology transfer approaches. The trainer should, therefore, act more of a facilitator than a lecturer and draw out and build on their knowledge, skills and experience that they shall bring in. The facilitator's role will be to create condusive environment for learning through coordination, listening and letting trainees feel like equals to each other and the CTT team members.

4.4 Training program

The training program proposed consists of the actual training modules. Health breaks should be considered when drawing the training program. The training program should preferably be based on the outline presented in **Annex 1** to allow the flow of ideas and topics. However, should the situation demand, the sequence and day of coverage for whole or parts of the modules can be modified to suit emerging requirements. The training program assumes that the trainees report on Sunday evening as the first day and leave 12 days later.

4.5 Training Methods

The training methods proposed for each session are suitable for adult learners and appropriate for addressing knowledge, skills and attitudes of the trainees. The choice of the methods has been informed by the competency issues being addressed, available time and experiences of the authors of this manual. Depending on time available, the facilitator can modify these training methods but as a golden rule no presentation by the facilitator should take more than 2 hours continuously. To avoid monotony and boredom; the facilitator should encourage other participatory training methods like participatory discussions, group exercises and brainstorming. The tables below present a list of available training methods.

Table 2: Description of training methods during cassava ToT training

Training Method	Description of Method
Plenary presentations	Use of power point or flip charts and plenary discussions in situations where knowledge and opinion or consensus is required
Group exercises, visits and brainstorming sessions	To be considered where skills are an issue requiring sharing and trying
Role play and case study problem-solving exercises	Plenary discussions have been considered as training methods where attitude is an issue
On-farm practical demonstration	To be considered where hands-on practical skills are acquired through sharing and demonstration

4.6 Planning Schedule and Guidance for ToT preparation

While planning for this training, the CTT leader should ensure the following before the training as outlined in Table 3.

Table 3: Planning schedules and guidelines for TOT Preparation

Duration to Training	Activities to be Done
Six Weeks	Recruit master trainers, compose CTT, identify the practical demonstration sites
Four weeks	Send out invitation letters to trainees and special guests detailing purpose, venue and program. Follow up on demonstration sites. Brief CTT members
Two weeks	Confirm names of trainees; reproduce training materials for facilitators and package, confirm preparedness of the field sites to be visited. Hold briefing of CTT members to finalize training plan. Confirm special guests if any
Four Days	Confirm training sites preparedness, prepare sitting arrangements, and brief assistants
One day	Arrange training room furniture, place materials, equipment and stationery on the tables. Arrange for the reception of trainees at residence proposed
On the first day	Arrange for the reception of trainees at the training venue. Ensure climate setting is done before the course is officially opened. This includes: • Registration • Welcome to the venue by host • Elaborate introduction of CTT and trainees • Ground rules • Group formation

4.7 Evaluation of Training

Half day has been allocated for planning for way forward and evaluation of the ToT on the last day of the training. The evaluation strategy should take two directions. The first being the individual trainees evaluate through evaluation forms without conferring to each other (Table 4). The evaluation forms are then collected and analyzed by the CTT members.

Table 4: Individual Sample Evaluation Form

Aspect / Module	Rating		
	Very useful (3 marks)	Useful (2 marks)	Least useful (1 mark)
Climate Smart Agriculture			
Farmer field and business school (FFBS) approach in Cassava production			

Cassava production niche and climatic requirements			
Cassava variety selection			
Cassava seed system			
Cassava agronomic management practices			
Cassava Crop Health			
Integrated Soil and Water Management Practices for cassava			
Cassava Value addition			
Post-harvest Management			
Cassava value addition			
Mechanization of cassava production activities			
Cassava Business and Marketing			
Cassava Cross Cutting Issues			
i. Innovation Platforms, Gender mainstreaming and social inclusion and Policy			
ii. Gender mainstreaming and social inclusion			
iii. Policy Issues			

The second evaluation is trainees' **group evaluation**. They retreat to one room and elect a chair and a secretary. They are the asked to objectively and constructively evaluate the training in about 45 minutes in the absence of the CTT members. They then present their evaluation to the CTT members and as they present, the CTT members should only give points of clarifications if any misunderstanding occurred but not try to be defensive. The CTT members then use the two evaluation results to write a report highlighting aspects that went on well and can be replicated, challenges that were encountered, and opportunities for future ToT's improvement.

4.8 Participant's Training Notes and Reference Materials

4.8.1. List of cassava publications

The detailed list of all publications is summarized in **Annex 2**

4.8.2 Guide on the use of the information

During training, printed handouts should also be made available especially for major pests and diseases for easy identification. The trainers are advised to issue farmers with at least one publication for each of the training sessions as many publications in one visit may be overwhelming and thus not able to consume the given information. However, those who are able to handle more than one publication can be allowed to take more.

The list of all individual publications will be stored and available as electronic copies – mainly PDFs. The service providers are strongly advised to keep these electronic copies on a memory flash disk, CD or portable hard drive to enable farmers easily access and if necessary print any of them out at their convenient time.

Trainers will be advised to issue one general cassava Farming Manual to be accompanied by at least 2 other publications such as brochures and leaflets during training sections.

PART II

This part presents the content of **13 modules** of training, namely: (1) Climate Smart Agriculture, (2) Farmer field and business school (FFBS), (3) Cassava production niche, (4) Cassava variety selection, (5) Cassava seed system, (6) Cassava climate smart agronomic practices, (7) Integrated Soil and Water Management Practices for Cassava, (8) Crop health (9) Post-harvest Management, (10) Cassava value addition, (11) Mechanization of Cassava production activities, (12) Cassava Business and Marketing, (13) Cassava Cross Cutting Issues (Innovation Platforms, Gender mainstreaming and Social Inclusion, Policy Issues)

All the modules are divided into the following components:

1.1 Introduction to the Module

1.2 Module Learning Outcomes

1.3 Module Target Groups

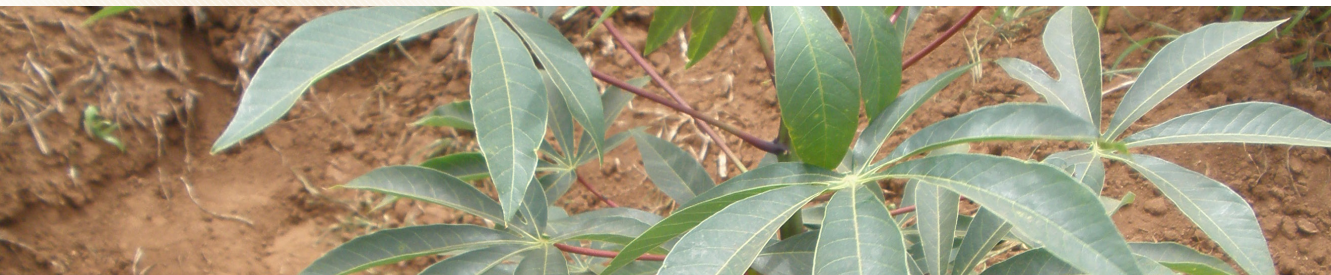
1.4 Module Users

1.5 Module Duration

1.6 Module Summary

1.7 Facilitator's Guidelines

1.8 Participant's Handouts



MODULE 1

CLIMATE CHANGE AND CLIMATE-SMART AGRICULTURE

1.1 Introduction to the Module

This module on climate smart agriculture practices aims to introduce from basic principles of climate science, the basis of current climate change scenario and the factors underlying the negative impacts of the climate change on agricultural productivity. The module also aims to emphasize that positive interventions made through the application of appropriate TIMPs, can lead to increased adaptation to climate change and mitigation against its negative effects, resulting in enhanced resilience and food security.

Specifically, this module intends to answer the following questions:

- What is climate change and what are its causes?
- How will climate change affect agriculture and pastoral practices?
- What is climate smart agriculture?
- What are practical solutions that agricultural and pastoral producers can put into practice to deal with climate change effects?

1.2 Module Learning Outcomes

By the end of the module, the following outcomes should be achieved:

1) Climate change explained and appreciated
2) The principles of Climate Smart Agriculture (CSA) described and understood
3) Impacts of climate change on agriculture and food security explained and understood
4) Climate Smart Agriculture TIMPs and some basic approaches to their validation and dissemination explained and understood
5) Climate Smart Agriculture practices, adaptation and resilience to climate change explained and understood.

1.3 Module Target Groups

This module is intended to be used to train private as well as public service providers working as extension agents.

1.4 Module Users

This module is intended for use by trainers who are members of the Core Team of Trainers (CTT) and Farmer Trainers. The module trainees should thoroughly familiarize themselves with the participants' handouts and training reference materials.

1.5 Module duration

The Module is estimated to take **4 hours**

1.6 Module Summary

Module 1: Climate Smart Agriculture			
Sessions	**Training methods**	**Training materials**	**Time**
1.6.1 Introduction, objectives and expectations	▪ Plenary discussions ▪ Power-Point presentation	▪ Flips charts ▪ Felt pens ▪ LCD Projector	30 minutes
1.6.2 Understanding climate change	▪ Power-Point presentations ▪ Plenary discussion	▪ Flips charts ▪ Felt pens ▪ LCD Projector ▪ Participants Handouts	45 minutes
1.6.3 Climate change impacts on agriculture and food security	▪ Power-Point presentations ▪ Plenary discussion ▪ Group formation and exercise	▪ Flips charts ▪ Felt pens ▪ LCD Projector ▪ Handouts 1.6.3	45 minutes
1.6.4 Climate Smart Agriculture TIMPs definition and Context-Specific Practices	▪ Power-Point presentations ▪ Plenary discussion ▪ Group work	▪ Flips charts ▪ Felt pens ▪ LCD Projector ▪ Handouts 1.6.4	1 hour 30 minutes

1.6.5 Module review	▪ Power-Point presentations ▪ Plenary discussion	▪ Flips charts ▪ LCD Projector ▪ Handouts	30 minutes
TOTAL			**4 hours**

1.7 Facilitator's Guidelines

Climate Smart Cassava Systems and Best Management Practices	
1.7.1 Introduction, outcomes and expectations (30minutes)	**Session Guide**
The facilitator introduces the module and invites trainees to introduce themselves and state their expectations. The facilitator presents modules objectives and expectations **Module Objectives** By the end of the module training the trainee should be able to: • Explain the causes of climate change. • Describe the principles of climate-smart agriculture. • Identify climate change impacts on agriculture and food security. • Define Climate Smart Agriculture TIMPs and some basic approaches to their validation and dissemination. • Describe climate smart agriculture practices e.g. soil management, crop management, Post-harvest Management and Value addition, irrigation systems, crop-livestock fish integrations and renewable energies. • Illustrate through clear examples, how climate smart agriculture practices result in increased adaptation and resilience to climate change; and, in the reduction of GHG emissions.	• Summarize trainees' expectations using cards or any appropriate method. • PowerPoint presentation • Distribute training notes and handouts at the end of the module

1.7.2 Understanding climate change (45 minutes)	Session guide
The facilitator makes a presentation on climate change; - causes, effects and mitigation) (**30 minutes**) **Plenary discussion (15 minutes)** The trainees recall what they learnt and discuss any issues that may arise. Any questions are also answered during this session.	• Power Point Presentation • Plenary Discussion
1.7.3 Climate changes impacts on agriculture and food security (45 minutes)	**Session guide**
The facilitator makes a presentation on the effects of climate change on agriculture and food security and guides the trainees in discussing the impact of climate change on food security **(30 minutes)** • Effects of climate change on agriculture. • How agriculture contributes to climate change. • The link between climate change and food security. **Plenary discussion (15 minutes)** The trainees ask questions on the presentation, which are answered by the facilitator. Also, they discuss practical experiences on the effects of climate change on agriculture in their local context, how it has affected food security and some of the intervention taken.	• PowerPoint presentation • Plenary discussion

1.7.4 Climate Smart Agriculture TIMPs Definitions and Context-Specific Practices (1 hour 30 minutes)	Session guide
Climate smart agriculture TIMPs definitions and context specific practices (45 minutes) *The facilitator presents on definitions of TIMPs and their validation through adaptive research and their dissemination.* Background and characteristics of the Kenyan agriculture • Definitions and examples of the different TIMPs. • Methods of validation and dissemination of TIMPs. • Characteristics of CSA and why CSA. • Principles of climate-smart agriculture (Triple wins). **Plenary discussion (15 minutes)** **Group Work (30 minutes)** Trainees to conceptualize and provide examples of CSA TIMPs and climate smart practices	• PowerPoint presentation • Flip charts • Group work • Plenary discussions
1.7.5 Module review (30 minutes)	**Session guide**
The facilitator leads the trainees in reviewing the module Summarize and review the main points of the training with the trainees' about climate-smart agriculture practices. • What new things did you learn from this module? • What are some of the problems and issues that you have become more aware of in the module? • What is your main take-home message?	Recap of the key take-home points using any of the following participatory methods: • Q & A session • Discussions • Questionnaires • Any other

1.8 Participants' Handouts

- Fundamentals of Climate Smart Agriculture Practices in Kenya

Reference Materials

1. FAO (2019). Climate Smart Agriculture Curriculum/Module for Training of Trainers in Myanmar. (Angon 28 pp). Food and Agricultural Organization of the United Nations and AVSI Foundation, Naypyidaw, 2019. License: CC BY – NC – SA 3.0 IGO

2. FAO (2018). Climate Smart Agriculture Training Manual: A reference manual for agricultural extension agents. Food and Agricultural Organization of the United Nations. Rome 2018 (106 pp).

3. GIZ-SLM (2017). Climate Smart Agriculture: A Manual for Implementing the Sustainable Land Management Program (SLMP). Ethiopia and GIZ, Addis Ababa, 2017.

4. Denmark (2017). Climate Smart Agriculture Manual for Agricultural Education in Zimbabwe, Climate Technology Centre and Network, Denmark, 2017.

5. FAO (2013). Climate Smart Agriculture Sourcebook. Food and Agricultural Organization of the United Nations Rome, 2013.

6. Esilaba, A.O.et al. (2019). KCEP-CRAL Climate Smart Agriculture Extension Manual. Kenya Agricultural and Livestock Research Organization, Nairobi, Kenya

MODULE 2

FARMER FIELD AND BUSINESS SCHOOL (FFBS) APPROACH IN CASSAVA PRODUCTION

2.1 Introduction to the Module

The module is designed for training and exposing trainees of Farmer Field and Business Schools (FFBS) to the Field school approach and concepts. In addition, practitioners of FFBS need to have knowledge of this methodology in order to mainstream various technologies, innovations and management practices (TIMPs) in Cassava production. The trainees will thereafter facilitate farmers in the Common Interest Groups (CIGs) to enable them share and learn by undertaking and trying available technologies and innovations as they implement them on their farms. FFBS also empowers the learners with various skills such as leadership, communication and business. Since the methodology is participatory, it improves the learners' observation skills and creates linkages with other value- chain players thereby making cassava production profitable and sustainable.

2.2 Module Learning Outcomes

By the end of the module training the following outcomes should be achieved:

1. The concept, characteristics and principles of Farmer Field and Business School (FFBS) as a 'learning by doing approach' described and understood
2. The differences between teaching and facilitation are explained and understood
3. The Agro Ecosystems Systems Analysis (AESA) on Cassava crop understood and applied
4. Knowledge on Participatory Technology Development (PTD) in Cassava TIMPs imparted and applied.

2.3 Module Target Group

These module targets pubic/agricultural extension service providers based at sub-county and ward level and service providers.

2.4 Module users

This module is intended for use by master trainers who are members of the Core Team of Trainers (CTT). The trainers using this module should thoroughly familiarize themselves with the participants' handouts or training materials

02.5 Module Duration

The Module is estimated to take 7 hours

2.6 Module Summary

Introduction to Farmer Field and Farm Business School Approach			
Sessions	**Training Methods**	**Training Materials**	**Time**
2.6.1 Introduction and levelling of expectations	• Group discussions • Presentation	• Module objectives • Marker pens, flip chats • LCD projector	1 hour
2.6.2 Introduction to FFBS	• Brainstorming • Plenary presentation	• Flip charts • LCD projector • Pictorials	1 hour
2.6.3 Designing an FFBS program	• Plenary presentations • Group Discussions and presentation	• LCD projector • Participants' handouts	1 hour
2.6.4 key activities in FFBS	• Plenary session • Group discussions	• LCD projector • Flip charts • Handouts	1hour 30 Minutes
2.6.5 introduction to communication and facilitation skills	• Brainstorming • Plenary sessions • Group discussions	• LCD projector • Flip charts	1 hour
2.6.6 Organization, management and leadership in FFBS	• Brainstorming • Plenary sessions • Group discussions	• LCD projector • Flip charts • Handouts	1 hour
2.6.7 Module review	• Trainees' questions and comments • Facilitator' summary	• Participants' handouts • Module review	30 minutes
TOTAL			**7 Hours**

2.7 Facilitators Guidelines introduction to FFBS

Module 2: Farmer Field and Business School (FFBS) Approach In Cassava Production	
2.7.1 Introduction And Levelling Expectations (1 hour)	**Session Guide**
Introduction (15 Minutes) *(The facilitator welcomes trainees to the module on FFBS Approach in Cassava Production and introduces him/herself stating his profile and experience of working with farmers).* *The facilitator invites trainees to state their expectations and thereafter presents module objectives.* **Module Objectives (45 Minutes)** By the end of the module training the trainee should be able to: • Describe the concepts, characteristics, principles and plans of Farmer Field and Business School (FFBS) as a 'learning by doing 'approach. • Identify main differences between teaching and facilitation. • Be able to conduct Agro systems Analysis (AESA) on Cassava crop. • Successfully lay Participatory Technology Development (PTD) in Cassava TIMPs.	• Summarize trainees' Expectations on a flipchart and make displays. • PowerPoint presentation
2.7.2 Introduction To FFBS (1 hour)	**Session Guide**
(The facilitator should be able to introduce FFBS by defining it and sharing its benefits with the trainees). **Plenary Presentation (1 hour)** • History of Farmer Field and Business Schools • Principles of FFBS • Characteristics of FFBS • Concepts of FFBS • Objectives of FFBS • Benefits of FFBS	• PowerPoint presentation • Participants handouts • Q&A Session

2.7.3 The Key FFBS activities Steps in conducting FFBS (1 hour)	Session Guide
Plenary Presentation (15 Minutes) • The concept of Agro Ecosystem Analysis (AESA) • Participatory Technology Development • Group Dynamics • Special Topics in FFBS • Field daily Guide • Cassava curriculum matrix **Group work (45 Minutes)** Each group comes up with probable special topics to be covered within the learning period	• PowerPoint presentation • Participants handouts • Group Discussion • Q&A Session
2.7.4 Designing an FFBS program (1 hour 30 Minutes)	**Session Guide**
(Facilitator guides discussions on the steps of preparation and establishment of FFBS) **Plenary Presentation (30 Minutes)** **The classical steps** • Ground working • Training of Facilitators • Establishing PTDs at the FFBS • Season long FFBS sessions • Evaluation of PTDs • Field days • Graduation • Establishment of Lead Farmer FFBS • Follow ups **Group Exercise (1 hour)** Steps in establishing FFBS in the community. Within the groups follow facilitator instructions.	• Distribute Participants' Handouts • Hand out on Procedure of ground working • PowerPoint presentation • Group Exercise • Q&A Session .

2.7.5 Communication skills (1 hour)	Session Guide
Plenary presentation (15 Minutes) *The facilitator introduces the topic on communication and why effective communication* • What is effective communication? • Purpose of communication • Barriers to effective communication • Maintaining communication within group (FFBS) **Group work (45 Minutes)** Group exercise on communication	• PowerPoint presentation • Q&A Session • Group Exercise
2.7.6 Facilitation skills (1 hour)	**Session Guide**
(The facilitator introduces the topic on Facilitating adult learners). **Plenary presentation (1 hour)** **Facilitating Cassava CIGs** • Definition of Facilitation, facilitate and effective facilitator • Qualities of a good facilitator • Golden rules of facilitator • Roles and responsibilities of FFBS Facilitators • Adult Non- formal learning techniques.	• PowerPoint presentation • Handout on adult learning techniques • Q&A Session
2.7.7 Organization, management and Leadership of FFBS (1 hour)	**Session Guide**
Plenary presentation (30 Minutes) The facilitator introduces the topic by asking the trainees how their groups are organized, managed and leadership structures • Leadership continuum- subjects, environment and leader • Existing leadership structure • Roles & responsibilities of leaders • Leadership and sustainability in groups	• PowerPoint presentation • Plenary discussion • Q&A Session

2.7.8.Module Review (30 minutes)	Session Guide
(The facilitator leads the trainees in reviewing the module) • What new things did you learn from this Module? • What are some of the problems and issues that you have become more aware of? In FFBS, problems are seen as challenges, how would we identify the priority problem in the community? • And how would we address it? • Why farming business proposition? • Any other question? questions *Let the trainees recall the new items they have learnt in this module*.	• The last participants' Handouts/training materials • Summarize the main points of the module on a flip chart and display • Module Evaluation

2.8 Participants' Handouts

- FFBS Guide
- FFBS fact sheets

References

1. FAO Government Cooperative Program: Farmer Field and Farm Business Schools. Manual for Preparation and Establishment of Farmer Field and Farm Business Schools
2. FAO: Farmer Field School Methodology, a TOT Manual
3. Khisa Godrick: Farmer Field School Methodology, Training of Trainers Manual.
4. Sustainet East Africa: Farmer Field School: A Technical Manual

MODULE 3

CASSAVA PRODUCTION NICHE AND ECOLOGICAL REQUIREMENTS

3.1 Introduction

This module exposes service providers, lead farmers and facilitators to the different types of production climatic conditions and soil types suitable for cassava production. Cassava farming is done mostly under rain-fed conditions, either as mono crop or an intercrop. The production systems are guided by the household resource base, decision making, available technologies, risk factors, food security and market access.

3.2 Module Learning outcomes

By the end of this module training the following outcomes should be achieved:

1. The Importance of cassava as a climate smart crop understood and appreciated
2. The importance of cassava in household's food security and Kenya's economy acknowledged and appreciated
3. The current production and yield statistics explained and understood
4. The appropriate climatic conditions for optimal cassava yield understood and applied.

3.3 Module Target Group and Categories

This module is intended for service providers and county public extension agents.

3.4 Module Users

This module is intended for use by master trainers who are members of the Core Team of Trainers (CTT) and Lead Farmers. The trainers using this module should thoroughly familiarize themselves with the content and participants' handouts.

3.5 Module Duration

The Module is estimated to take 3 hours and 30 minutes

3.6 Module Summary

Module 1: Cassava production niche and ecological requirements			
Sessions	**Training methods**	**Training materials**	**Time**
3.6.1 Introduction, expectations and objectives	▪ Personal introductions ▪ Presentations ▪ Plenary discussions	▪ Flips charts ▪ Felt pens ▪ LCD projector	1 hour
3.6.2 Importance of cassava in household's food security and Kenya's economy	▪ Presentations ▪ Plenary discussions	▪ Flips charts ▪ LCD projector ▪ Participants Handouts	1 hour
3.6.3 Cassava production niche and appropriate climatic conditions for optimal yield in Kenya	▪ Presentations ▪ Plenary discussions	▪ Flips charts ▪ LCD projector ▪ Participants Handouts	1 hour
3.6.4 Module review	▪ Presentations ▪ Discussions	▪ Flip charts ▪ Felt pens ▪ LCD projector	30 minutes
Total			**3 hours and 30 minutes**

3.7 Facilitator's Guidelines

Module 3: Cassava production niche and ecological requirements	
3.7.1. Introduction and levelling of expectations and objectives (1 hour)	**Session Guide**
(The facilitator welcomes trainees to the module on niche and ecological requirements. They are then invited to introduce themselves and state their expectations). **Expectations** (The facilitator requests the trainees to form groups (e.g. county based) and lists their expectations). **Module Objectives** *(The facilitator presents modules objectives)* By the end of the module training the trainee should be able to: • Appreciate cassava as a climate smart crop. • Acknowledge the importance of cassava in household's food security and Kenya's economy. • Understand the current production and yield statistics. • Understand the appropriate climatic conditions for optimal cassava yield.	• Summarize trainees' Expectations and display. • PowerPoint Presentation • Distribute Participants Handouts • Module Outcomes and Training Program
3.7.2. Importance of cassava production in household's food security and Kenya's economy (1 hour)	**Session Guide**
(The facilitator discusses cassava as a climate smart crop, its importance in household's food security, Kenya's economy, its production trend and yield statistics) **PowerPoint Presentation (45 minutes)** • Contribution of cassava production to households' food security in Kenya. • Cassava production and yields in Kenya. • Contribution of cassava production to Kenya's economy. **Plenary Discussion (15 minutes)** • Let the trainees recall what they learned and discuss any issues that may arise	• PowerPoint Presentation • Distribute Participants Handouts

3.7.3. Cassava production niche and appropriate climatic requirements for optimal production (1 hour)	Session Guide
PowerPoint Presentation(45 minutes) • Cassava production suitability map in Kenya. • Overview of climatic conditions suitable for cassava in Kenya. • Environmental and soils guidelines for cassava. **Plenary Discussion (15 minutes)** • Let the trainees recall what they learned and discuss any issue that may arise	• PowerPoint Presentation • Distribute participants Handouts
3.7. 4. Module review (30 minutes)	**Session Guide**
(The facilitator leads the trainees in reviewing the module) • Let the trainees recall what they learned and discuss any issus that may arise.	• The last Participants' Handouts • Summarize the main points of the module on a flip chart and display

3.8 Participants' Handouts

- Cassava production Guide
- Cassava leaflets

MODULE 4

IMPROVED CASSAVA VARIETIES

4.1. Introduction to the module

This module is designed to expose facilitators, agricultural extension service providers and lead farmers to the available improved Cassava varieties for cultivation in different agro-ecological zones. This includes variety names, special attributes, target environment and appropriate regions for optimal yield by use of superior varieties.

Module learning out comes

By the end of the module training, the following outcomes should be achieved:

1. The improved Cassava varieties and their special attributes described and understood
2. The suitable environment for growing Cassava explained and understood
3. The Cassava varietal identification explained and understood.

4.3 Module Target group

These module targets public agricultural extension service providers based at sub-county and ward level and service providers.

4.4 Module users

This module is intended for use by master trainers who are members of the Core Team of Trainers (CTT) and Lead Farmers in the Cassava value chain target Counties. The trainers using this module should thoroughly familiarize themselves with the participant's handouts (training materials).

4.5 Module duration

The Module is estimated to take 4 hours

4.6 Module summary

Module 4: Improved Cassava varieties			
Sessions	**Training Methods**	**Training Materials**	**Time**
4.6.1 Introduction, objectives and expectations	▪ Personal introductions ▪ Presentations ▪ Group work ▪ Plenary discussions	▪ Flips charts ▪ Projector	1 hour
4.6.2 Improved cassava varieties their attributes and target environment	▪ Plenary discussions ▪ Presentation ▪ Field demonstration ▪ Plenary discussions and presentation	▪ Flips charts ▪ Felt pens ▪ Samples of stumps for different varieties ▪ Handouts	2 hours 30 Minutes
4.6.3 Review of Module	▪ Trainees' questions and comments ▪ Facilitator's summary	▪ Handouts	30 Minutes
TOTAL			**4 hours**

4.7 Facilitator's guide

Module 4: improved cassava varieties	
4.7.1 Introduction and Levelling Expectations (1 hour)	**Session Guide**
(The facilitator welcomes trainees to the module on cassava varietal selection. They are then invited to state their expectations). **Trainees' expectations (40 Minutes))** (The facilitator requests the trainees to form groups and list their expectations and present in plenary) **Module Objectives (20 minutes)** *(The facilitator presents module objectives)* By the end of the module training the trainee should be able to: • Describe the available cassava varieties and their special attributes. • Demonstrate understanding of the varietal target environments.	• Summarize trainees' Expectations and display. • PowerPoint Presentation • Distribute Participants Handouts • Module objectives and Training Program
4.7.2 Improved cassava varieties and their appropriate niche (2 hours)	**Session Guide**
(The facilitator presents on the available improved cassava varieties and their main characteristics and suitable areas for cultivation followed by a field visit to identify some released). **Plenary Presentation (1 hour)** • Available released varieties, variety characteristics, yield performance and special attributes • Suitable regions for cultivation **Field visit (1 hour)** • Mention activities to be undertaken in the field **Plenary Discussion (30 minutes)** Let the trainees recall what they learned and discuss any issue that may arise.	• PowerPoint Presentation • Distribute handouts, brochures, information leaflets and manuals • Field Demonstration

4.7.3 Module review (30 minutes)	Session Guide
(The facilitator leads the trainees in reviewing the module) • Let the trainees recall what they learned and discuss any issues that may arise.	• The last Participants' Handouts • Summarize the main points from the module on a flip chart and display

4.8 Participants handouts

- Cassava fact sheets
- Cassava production Guide

References

1. Abass, A. B., A. Onabolu and M. Bokanga. 1998. Impact of the High Quality Cassava Flour Technology in Nigeria. In: Root Crops in the 21st Century. Proceeding of the 7th International Conference of the International Society for Root and Root Crops – African Branch (ISTRC- AB).Cotonou, Benin Republic. (Akoroda MO and Ngeve JM, eds.) 735-741.
2. Adio, M. O. (2014). Gross Margin Analysis of Small Scale Cassava Processing Activities in Surulere Local Government Area of Oyo State.*). International Journal of Research* (IJR) Vol-1, Issue-9, October 2014 ISSN 2348-6848
3. Burns, A.E., Gleadow, R. M., Zacarias, A.M., Cuambe, C.E., Miller, R.E., and Cavagnaro, T.R., (2012). Variations in the Chemical Composition of Cassava (*Manihot esculenta Cratz*) Leaves and roots as Affected by Genotype and Environmental Variation. Journal of Agricultural and Food Chemistry 60, 4946-4956.

MODULE 5

CASSAVA CLEAN SEED PRODUCTION

5.1 Introduction to the module

Cassava average yields in Kenya are low due to several factors among them diseases and pests, unavailability of timely adequate clean planting materials and limited utilization options that could generate income. Viral diseases such as cassava mosaic and brown streak are major constraints in the production of cassava and are exacerbated by recycling of planting materials sourced from previous crop. This results from lack of an effective cassava clean seed system. There is need to have a seed system that provides high quality planting materials to farmers, in order to address losses attributed to diseases. Cassava plants started off using infected cuttings produce low or no yields at all. Hence there is need to have a system of cleaning, multiplication and distribution of disease free cassava planting materials and sensitizing farmers on the importance of using disease free materials whenever they are planting a new crop. This module is designed for exposing facilitators to Cassava clean seed production. It is expected that the trainers will transfer the Cassava planting material production and transfer the knowledge to ToTs. The ToTs shall in turn facilitate farmers enabling them share and learn by undertaking and trying available technologies and innovations on their farms. In addition the ToTs shall facilitate farmers' community groups. It also seeks to promote resilience among Cassava farmer through production of clean planting material and improvement of the existing distribution systems.

5.2 Module learning out comes

By the end of the module training, the following outcomes should be achieved:

1. The successes and limitations of existing Cassava clean seed production methods explained and appreciated.
2. The concept, characteristics and principles of Cassava clean seed production described and understood.
3. Logical cassava clean seed production and distribution system developed and applied.

5.3 Module target group

This module targets agricultural extension service providers based at sub county and ward levels.

5.4 Module users

This module is intended for use by trainers who are members of the Core Team of Trainers (CTT) and Farmer Trainers. The module trainer should thoroughly familiarize themselves with the participants' handouts and training reference materials.

5.5 Module duration

The Module is estimated to take **4 hours**

5.6 Module Summary

Module 5: Cassava clean seed production			
Sessions	**Training Methods**	**Training Materials**	**Time**
5.6.1. Introduction, objectives and expectations	· Personal introductions · Presentations · Plenary discussions	▪ Flips charts ▪ Felt pens ▪ LCD Projector	30 Minutes
5.6.2. Introduction to Cassava clean seed system in Kenya	▪ Presentations ▪ Plenary discussions ▪ Practical demonstration	▪ Flips charts ▪ LCD Projector ▪ Participants Handouts	1 hour 30 minutes
5.6.3 Requirements for production of cassava quality declared seed	▪ Presentations ▪ Plenary discussions ▪ Practical demonstration	▪ Flips charts ▪ Participants Handouts ▪ LCD Projector	1 hour 30 minutes
5.6.4. Module review	▪ Discussions	▪ Flips charts	30 Minutes
TOTAL			**4 hours**

5.7 Facilitators Guidelines

Module 5: Cassava Seed System	
5.7.1. Introduction and levelling of expectations and objectives (30 Minutes)	**Session Guide**
Introduction *(The facilitator welcomes trainees to the module and invites them to introduce themselves and state their expectations).* **Module Objectives** *(The facilitator presents modules objectives)* By the end of the module training the trainee should be able to: • Explain the main cassava seed system in Kenya. • Explain the importance of certified seed in cassava production. • Demonstrate how to produce cassava quality declared seed.	• Summarize trainees' Expectations and display. • PowerPoint Presentation • Distribute Participants Handouts on Module Objectives and Training Program
5.7.2. Introduction to Cassava clean seed system in Kenya (1 hour)	**Session Guide**
Plenary Presentation: (1 hour) PowerPoint presentation Highlights: • Characteristics of main seed systems (formal and informal seed system) • The main factors to be considered during seed purchase and selection **Discussion (30minutes)** Let the trainees recall what they learned and discuss any issue that may arise.	• PowerPoint Presentation • Distribute Participants Handouts • Brochures, Leaflets, Manuals

5.7.3. Requirements for production of cassava quality declared seed (1 hour 30 Minutes)	Session Guide
Plenary Presentation (1 hour) PowerPoint presentation highlighting:- • Overview of quality cassava seed. • Seed challenges • Sources of seed • Procedure for producing cassava quality seed **Practical demonstration on cassava seed production (30 minutes)**	• PowerPoint Presentation • Distribute participants handouts • Practical Demonstration
5.7.4. Module review (30 minutes)	**Session Guide**
(The facilitator leads the trainees in reviewing the module) Summarize the main points of the training and together with the participants review the main points on: • Cassava seed systems and their characteristics • Importance of using certified seed • Quality declared seed *(Discuss with trainees about new things learnt from this Module. What are some of the problems and issues that they have become more aware of in the module?)*	• The last Participants' Handouts • Summarize the main points from the module on a flip chart and display

5.8 Participants' Handouts

- Cassava production Guide
- Cassava seed production fact sheets

MODULE 6

GOOD AGRONOMIC PRACTICES

6.1 Introduction to the module

Most cassava farmers' plant by digging hills /holes. Steps in planting are; making hills, applying manure and phosphate fertilizer, placing cutting slanting at 60 degrees, covering with soil properly and applying water when using irrigation. The crop may be intercropped with cereals or a nitrogen fixing legume, to boost the soil fertility. This module exposes service providers, lead farmers and facilitators to the importance of using the recommended cassava agronomic practices, the inputs required in cultivation and their accompanying recommendations for optimal production.

6.2 Module Learning outcomes

By the end of the module training, the following outcomes should be achieved:

1. The agronomic practices for Cassava optimal yield explained and applied
2. Appropriate inputs for cassava optimal production and their correct dose understood and described.

6.3 Module Target Group and Categories

The target users are service providers and public county extension officers

6.4 Module Users

This module is intended for use by master trainers who are members of the Core Team of Trainers (CTT). The trainers using this module should thoroughly familiarize themselves with the participants' handouts.

6.5. Module Duration

The Module is estimated to take 6 hours

6.6 Module Summary

Module 6: Cassava agronomic practices			
Sessions	**Training methods**	**Training materials**	**Time**
6.6.1 Introduction, objectives and expectations	▪ Personal introductions ▪ Presentations ▪ Plenary discussions	▪ Flips charts ▪ Felt pens ▪ LCD Projector	1 hour
6.6.2 Good agronomic practices for optimal cassava yields	▪ Presentations ▪ Plenary discussions	▪ Flips charts ▪ LCD Projector Participants Handouts	2 hours
6.6.3 Appropriate inputs for optimal cassava production and their correct dose	▪ Presentations ▪ Plenary discussions ▪ Practical demonstration	▪ Flips charts ▪ LCD Projector ▪ Participants Handouts	2 hours
6.6.4 Module review and discussion	▪ Discussion	▪ Flips charts	1 hour
Total			**6 hours**

6.7 Facilitator's Guidelines

Module 6: Cassava agronomic practices **6.7.1. Introduction and levelling of expectations and objectives (1 hour)**	**Session Guide**
Introduction (30 minutes) *The facilitator welcomes trainees to the module. They are then invited to introduce themselves and state their past or current involvement in cassava production.* **Module Objectives (30 minutes)** *(The facilitator presents modules objectives)* By the end of the module training, the trainee should be able to: • Describe the appropriate cassava agronomic practices for optimal yield. • Outline the required inputs and their rate of application for cassava optimal yield. • Explain correct field management for cassava optimal yield.	• Summarize Trainees' expectations and display. • PowerPoint Presentation • Distribute Participants Handouts on Module Objectives and Training Program

6.7.2. Good agronomic practices for Cassava optimal yield (2 hours)	Session Guide
(The facilitator presents the required inputs to be used in cassava production and the recommended field management practices). **Plenary Presentation (1 hour 30 minutes)** The facilitator presents PowerPoint presentation on the recommended cassava GAPs, their effect on cassava yield, required inputs and their recommended application rate and time for optimal yield. Presentation will include:cassava cropping systems, recommended, spacing (Inter-and intra-row spacing), planting methods, crop management, inputs required and the recommendations. **Discussion (30 minutes)** Let the trainees recall what they learned and discuss any issue that may arise.	• PowerPoint Presentation • Distribute Participants' Handouts • Brochures, leaflets and manual
6.7.3. Appropriate inputs for optimal cassava production and their correct dose (2 hours)	**Session Guide**
Plenary Presentation PowerPoint Presentation highlighting: • Appropriate inputs (fertilizer type, quality manure) and the application rates for optimal production • Soil liming to correct acidity **Practical Demonstration** • Tour demonstration plots for a practical session on cassava GAPs • Demonstration with cassava plots showing recommended spacing.	• PowerPoint Presentation • Distribute Participants Handouts • Brochures, leaflets and manual Practical Demonstration
6.7.4. Module review (1 hour)	**Session Guide**
(The facilitator leads the trainees in reviewing the module) Summarize the main points of the training and together with the trainees review the main points about : *(Discuss with trainees about new things learnt from this Module. What are some of the problems and issues that they have become more aware of in the module?)*	• The last Participants' Handouts • Summarize the main points from the module on a flip chart and display

6.8 Participants' Handouts

1. Cassava production Guide
2. Good Agronomic Practices fact sheet

MODULE 7

INTEGRATED SOIL AND WATER MANAGEMENT PRACTICES FOR CASSAVA PRODUCTION

7.1 Introduction to the module

The performance of the agriculture sector in Kenya has continued to be an important focus because of its role in the national economy. Increased soil acidity, mining of nutrients not supplied in the applied fertilizers, lowering of the soil organic matter content caused by non-use organic resources habe been crucial. Macronutrients nitrogen (N), phosphorus (P), potassium (K) and Sulphur (S). Important micronutrients include zinc (Zn), Molybdenum (Mo) and Boron (B)). They have been identified as deficient in Kenyan soils. Additionally, climate change has accelerated the decline of the agricultural sector performance through limited and unpredictable water supply to crop production systems. Integrated Soil Fertility Management (ISFM), which includes conservation agriculture offers the excellent options for improving soil fertility while allowing for climate change adaptation.

Cassava is mostly cultivated by smallholder farmers with minimal inputs. Drought management technologies to mitigate drought effects in the cassava production are available. However, farmers have not realized the full benefits due to limited integration of the developed integrated natural resource management (INRM) and sustainable intensification practices in their cassava production systems. This module introduces service providers, lead farmers and facilitators to the importance of integrated soil and water management practices for enhanced cassava production.

7.2 Module learning outcomes

By the end of the module training, the following training outcomes should be achieved:

1. Knowledge on soil composition, the various physical, chemical and biological properties and what constitutes a healthy soil including soil classification acquired.
2. Soil and plant tissue sampling for laboratory analysis, interpretation and utilization of results and also identification of accredited laboratories in Kenya discussed and understood.
3. Soil fertility and plant nutrition for increased crop productivity (R4 Stewardship that includes fertilizer source, rates, application methods and timing) understood.
4. Knowledge on soil health and Integrated Soil Fertility Management (ISFM) for climate resilient cropping systems acquired.
5. Knowledge on water harvesting technologies, soil and water management acquired.
6. Knowledge and skills for identifying temporary or permanent decline of land productive capacity and provide various solutions to soil degradation imparted and understood.

7. Awareness on the occurrence of problematic soils and their management increased and understood by the trainees.

7.3 Module Target Group and Categories

This module is intended for service providers and county public extension agents in the cassava producing areas.

7.4 Module Users

This module is intended for use by master trainers who are members of the Core Team of Trainers (CTT). The trainer using this module should thoroughly familiarize themselves with the participants' handouts.

7.5 Module Duration

The Module is estimated to take 9 hours

7.6 Module Summary

Module 6: Integrated soil and water management practices for cassava production			
Sessions	**Training methods**	**Training materials**	**Duration**
7.6.1 Introduction, objectives and expectations	▪ Personal introductions ▪ Presentations ▪ Plenary discussions	▪ Flips charts ▪ LCD Projector	30 minutes
7.6.2 Soil composition, properties and health	▪ Presentations ▪ Field demonstrations	▪ Flips charts ▪ LCD Projector ▪ Participants Handouts	1 hour 30 minutes
7.6.3 Soil and plant tissue sampling and analysis	▪ Presentations ▪ Field demonstrations	▪ Flips charts ▪ LCD Projector ▪ Participants Handouts	1 hours
7.6.4 Soil fertility and plant nutrition	▪ Presentations ▪ Field demonstrations	▪ Flips charts ▪ LCD Projector ▪ Participants Handouts	1 hours
7.6.5 Soil health and ISFM for climate resilient cropping systems	▪ Presentations ▪ Field demonstrations	▪ Flips charts ▪ LCD Projector ▪ Participants Handouts	1 hours

7.6.6 Soil and water management and water harvesting technologies	▪ Presentations ▪ Field demonstrations	▪ Flips charts ▪ LCD Projector ▪ Participants Handouts	1 hours
7.6.7 Soil degradation and reclamation	▪ Presentations ▪ Field demonstrations	▪ Flips charts ▪ LCD Projector ▪ Participants Handouts	1 hours
7.6.8 Problematic soils and their management	▪ Presentations ▪ Field demonstrations	▪ Flips charts ▪ LCD Projector ▪ Participants Handouts	1 hours
7.6.9 Module review and discussion	▪ Discussions ▪ Presentations	▪ Flips charts	1 hour
Total			**9 hours**

7.7 Trainers Guidelines

Module 7: Integrated soil and water management practices for cassava production	
7.7.1. Introduction, Objectives and Expectations (30 minutes)	**Session Guide**
(The trainers welcomes trainees to the module. They are then invited to introduce themselves and state their expectations) **Module Objectives** *(The facilitator presents modules objectives)* By the end of the module trraining, trainees' should be able to: • Describe soil composition, properties and health. • Explain soil and plant tissue sampling and analysis. • Demonstrate understanding of Soil fertility and plant nutrition. • Outline soil health and (ISFM) for climate resilient cropping systems. • Recount soil and water management and water harvesting technologies. • Explain soil degradation and reclamation. • Describe problematic soils and their management.	• Summarize trainees expectations and display. • PowerPoint Presentation • Distribute Participants Handouts on Module Objectives and Training Program
7.7.2. Soil composition, properties and health (1 hour)	**Session Guide**
(The trainers presents on soil composition, properties and health). **Plenary Presentation (45 minutes)** Soil composition, properties and health • Description of soil composition • Description of soil properties • Describe what soil health is all about **Discussion (15 Minutes)** Let the trainees recall what they learned and discuss any issues that may arise.	• PowerPoint Presentation • Distribute Participants Handouts • Brochures, leaflets and manual

7.7.3. Soil and plant tissue sampling and analysis (1 hour 30 Minutes)	Session Guide
Plenary Presentation (45 minutes) PowerPoint presentation highlighting the following: • Overview of the soil sampling methods • Soil analysis results and interpretation • Overview of soil analysis results using available examples • Soil sampling guidelines **Practical exercise on soil sampling (45 minutes)** Demonstration on soil sampling method	• PowerPoint Presentation • Distribute Participants Handouts • Brochures, leaflets and manuals • Practical Demonstration
7.7.4. Soil fertility and plant nutrition (1hour)	**Session Guide**
Plenary Presentation (45 Minutes) PowerPoint Presentation Highlighting: • Potential role of different soil managements techniques in addressing soil fertility challenges in cassava smallholder farming systems • Integrated Soil Fertility Management techniques • Soil management guidelines **Discussion (15 Minutes)** • Let the trainees recall what they learned and discuss any issue that may arise.	• PowerPoint Presentation • Distribute Participants Handouts • Brochures, leaflets and manual

7.7.5 Soil health and (ISFM) for climate resilient cropping systems (1 hour)	Session Guide
Plenary Presentation (45 Minutes) • Insight on soil health • Integrated Soil fertility management (ISFM) • Soil health and ISFM for a climate resilient cropping system • Manure management, mulching, organic amendments and composting for increased use of organic manure for improved agricultural production • Conservation Agriculture (CA) as a climate smart agriculture practice • Crop rotation as climate resilient cropping systems **Discussion (15 Minutes)** Let the trainees recall what they learned and discuss any issues that may arise.	• PowerPoint Presentation • Distribute Participants Handouts • Brochures, leaflets and manual
7.7.6 Soil and water management and water harvesting technologies (1 hour)	**Session Guide**
Plenary Presentation (45 minutes) • Principles of soil management for increased crop productivity • Methods of tillage systems that conserve water for crop use. • principles of soil fertility management for increased crop productivity • Methods of soil fertility management for increased crop productivity **Discussion (15 Minutes)** Let the trainees recall what they learned and discuss any issues that may arise.	• PowerPoint Presentation • Distribute Participants Handouts • Brochures, leaflets and manual

1.1.7 Soil degradation and reclamation (1 hour)	Session Guide
Plenary Presentation • Overview of soil degradation and reclamation. • Identification of the causes of soil degradation. • Identification of Reclamation measures of degraded soil. **Discussion (15 Minutes)** Let the trainees recall what they learned and discuss any issues that may arise.	• PowerPoint Presentation • Distribute Participants Handouts • Brochures, leaflets and manual
7.7.8 Problematic soils and their management (1 hour)	**Session Guide**
Plenary Presentation (45 minutes) • Problematic soils and their management. • Soils with unsuitable biological properties. • Soils with unsuitable chemical properties. • Soils with unsuitable physical properties. **Discussion (15 Minutes)** Let the trainees recall what they learned and discuss any issues that may arise.	• PowerPoint Presentation • Distribute Participants Handouts • Brochures, leaflets and manual
7.7.9. Module review (1 hour)	**Session Guide**
The trainers leads the trainees in reviewing the module) • Summarize the main points of the training and together with the trainees in each of the sub topics. *(Discuss with trainees about new things learnt from this Module. What are some of the problems and issues that they have become more aware of in the module)?*	• The last Participants' Handouts • Summary of the main points on from the module on a flip chart and display

7.8 Participants' Handouts

- Cassava Extension Manual
- Cassava Factsheets- Integrated soil and water management practices for cassava production
- OFRA Technical Training Manual

References

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2. Lekasi JK, Tanner JC, Kimani SK, Harris PJC. (2001). Managing manure to sustain smallholder livelihoods in the East African highlands. HDRA publications.
3. KALRO KCEP_Soil Training and Extension manual. http://www.kcepcral.go.ke/wp-content/uploads/2017/04/KCEP-Soil-Training-and-Extension-manual.pdf

MODULE 8

CROP HEALTH

8.1 Introduction to the Module

Cassava diseases are a key hindrance to increased productivity. This is mostly so for cassava Brown streak (CBS) and cassava mosaic virus (CMV). Pests such as cassava mite and cassava white flies and aphids also reduce productivity and quality of cassava. Scales, mealy bugs and thrips also reduce quality of cassavas. It is common for farmers to blame the soil, fertilizers or bad weather for low cassava yields whereas the actual problem could be pest and disease. Differentiating disease symptoms from signs of nutrient deficiencies is crucial thereafter.

There is need to understand the IPM and crop protection practices that lead to reduced costs in pests and disease management and thus enhances productivity for a market led cassava production system. Some sessions of this module are related to sessions in other modules on cassava handling particularly session on storage pests.

8.2 Module learning outcomes

By the end of the module , the following outcomes should be achieved:

1. Cassava insects' pests, their signs, and economic importance on productivity described and appreciated.
2. Important Cassava diseases, their causes, symptoms and economic importance on productivity described and appreciated.
3. Knowledge on important cassava weeds and their economic importance on productivity enhanced.
4. Knowledge on appropriate pest management practices including IPM for increased productivity enhanced and applied.
5. Skills on safe use and handling practices of pesticides learnt and applied.

8.3 Module Target Group

This module is intended for private service providers and county public extension agents and lead farmers.

8.4 Module Users

This module is intended for use by master trainers who are members of the Core Team of Trainers (CTT). The trainer using this module should thoroughly familiarize themselves with the participants' handouts.

8.5 Module duration

The Module is estimated to take 7 hours

8.6 Module Summary

Module 8: Crop Health			
Sessions	**Training Methods**	**Training Materials**	**Time**
8.6.1 Introduction to the module and leveling of expectations	• Personal Introductions • Discussions • Presentations	• Flip charts and Felt pens • PowerPoint Presentation • LCD projector	30 minutes
8.6.2 Cassava pests	• Group discussions • Buzz exercise • Presentation	• Flip charts, flash cards, felt pens • LCD projector • Participants' handouts	1 hour
8.6.3 Cassava diseases	• Brainstorming • Presentations	• Flip charts, flash cards, felt pens • LCD projector • Participants handouts	1 hour
8.6.4 Cassava weeds	• Group discussion • Presentation	• Flip charts, felt pens • LCD projector • Participants handouts	1 hour 30 minutes
8.6.5 IPM and field sanitation	• Group work • Presentation	• Flip charts, felt pens • LCD projector • Participants handouts	40 minutes
8.6.6 Safe and effective use of agro chemicals	• Presentations • Discussion and feedback	• Flip charts and LCD Projector • Sample pesticide and container • Participants handouts	1 hour
8.6.7 Module review	• Presentations • Participants' questions and comments • Facilitator's summary	• Participants' Handouts • Module review	40minutes
Total			**7 hours**

8.7 Trainers' Guidelines

Module 8: Crop Health	
8.7.1 Introduction And Levelling of Expectations and objectives (30 minutes)	**Session Guide**
Introduction *(The trainers welcomes trainees to the module crop protection and introduces him/herself by stating his/her profile and experience of working with farmers)* The trainer invites the trainees to state their expectation for the module. **Module Objectives** *The trainer introduces the module objectives* By the end of the module training the trainee should be able to: • Identify different Cassava insect pests and their effects on productivity. • Identify various Cassava diseases, their causes, symptoms and effects on productivity. • Identify cassava important cassava weeds and their effects on productivity. • Describe and explain appropriate integrated pest and disease management practices for increased Cassava productivity. • Describe and explain safe use and handling practices of pesticides.	· List the participants' expectations and display · Distribute Participants' Handouts on module Objectives and training · PowerPoint presentation
8.7.2 Major Cassava Pests (1 hour)	**Session Guide**
(The trainer guides the trainees in understanding the economic importance of pests in Cassava production, how to identify their destructive stages and the integrated management practices available). **Plenary presentation (40 Minutes)** • Common Cassava insect pests • Economic Importance Of insect Pests • The insect Pests' Life Cycles **Buzz Exercise: Identification of destructive stages of insect pests (20 Minutes)** With reference to participants' handouts ask trainees to identify the destructive stage of the each pest in 5 minutes and present in plenary	• PowerPoint Presentation • Distribute Participants Handouts • Buzz Exercise

8.7.3 Major Cassava Diseases	Session Guide
(The trainer presents and leads discussions on identification of causal organisms, spread of diseases, economic importance and management practices). **Plenary presentation** • Disease causing organisms and their symptoms (bacteria, fungus and viruses) and their mode of transmission • Economic importance of cassava diseases emphasizing on loss of yields, poor quality produce, increased cost of production and reduced income • Factors influencing occurrence and spread of diseases **Group Exercise: Identification of Diseases and their Symptoms** Through brain storming sessions ask the trainees to mention the common cassava diseases in their area. List the diseases mentioned on flip chart	• PowerPoint Presentation • Distribute Participants Handouts • Group Exercise
8.7.4 Integrated Pests Management (IPM) and Sanitation	**Session Guide**
(The trainer leads trainees through discussions on the need for IPM emphasizing on the dangers of accumulation and spread of diseases which have no chemical control methods but cause severe crop losses). **Plenary Presentation (1 hour)** • **Integrated Pest Management Practices** *Trainer leads discussions on integrated disease management practices at farm level.* • **Techniques of IPM** Components of Integrated pest management as a suitable approach to management of diseases aiming at minimizing economic, health and environmental issues associated with disease management.	• PowerPoint Presentation • Distribute Participants Handouts • Plenary Discussion

8.7.5 Weed management	Session Guide
Plenary Discussion (Initiate the discussion by asking whether weeds are a problem in Cassava farming. Ask trainees to list important weeds). **Plenary presentation** • Important weeds • The economic importance of weeds in cassava • Weeding methods	• PowerPoint Presentation • Distribute Participants Handouts • Plenary Discussion
8.7.6 Safe and Effective Use of Pesticides	**Session Guide**
Plenary Discussion (20 Minutes) *(The trainer seeks opinions of trainees majority of who have undergone safe use of pesticides training and outline key issues on agro chemicals use and impacts on the environment).* **Plenary Presentation** • Agro Chemicals used in cassava (Ask the trainees to mention classes of agro inputs commonly used in Cassava. They should also mention examples of their respective brands). • Overview of Safe and Effective Use of Pesticides • Key steps in safe and effective use of pesticides	• PowerPoint Presentation • Distribute Participants Handouts • Plenary Discussion
8.7.7 Module review	**Session Guide**
(The trainer leads the trainees in reviewing the module) • Summarize the main points of the training Together with the trainees, review the main points about cassava crop health. *(Discuss with trainees about new things learnt from this Module. What are some of the issues that need clarification?)*	• The last Participants' Handouts • Summarize the main points from the module on a flip chart and display

8.8 Participants' Handouts

1. Major Cassava pests fact sheets
2. Major Cassava Diseases fact sheets
3. Weed management fact sheets

MODULE 9

HARVESTING AND POST-HARVEST MANAGEMENT OF CASSAVA

9.1 Introduction to the module

Cassava roots lose the valuable starch, rot or become woody if not harvested at maturity. Roots start deteriorating within 2 – 3 days after harvesting becoming of little value for consumption or industrial use. Therefore, farmers need to adopt improved harvesting and post-harvest technologies to prolong their shelf life. This module is designed to expose trainers to post-harvest handling and storage of Cassava in order to promote resilience among cassava farmer through improved tuber quality.

9.2 Module learning outcomes

By the end of the module training, the following should be achieved:

1. Knowledge on proper harvesting of cassava enhanced and applied.
2. Post-harvest handling and storage of cassava root explained and understood

9.3 Module Target group

This module targets public and private agricultural extension service providers.

9.4 Module users

This module can be used by master trainers and members of CCTS who are members of the core Team Trainers.

9.5 Module duration

The Module is estimated to take 4 hours 30 minutes

9.6 Module Summary

Module 9:Cassava Harvesting and Post-harvest Management			
Sessions	**Training Methods**	**Training Materials**	**Time**
9.1 Introduction, objectives and expectations	• Personal introductions • Presentations • Plenary discussions	• Flips charts • LCD projector • PowerPoint presentation	30 minutes
9.2. Cassava Harvesting	• Plenary Presentations • Plenary discussions • Practical session	• LCD projector • Participants handouts	1 hour 30 minutes
9.3. Post-harvest handling and storage of cassava roots	• Presentation • Practical session • Plenary Presentation	• LCD projector • Participants handouts	1 hour 30 minutes
9.6 Module review	• Participants' questions and comments • Facilitator's summary • Plenary Presentation	• Participants Handouts' • Module review	30 minutes
TOTAL			**4 hours 30 minutes**

9.7 Facilitators Guidelines

Module 9:Cassava Harvesting and Post-harvest Management	
9.7.1 Introduction, Objectives and Expectations (30 minutes)	**Session Guide**
(The trainer welcomes trainees to the module and then invited to introduce themselves and state their expectations) **Module Objectives (30 minutes)** *(The trainer presents modules objectives)* By the end of the module training the trainee should be able to: 1. Explain cassava harvesting and post-harvesting handling. 2. Identify harvesting indices that are important for determining the maturity of cassava roots. 3. Identify Factors contributing to physiological deterioration. 4. Recount post- harvest management practices.	• Summarize Participants' Expectations and Display. • PowerPoint Presentation • Distribute Participants Handouts on Module Objectives and Training Program
9.7.2. Cassava harvesting (1 hour 30 minutes)	**Session Guide**
Plenary Discussion (15 minutes) *(The trainer leads the participants in discussing Cassava maturity indices and harvesting).* **Plenary presentation (1 hour)** • Maturity indices- Determining maturity stage of Cassava and features to look for • Colour change of the tuber • Harvesting techniques, the necessary tools and how to use them • Use of ridgers for harvesting • Market differences/preferences and harvesting time. **Practical Session (15 minutes)** • Cassava harvesting *The trainer guides the trainees field practical session on Cassava harvesting. Ensure that the field is ready including equipment needed before proceeding there.*	• PowerPoint Presentation • Distribute Participants Handouts • Practical Session

9.3. Post-harvest handling and storage of cassava roots (1 hour 30 minutes)	Session Guide
Plenary presentation (1 hour) • Cassava post-harvest management option • Sustainable post-harvest management techniques • Postharvest management guidelines • Cassava storage **Practical Session (30 minutes)** Practical Session on tuber storage	• PowerPoint Presentation • Distribute Participants Handouts • Practical Session
9.4. Module Review	**Session Guide**
The trainer leads the trainees in reviewing the module. Summarize and review with the participants, the main points of the training: • What new things did you learn from this module? • What questions do you still have about cassava harvesting, postharvest handling and storage of cassava? • What is your main take-home message?	• Distribute participants' module • Recap of the key take-home points using any of the following participatory methods: • Q & A session • Discussions • Questionnaires

9.8 Participants' Handouts

1. Cassava harvesting and Postharvest Management fact sheets
2. Storage of cassava roots factsheets

MODULE 10

CASSAVA VALUE ADDITION

10.1 Introduction to the module

Cassava tubers in Kenya are mostly sold fresh. To counter this there is need to add value hence the need to train farmers in the modern methods/technologies of value addition for better returns from the crop. This module is designed to expose facilitators to the importance of cassava in addressing food security and nutrition (FSN) at the household level and the contribution of value addition in addressing FSN. The module also covers the various homemade cassava value added products that can help increase cassava household consumption and commercialization.

10.2 Module learning out comes

By the end of the module training the following outcomes should be achieved:

1. The role of cassava as a food and nutrition security crop explained and appreciated.
2. Cassava nutritional composition and their impact explained.
3. Knowledge on cassava based value added products enhanced and applied.

10.3 Module Target group

This module targets public and private agricultural extension service providers based at sub county and ward levels.

10.4 Module users

This module can be used by master trainers and members of the Core Team Trainers (CCTs). The module trainers should thoroughly familiarize themselves with the participants' handouts and training reference materials.

10.5 Module duration

The module is estimated to take 5 hours.

10.6 Module Summary

Module 10.6.6: Cassava value addition			
Sessions	**Training methods**	**Training materials**	**Duration**
10.6.1.Introduction, objectives and expectations	▪ Personal introductions ▪ PowerPoint ▪ Presentations ▪ Plenary discussions	▪ Flips charts ▪ LCD Projectors	30 minutes
10.6.2. Role of cassava as a food and nutrition security crop	▪ Presentations ▪ Plenary discussions	▪ LCD Projectors Participants Handouts	1 hour
10.6.3 Cassava nutritional composition and its effect in human health	▪ Presentations ▪ Plenary discussions ▪ Demonstrations	▪ LCD Projectors ▪ Participants Handouts	1 hour 30 minutes
10.6.4.Cassava-based value added products	▪ Presentations ▪ Plenary discussions ▪ Demonstrations	▪ LCD Projectors ▪ Participants Handouts	1 hour 30 minutes
10.6.5.Module review and discussion	▪ Discussions	▪ Flips charts	30 minutes
Total			**5 hours**

10.7 Trainers' Guidelines

Module 10 Cassava value addition	
10.7.1. Introduction, Objectives and Expectations (30 minutes)	**Session Guide**
(The trainer welcomes trainees to the module . They are then invited to state their expectations). **Module Objectives (30 minutes)** *(The trainer presents modules objectives)* By the end of the module training, the trainee should be able to: • Demonstrate the role of cassava as a food security and nutrition crop. • Explain Nutritional composition of cassava and impact on human health. • Make cassava-based value added products.	• Summarize trainees' Expectations and display. • PowerPoint Presentation • Distribute Participants Handouts on Module Objectives and Training Program
10.7.2. Role of cassava as a food security and nutritional crop (1 hour)	**Session Guide**
(The trainer presents on the importance of cassava in addressing food security and nutrition). **Plenary Presentation (45 minutes)** PowerPoint presentation highlighting the critical elements which include: • Micronutrient malnutrition cases in Kenya • Dietary nutrient requirements, food nutrient deficiency symptoms, sources of nutrients and their implication in human health **Discussion (15 Minutes)** Let the trainees recall what they learned and discuss any issues that may arise.	• PowerPoint Presentation • Distribute Participants Handouts • Brochures, leaflets and manual

10.7.3. Cassava nutritional composition and its impact in human health (1 hour 30 minutes)	Session Guide
Plenary Presentation(1 hour) PowerPoint Presentation Highlighting: • Overview of the documented cassava nutritional composition and their role in human health • Nutrient guidelines **Discussion (30 Minutes)** Ask trainees to recall what they have learnt and discuss any issues that may arise.	• PowerPoint Presentation • Distribute Participants Handouts • Brochures, leaflets and manual
10.7.4. Cassava-based Value added products (1 hour 30 minutes)	**Session Guide**
Plenary Presentation (1 hour) PowerPoint Presentation Highlighting: • Common cassava utilization methods and dishes • Cassava-based value added products **Practical exercise (30 minutes)** Demonstration on recipes of cassava value added products	• PowerPoint Presentation • Distribute Participants Handouts • Brochures, leaflets and manual • Practical Exercise
10.7.5. Module review (30 minutes)	**Session Guide**
(The trainer leads the trainees in reviewing the module) • Summarize the main points of the training and together with the participants review the main points. *(Discuss with trainees about new things learned from this Module. What are some of the problems and issues that they have become more aware of in the module?)*	• The last Participants' Handouts • Summary of the main points on from the module on a flip chart and display • Module evaluation forms

10.8 Participants' Handouts

1. Cassava value addition fact sheets

MODULE 11

MECHANIZATION OF CASSAVA PRODUCTION ACTIVITIES

11.1 Introduction to the module

Agricultural mechanization supports the enhancing of production, productivity and profitability in agriculture by achieving timeliness and reducing drudgery in farm operations. It comes along with precision in metering and placement of inputs, reducing available input losses, increasing utilization efficiency of costly inputs (planting materials, chemical, fertilizer, irrigation, water etc.), reducing unit cost of produce, enhancing profitability and competitiveness in the cost of operation. It also helps in the conservation of agricultural produce and byproducts from damages; enables value addition and establishment of agro processing enterprises for additional income and employment generation from farm produce. Agricultural mechanization is one of the important inputs that has potential to revolutionize all round development in the rural Kenya, particularly in cassava value chain.

11.2 Module learning outcomes

By the end of the module training the following should be achieved:

1. Climate smart tillage operations explained and appreciated.
2. Knowledge of calibration of fertilizer and seed rates for planters enhanced and applied.
3. Use of pest control implements and tools explained and demonstrated.
4. Harvesting and post-harvest handling machines explained and understood.
5. Drying methods described and understood.

11.3 Module Target Group and Categories

This module is intended for service providers and county public and private extension agents and lead farmers.

11.4 Module Users

This module is intended for use by master trainers who are members of the Core Team of Trainers (CTT). The trainer using this module should thoroughly familiarize themselves with the participants' handouts.

11.5 Module Duration

The module is estimated to take 5 hours

11.6 Module Summary

Module 11: Mechanization of cassava production activities			
Sessions	**Training methods**	**Training materials**	**Duration**
11.6.1 Introduction, objectives and expectations	• Personal introductions/know your audience • Presentations • Plenary discussions	• Flips charts • LCD Projector	30 minutes
11.6.2 Calibration of fertilizer placement	• Presentations • Plenary discussions • Practical	• Flip chart • Projector • Participants Handouts	1 hour
11.6.3 Cassava Chemical application implements and tools utilization (1 hours)	• Presentations • Plenary discussions • Practical	• Flip chart • Projector • Participants Handouts	1 hour
11.6.4 Harvesting and post-harvest handling machines (1 hours)	• Presentations • Plenary discussions • Practical	• Flip chart • Projector • Participants Handouts	1 hour
11.6.5 Drying methods	• Presentations • Plenary discussions • Demonstrations • Practical	• Flip chart • Projector • Participants Handouts	1 hour
11.6.6 Model review	• Presentations • Plenary Discussions	• Flip Charts • Hand outs	30 minutes
Total			**5 hours**

11.7 Trainers'Guidelines

Module 11: Mechanization of Cassava production activities (30 min)	
11.7.1 Introduction, Objectives and Expectations (30 minutes)	**Session Guide**
(The trainer welcomes trainees to the module on Mechanization of Cassava production activities. They are then invited to introduce themselves and state their expectations). **Module Objectives** (The facilitator presents modules objectives) By the end of the module training the trainees' should be able to: • Explain the various climate smart tillage options. • Outline calibration of fertilizer placement. • Demonstrate pest control implements and tools. • Describe and explain harvesting methods. • Describe harvesting and post-harvest handling machines. • Outline and explain drying methods.	• Summarize Participants' Expectations and display. • PowerPoint Presentation • Distribute Participants Handouts on Module Objectives and Training Program
11.7.2 Calibration of fertilizer placement (1 hour)	**Session Guide**
(The trainer presents on the calibration of fertilizer placement) **Plenary Presentation (45 minutes)** • Overview of the cassava mechanization activities • Climate smart tillage options **Discussion (15 Minutes)** Let the trainees recall what they learned and discuss any issues that may arise.	• PowerPoint Presentation • Distribute Participants Handouts • Plenary Discussion

11.7.3. Cassava Chemical application implements and tools utilization (1 hours)	Session Guide
Plenary Presentation (45 minutes) • Techniques an methods of using cassava pest control equipment and tools. **Discussion (15 Minutes)** Let the trainees recall what they learned and discuss any issues that may arise.	• PowerPoint Presentation • Distribute Participants Handouts • Plenary Discussion
11.7.4. Harvesting and post-harvest handling machines (1 hour)	**Session Guide**
Plenary Presentation(45 minutes) • Harvesting tools, cleaning, peeling and grating **Discussion (15 minute)** Let the trainees recall what they learned and discuss any issue that may arise.	• PowerPoint Presentation • Distribute Participants Handouts • Plenary Discussion
11.7.5 Drying methods (1 hour)	**Session Guide**
Plenary Presentation(45 minutes) PowerPoint Presentation Highlighting on: • Various drying equipment **Discussion (15 Minutes)** Let the trainees recall what they learned and discuss any issues that may arise.	• PowerPoint Presentation • Distribute Participants Handouts • Plenary DiscussionBrochures,
111.7.6 Module review (30 minutes)	**Session Guide**
The trainer leads the trainees in reviewing the module) Summarize the main points of the training and together with the trainees review the main points: • Calibration of fertilizer placement. • Cassava chemical application implements and tools utilization. • Harvesting and post-harvest handling machines. • Drying methods. Machine and procedure for grading. *(Discuss with trainees about new things learnt from this Module. What are some of the problems and issues that they have become more aware of in the module?)*	• The last Participants' Handouts • Summary of the main points on from the module on a flip chart and display

11.8 Participants' Handouts

1. Cassava mechanization factsheets

MODULE 12

CASSAVA BUSINESS AND MARKETING

12.1 Introduction to the Module

This module introduces service providers, lead farmers and facilitators to the importance of cassava farming as a business. The module also focuses on helping farmers to acquire sustainable business skills that will assist them to build a long-term financial resilience to the negative impact of increasing drought and poverty. The module outlines how this would be achieved through production and development of marketable cassava products that contribute to addressing improved food and nutritional security and better income at the household level. The areas covered under this module include the concept of cassava farming as a business, opportunities of cassava products in local and international markets, risk management in cassava farming business, market analysis and importance of a SWOT analysis, farm decision analysis tools (partial budget, break-even and gross-margin) and business plan and marketing of cassava farm products.

12.2 Module Learning Outcomes

By the end of the module training, the following outcomes should be achieved:

1. The importance of cassava farming for household's subsistence and commercial farming appreciated.
2. The opportunities for cassava products and requirements for participating in local and international markets explained and understood.
3. The elements and the principles of preparing and implementing a profitable Business plan explained and understood.
4. Knowledge on the principles and partial budget analysis, break-even analysis and gross margin analysis for cassava business imparted and applied.
5. The SWOT analysis matrix for cassava business described and appreciated.
6. The principles of 5 'Ps' marketing mix in cassava production based on products, promotion, place and price and delivery systems explained and appreciated.
7. E-marketing and contract Farming explained and understood.

12.3 Module Target Group

This module is intended for service providers and public extension agents in the cassava producing counties

12.4 Module Users

This module is intended for use by master trainers who are members of the Core Team of Trainers (CTT). The trainer using this module should thoroughly familiarize themselves with the required participant's handouts.

12.5 Module Duration

The Module is estimated to take 6 hours 45 minutes

12.6 Module Summary

Module 12: Cassava Business and Marketing			
Sessions	**Training methods**	**Training materials**	**Time**
12.6.1 Introduction, learning expectations and outcomes	▪ Personal introductions ▪ Plenary discussions ▪ Presentations	▪ Flips charts ▪ Felt pens ▪ Projector	30 minutes
12.6.2 Subsistence and Commercial Cassava Production	▪ Presentations ▪ Plenary discussions	▪ Flips charts ▪ Felt pens ▪ LCD Projector ▪ Participants Handouts	30 minutes
12.6.3 Risk management in cassava farming business, Opportunities and Participation requirements for Cassava products in local and international markets	▪ Presentations ▪ Plenary discussions ▪ Demonstrations	▪ Flips charts ▪ Felt pens ▪ LCD Projector ▪ Participants Handouts	45 minutes
12.6.4 Cassava Farm Business Record Keeping and developing a Business plan	▪ Presentations ▪ Plenary discussions	▪ Flips charts ▪ Felt pens ▪ LCD Projector ▪ Participants Handouts	1 hour 30 minutes
12.6.5 Managing cassava business performance by developing partial budget, Break-even, and Gross margin analysis	▪ Presentations ▪ Practical exercises ▪ Plenary discussions	▪ Flips charts ▪ Felt pens ▪ PowerPoint Presentations – Participants Handouts	1 hour 30 minutes

12.6.6 Marketing of cassava products by developing Strengths, Weaknesses, Opportunities and Threats (SWOT) matrix, use of principles of 5 'Ps', Contract Farming and E-marketing	▪ Presentations ▪ Practical exercise ▪ Plenary discussions	▪ Flips charts ▪ Felt pens ▪ LCD Projector ▪ Participants Handouts	1 hour 30 minutes
12.6.7 Module Review	Presentations Plenary discussion	Flip charts Felt pens	30 minutes
Total			**6 hours 45 minutes**

12.7 Trainers' Guidelines

Module 12: Cassava Business and Marketing	
12.7.1 Introduction and Expectations (30 minutes)	**Session Guide**
(The trainer welcomes trainees to the module. They are then invited to introduce themselves and state their expectations) **Module Objectives** *(The trainer presents modules objectives)* By the end of this module training, the trainee should be able to: • Appreciate the cassava business concept. • Distinguish between subsistence and commercial farming practices. • Identify risks in cassava farming business and opportunities for cassava products and requirements for participating in local and international markets . • Understand the importance of record keeping and common types of records required in a cassava farm business. • Appreciate the principles of preparing and implementing a profitable Business plan. • Understand the concept of farm budgeting, different types of farm budgets and the components of a farm budget. • Understand the concept of marketing and approaches (SWOT, 5Ps, E-marketing and Contract Farming • Evaluate different target markets and marketing channels for cassava products.	• Summarize Participants' Expectations and display. • PowerPoint Presentation • Distribute Participants Handouts on Module Objectives and Training Program

12.7.2 Subsistence and Commercial Cassava Production (30 minutes)	Session guide
Plenary Presentation (20 minutes) **Presentation highlighting:** • Concept of a cassava business • Key principles of cassava business • Commercialization and competitiveness of cassava as a commodity crop (from subsistence to commercial farming) • Advantages of practicing cassava farming as a profitable agro-enterprise **Plenary Discussion (10 minutes)** Discussion on the concept of cassava farming as a business	• PowerPoint presentation • Distribute participants handouts • Plenary Discussion
12.7.3 Risk management in cassava farming business, Opportunities and Participation requirements for Cassava products in local and international markets (45 minutes)	**Session Guide**
Plenary Presentation (30 minutes) **The trainer presents the following:** • The concept of risk • Risks associated with cassava farming business • Risk management measure at farm level for instance crop insurance • Cassava business environment both locally and internationally • Cassava production, demand and supply trends • Diversity in marketable cassava-based products • Cassava products market quality requirements and their respective prices. **Plenary Discussion (15 minutes)** • Let the trainees recall what they learned and discuss any issue that may arise • Discussion on cassava products available locally and unexploited market opportunities	• PowerPoint presentation • Distribute participants handouts

12.7.4 Cassava Farm Business Record Keeping and developing a Business plan for planning (1 hour 30 minutes)	Session Guide
Plenary Presentation (30 minutes) • Why should records be kept in a cassava farm business? • General principles for record keeping in cassava business • Why plan cassava business? • Elements of a successful business plan • Guidelines and steps in preparing a competitive and profitable business plan • Characteristics of a good business plan **Practical exercises (1 hour)** Trainees to develop a business plan for a cassava business	• PowerPoint presentation • Distribute participants handouts • Practical Exercises
12.7.5 Managing cassava business performance by developing partial budget, Break-even, and Gross margin analysis (1 hour 30 minutes)	**Session Guide**
Plenary Presentation (30 minutes) • What is cassava farm budgeting? • Uses of cassava farm budgets • Common types of farm budgets • Steps in preparing farm budgets: Partial budget analysis (in farm changes or alternatives), break-even analysis and gross margin analysis **Practical exercises (1 hour)** Trainees develop a gross margin budget for a cassava business for one acre	• PowerPoint presentation • Distribute participants handouts • Practical Exercises

12.7.6 Marketing of cassava products by developing Strengths, Weaknesses, Opportunities and Threats (SWOT) matrix, use of principles of 5 'Ps', Contract Farming and E-marketing (1 hour 30 minutes)	Session Guide
Plenary Presentation (30 minutes) • The marketing concept. • Market survey for Cassava products. • Identification of target buyers and marketing channels. • What SWOT analysis mean for a cassava business. • Cassava farming as a business by its strengths, weaknesses, opportunities and threats. • Marketing options for cassava products (5Ps) – marketing mix. • Contract farming in cassava business. • Role of marketing institutions. **Group exercise on SWOT analysis on cassava marketing (1 hour)** *(The group then compares the list from the facilitator and that developed during the group exercise).*	• PowerPoint presentation • Distribute participants handouts • Group Exercise
12.7.7 Module review (30 minutes)	**Session guide**
Summarize the main points of the training and together with the trainees review the main points: • Transformation process of cassava farming from subsistence to commercial • Options for risk management in cassava business • Opportunities for cassava products in local and international markets • Participation requirements in local and international markets • Importance of record keeping and business plan • Tools for financial management • Marketing options for cassava products *(Each trainee lists the main points leant during the training. Discuss with participants new things learnt from this Module. What are some of the problems and issues that they have become more aware of in the module?)*	• Group discussions • Q& A session • Recap the main points • Participatory evaluation of the session

12.8 Participants' Handouts

1. Cassava business fact sheets
2. Strengths, Weaknesses, Opportunities and Threats in cassava farming business

MODULE 13

CASSAVA CROSS-CUTTING ISSUES (AGRICULTURAL INNOVATION PLATFORMS, POLICY ISSUES AND GENDER MAINSTREAMING AND SOCIAL INCLUSION)

SUB-MODULE 13.1: AGRICULTURAL INNOVATION PLATFORMS

13.1.1 Introduction to the Sub-Module

This sub module exposes the service providers and lead farmer facilitators to an innovation systems based configuration of stakeholders called the Agricultural Innovation Platform (AIP). It is an organizational model for stimulating innovation and development and brings actors together in a way that pools together skills and knowledge used to address challenges and utilize opportunities. The actors include individuals, private and public sector organizations, policy makers and other value chain stakeholders who are brought together to seek a solution to a challenge hindering agricultural productivity within a value chain such as cassava. The AIP facilitates actors to interact, innovate, learn and change with time as they seek a solution to the common challenge or compelling agenda. In an innovation platform, information exchange takes place in an environment where every actor's contribution is valued and various benefits accrue to all in a win-win situation. The AIP has been proved to be a useful methodology for catalyzing uptake, up scaling and sustaining use of various technologies.

13.1.2 Sub-module learning Outcomes

By the end of the module training, the following outcomes should be achieved:

1. The attributes of an innovation platform described and understood.
2. Stakeholders mobilization for initiation of an Agricultural Innovation Platform explained demonstrated.
3. The establishment, management and monitoring of Agricultural Innovation Platforms explained and demonstrated.
4. The process of building innovation capacity of the actors explained and understood.

13.1.3 Sub-module Target Group and Categories

The target users are public county extension officers, private agricultural service providers, and lead farmers

13.1.4 Module Users

This module is intended for use by master trainers who are members of the Core Team of Trainers (CTT). The trainer using this module should thoroughly familiarize themselves with the participants' handouts.

13.1.5 Sub-module Duration

The Module is estimated to take 3 hours

13.1.6 Sub-module Summary

Sub-Module 13.1 Agricultural Innovation Platforms (AIP)			
Sessions	**Training methods**	**Training materials**	**Time**
13.1.6.1 Introduction, objectives and expectations	▪ Personal introductions ▪ Presentations ▪ Plenary discussions	▪ Flips charts ▪ LCD projector	30 minutes
13.1.6.2 An overview of attributes of an Agricultural Innovation Platform (The characteristics of an innovation platform)	▪ Power point Presentations ▪ Plenary discussions	▪ Flip charts ▪ LCD projector ▪ Participants Handouts	1 hour
13.1.6.3 Pre-formation stages –stakeholder mobilization and sensitization. -AIP Phases (Initiation, Establishment, Management and Sustenance)	▪ Power point presentations ▪ Plenary discussions ▪ Role plays	▪ Flips charts ▪ LCD projector ▪ Handouts	1 hour
13.1.6. 4 Module review	▪ Discussions	▪ Flip Charts	30 minutes
Total			**43 hours**

13.1.7 Trainers' Guidelines

Agricultural Innovation Platform (AIP)	
13.1.7.1. Introduction, levelling of expectations and objectives (30 Minutes)	**Session Guide**
Introduction *(The trainer welcomes trainees to the sub-module. They are then invited to introduce themselves and state their expectations)* **Module Objectives** *(The trainer presents modules objectives and levels out expectations)* By the end of the module training, the trainee should be able to: • Explain characteristics of an innovation platform. • Mobilize and sensitize stakeholders. • Describe how to initiate and establish Agricultural Innovation Platforms. • Explain how to manage and sustain innovation capacity of actors in Agricultural Innovation Platforms.	• Summarize Trainees' "Expectations" and display. • PowerPoint Presentation • Module Objectives and Training Program
13.1.7.2. The characteristics of an innovation platform (1hour)	**Session Guide**
The trainer presents an overview of innovation platforms and their main characteristics **Plenary Presentation (30 minutes)** • Past progression of research and extension models and their shortcomings • Agricultural Innovation Systems perspective and Agricultural Innovation Platforms model • Comparison of Agricultural Innovation Platforms with social and technical events working through committees with different roles but common goals • Value chain actor linkages and other benefits. **Discussion (30 minutes)** Let the trainees recall what they learned and discuss any issues that may arise.	• PowerPoint Presentation • Notes Handouts, • Brochures, information leaflets and manuals

13.1.7.3 Preformation and formation phases of the Cassava AIP (1 hour)	Session Guide
Plenary Presentation (50 Minutes) Facilitator presents on: **Initiation or preformation phase** • Engagement or mobilization of stakeholders in the sorghum value chain • Visioning process and rules of engagement mediated by an initiator such as an change agent. **Establishment** • Assessment of the status of the value chain to clearly identify the compelling agenda or bottleneck - APVC analysis to identify weaknesses in the chains. • Laying out of proper plans to define roles, establish task- based committees, expected milestones and resourcing strategies. **Management** • Keeping stakeholders focused on the vision and upholding values to ensure an inclusive and transparent process. • Neutral facilitation to ensure joint strategy building and action and the coordination of support activities. • Managing emerging experts taking up leading roles and issues as champions. **Sustainability** • Guiding in evolving and identifying fresh issues or challenges • Maintaining capacity acquired to address new issues or challenges in subsequent cycles. **Discussion (10 minutes)** Let the trainees recall what they learned and discuss any issues that may arise.	• PowerPoint Presentation • Distribute Participants Handouts • Brochures, Leaflets, Manuals • Short video clips

13.1.7.4. Module review (30 minutes)	Session Guide
(The trainer leads the trainees in reviewing the module) Summarize the main points of the training and together with the trainees review the main points on: • AIP characteristics and initiation • AIP establishment and management • Sustenance of Cassava AIPs *(Discuss with trainees' new things learnt from this sub-module. What are some of the problems and issues that they have become more aware of in the sub-module?)*	• The last Participants' Handouts • Summarize the main points from the module on a flip chart and display

13.1.8. Participants' Handouts

1. Agricultural Innovation Platform (AIP) fact sheets

References:

1. Kamau, G.M. and Makini F.W. (2019). Agricultural Innovation Platforms for knowledge exchange and learning for technical, economic, social and institutional change
2. Makini F., Mulinge W., Mose L., Salasya B., Kamau G., Makelo M., and On'gala, J. (2018). Impact of Agricultural Innovation Platforms on Smallholder livelihoods in Eastern and Western Kenya. FARA Research Results Vol2(6
3. Makini F., Kamau G., Makello M., Adekunle A., Mburathi G. (2013). Operational field guide for developing and managing local agricultural innovation platforms KARI ISBN 978-9966-30-004-1

SUB-MODULE 13.2

CASSAVA GENDER, VULNERABLE AND MARGINALIZED GROUPS (VMGs), SOCIO, ENVIRONMENTAL CONCERNS AND COHESION

13.2.1 Introduction to the Sub-Module

Cassava is a major agro-enterprise and therefore all the gender categories (men, women, youth as well as vulnerable marginalized groups (VMGs) are involved in its value chain from production, marketing and consumption. However, women perform most of the crops production activities such as planting, weeding, harvesting and threshing while men mostly perform the task of marketing. Despite this huge women's contribution, gender inequalities exist in all areas of the value chain. Some of these gender inequalities include: division of labour, access to and control of resources and decision making within and beyond the household. These inequalities limit women, youth and VMGs access to and benefits from the various Technologies, Innovations and Management Practices (TIMPs) at different nodes of the value chain. At the macro-level, effective participation of women and youth in groups and market activities is constrained by their low decision making power, lack of voice and lack of access to financial resources. Gender analysis examines the productive and reproductive roles of men and women; access, control and ownership of resources; levels of power relations; differential needs, constraints and opportunities; and impact of these differences (positive/ negative) on lives of men, women, youth and the VMGs.

Cassava value chain TIMPs interventions, when designed and implemented with gender equitable principles, can foster adoption leading to increased productivity as well as enhanced social and environmental impacts.

The overall objective of this sub-module is to ensure that gender mainstreaming and social inclusion in cassava TIMPs is enhanced by field agricultural practitioners and extension officers as an effort geared towards achieving Climate Smart Agriculture "triple win" in target counties.

13.2.2 Sub-Module learning outcomes

By the end of the training sub-module training, the following outcomes should be achieved:

1. The concept of Gender mainstreaming and social inclusion in Cassava value chain understood and appreciated.
2. Youth empowerment in Cassava value chain Explained and understood.
3. Women empowerment in Cassava value chain Explained and understood.

4. Strategies for inclusion of vulnerable and marginalized groups in cassava value chain understood and applied.
5. Socio-cultural barriers in cassava value chain explained and understood.
6. Knowledge on Environmental and social management framework (ESMF) tool enhanced.

13.2.3 Sub-module Target Group

This sub-module is intended for service providers and county public extension agents and lead farmers.

13.2.4 Sub-module Users

This sub-module is intended for use by master trainers who are members of the Core Team of Trainers (CTT). The sub-module outlines the learning outcomes, the category of trainees targeted, module summary, and participants' handouts. The trainer using this module should thoroughly familiarize themselves with the participants' handouts.

13.2.5 Sub-module Duration

The sub-module is estimated to take 7 hours.

13.2.6 Sub-module Summary

Sub-module 13.2: Gender mainstreaming and social inclusions in the Cassava value chain			
Sessions	**Training methods**	**Training materials**	**Duration**
13.2.6.1 Introduction, expectations and objectives	▪ Personal introductions ▪ Presentations ▪ Plenary discussions	▪ Flips charts ▪ Felt pens ▪ LCD projector ▪ Laptop ▪ Participants handouts	30 Minutes
13.2.6.2 Gender mainstreaming in Cassava value chain	▪ PowerPoint Presentations ▪ Group discussions ▪ Plenary discussions	▪ Flips charts ▪ Felt pens ▪ LCD projector ▪ Participants handouts	1 hour

13.2.6.3 Youth empowerment in Cassava value chain	▪ PowerPoint Presentations ▪ Group discussions ▪ Plenary discussions	▪ Flips charts ▪ Felt pens ▪ PowerPoint Presentation ▪ Participants handouts	1 hour
13.2.6.4 Women empowerment in Cassava value chain	▪ PowerPoint Presentations ▪ Group discussions ▪ Plenary discussions	▪ Flips charts ▪ Felt pens ▪ LCD projector ▪ Participants handouts	1 hours
13.2.6.5 Strategies for inclusion of vulnerable and marginalized groups	▪ PowerPoint Presentations ▪ Group discussions ▪ Plenary discussions	▪ Flips charts ▪ Felt pens ▪ LCD projector ▪ Participants handouts	1 hours
13.2.6.6 Environmental and Social Management Framework	▪ PowerPoint Presentations ▪ Group discussions ▪ Plenary discussions	▪ Flips charts ▪ Felt pens ▪ LCD projector ▪ Participants handouts	1 hour
13.2.6.7 Socio economic and environmental impact of Cassava activities	▪ PowerPoint presentations ▪ Group discussions ▪ Plenary discussions	▪ Flips charts ▪ Felt pens ▪ LCD projector ▪ Participants handouts	1 hour
13.2.6.8 Module Review	▪ Plenary discussions	▪ Flips charts ▪ Felt pens	30 Minutes
Total			**7 hours**

13.2.7 Trainers' Guidelines

Sub Module 13.2: Gender mainstreaming and social inclusion in Cassava value	
13.2.7.1 Introduction, Objectives and Expectations (30 Minutes)	**Session Guide**
(The trainer welcomes trainees to the module on gender mainstreaming and social inclusion in Cassava value chain. They are then invited to introduce themselves and state their expectations) **Module Objectives (30 Minutes)** (The trainer presents modules objectives) By the end of the module training the trainee should be able to: Appreciate gender main streaming and social inclusion, in Cassava value chain. • Appreciate youth empowerment in Cassava value chain. • Appreciate women empowerment in Cassava value chain. • Know strategies for inclusion of vulnerable and marginalized groups in Cassava value chain. • Know socio-cultural barriers in Cassava value chain. • Realize the environmental and social management framework (ESMF) tool.	• Summarize Trainees' Expectations and display. • PowerPoint Presentation • Flipcharts • Group exercise • Objectives and Training Program

13.2.7.2 Gender mainstreaming and social inclusion in Cassava value chain (1 hour 30 Minutes)	Session Guide
(The trainer should present and explain what is gender mainstreaming, who does what activity, who has access to what resources etc. and why gender mainstreaming is important in Cassava value chain). **Plenary Presentation (30 minutes)** Definition of gender • What is gender mainstreaming and why it is important. • Who does what? (gender division of roles in Cassava value chain). • Who owns what? (access and control of resources & benefits). • Who makes which decisions? • Socio-cultural limitations related to Cassava value chain. • Existing policies in support of gender mainstreaming. **Group exercise and discussion (30 Minutes)** Let the trainees recall what they learned and discuss any issues that may arise.	• PowerPoint Presentation, Group exercise • Plenary discussions • Distribute Participants Handouts • Group exercise • Plenary discussions
13.2.7.3 Women empowerment in Cassava gram value chain (1 hour)	**Session Guide**
Plenary Presentation (45 minutes) PowerPoint presentation highlighting: • Women's role in the value chain • Challenges facing women in the value chain • Strategies for empowering women in the value chain **Plenary discussion (15 minutes)** Let the trainees recall what they learned and discuss any issues that may arise.	

13.2.7.4. Strategies for inclusion of vulnerable and marginalized groups in Cassava value chain (1 Hour)	Session Guide
Plenary Presentation (30 hour) Who are vulnerable and marginalized groups (VMGs) • Why gender inequality exists • Social inclusion and why • Strategies of inclusion of VMGs **Plenary Discussion (30 minutes)** Let the trainees recall what they learned and discuss any issues that may arise.	• PowerPoint Presentation • Group exercise • Plenary discussion
13.2.7.5. Environmental and social management framework (ESMF) (1 hour)	**Session Guide**
Plenary Presentation (45 minutes) • Objective of ESMF in Cassava value chain • Impacts and action plans for safeguards Environmental and socioeconomic impacts of Cassava value chain activities. **Plenary discussion (15 minutes)** Let the trainees recall what they learned and discuss any issues that may arise.	
13.2.7.6. Module review (30 Minutes)	**Session Guide**
The trainer leads the trainees in reviewing the module) Summarize the main points of the training and together with the trainees review the main points: • What is gender mainstreaming and why it is important? • Youth empowerment in Cassava value chain • Women empowerment in Cassava value chain • Strategies for inclusion of vulnerable and marginalized groups in Cassava value chain • Socio-cultural barriers in the value chain • Environmental and socioeconomic impacts of Cassava activities.Let the trainees recall what they learned and discuss any issue that may arise.	· Summary of the main points on from the module on a flip chart and display

13.2.8. Participants' Handouts

- Gender mainstreaming and social inclusion fact sheets

Reference

1. Commonwealth secretariat, (2001). Gender Mainstreaming in Agriculture and Rural Development: A Reference Manual for Governments and Other Stakeholders. Marlborough house, London.

SUB-MODULE 13.3

CLIMATE-SMART AGRICULTURAL POLICY OPTIONS

13.3. 1 Introduction to the Sub-Module

Kenya adopted Vision 2030 in 2007 as a new blue print and roadmap for political, social and economic development of the country in the next two decades. The Vision identifies Agriculture as the engine of growth through transformation of smallholder and subsistence agriculture to innovatively and commercially oriented industry. Kenya promulgated the new constitution in 2010 which defines two levels of governments (national & county) with defined functions. Agriculture is one of the devolved governance functions. However, agriculture in Kenya is facing many challenges and threats such as climate change, declining agricultural performance, limited high potential agricultural land and over-reliance on rain fed agriculture, limited diversification of Agricultural production, poor and inadequate rural infrastructure, inadequate and declining research in agriculture, inadequate agricultural sector financing and low technical capacity among the actors. Therefore, agricultural policy in Kenya revolves around the main goals of increasing productivity and income growth, especially for smallholders; enhanced food security and equity, emphasis on irrigation to introduce stability in agricultural output, commercialization and intensification of production especially among small scale farmers; appropriate and participatory policy formulation and environmental sustainability. This module introduces the national and county governments, service providers, lead farmers, facilitators and relevant stakeholders in the design and implementation of effective climate-smart-sensitive agricultural policy options to promote the transition to climate-smart agriculture at the smallholder level. The policy context of this module is structured around six topics.

13.3.2 Sub-module Learning Outcomes

By the end of this sub-module training, the following outcomes should be achieved:

1. The role of agricultural policy frameworks in Kenya discussed and appreciated.
2. Climate-smart agriculture practices, policy options and approaches identified and understood.
3. Climate-smart-sensitive policy cycle explained and understood.
4. Implementation of the climate-smart-sensitive policy at the county level discussed and shared.
5. Financing and Investments for Climate-smart Agriculture discussed and appreciated.
6. The need for a Technology Policy explained and understood.

13.3.3 Sub-module Target Group

This sub-module is intended for service providers, policy makers, public extension agents and relevant stakeholders in the design and implementation of effective, climate-smart-sensitive agricultural policies.

13.3.4 Sub-module Users

This sub-module is intended for use by master trainers who are members of the Core Team of Trainers (CTT). The trainers using this module should thoroughly familiarize themselves with the required participants' handouts.

13.3.5 Sub-module Duration

The sub-module is estimated to take 5 hours 30 minutes.

13.3. 6 Sub-module Summary

Sub-Module 13.3: Climate-Smart Agricultural Policy Options			
Sessions	**Training methods**	**Training materials**	**Time**
13.3.6.1 Introduction, learning expectations and outcomes	▪ Personal introductions ▪ Group discussions ▪ Plenary discussions ▪ Presentations	▪ Flips charts ▪ Felt pens ▪ LCD projector	30 Minutes
13.3.6.2 Agricultural Policy Frameworks in Kenya	▪ Presentations ▪ Practical exercises ▪ Plenary discussions	▪ Flips charts ▪ Felt pens ▪ LCD projector	1 hour
13.3.6.3 Climate-smart agriculture practices, policy options and approaches	▪ Presentations ▪ Practical exercises ▪ Plenary discussions	▪ Flips charts ▪ Felt pens ▪ LCD projector ▪ Participants Handouts	1 hour
13.3.6.4 Climate-smart-sensitive policy cycle	▪ Presentations ▪ Plenary discussions	▪ Flips charts ▪ Felt pens ▪ LCD projector ▪ Participants Handouts	20 minutes

13.3.6.5 Implementation of the climate-smart-sensitive policy at the county level	▪ Presentations ▪ Practical exercise ▪ Plenary discussions	▪ Flips charts ▪ Felt pens ▪ LCD projector ▪ Participants Handouts	50 minutes
13.3.6.6 Financing and Investments for Climate-smart Agriculture	▪ Presentations ▪ Practical exercise ▪ Plenary discussions	▪ Flips charts ▪ Felt pens ▪ LCD projector ▪ Participants Handouts	1 hour
13.3.6.7 Technology Policy	▪ Presentations ▪ Plenary discussions	▪ Flips charts ▪ Felt pens ▪ PLCD projector ▪ Participants Handouts	20 minutes
13.3.6.8 Module Review	Plenary discussion	Flip charts Felt pens	30 minutes
Total			**5 hours 30 minutes**

13.3.7 Trainers' Guidelines

Sub-module 13.3: Climate-Smart Agricultural Policy Options	
13.3.7.1 Introduction, Expectations and Outcomes (30 Minutes)	**Session Guide**
(The trainer welcomes trainees to the sub-module. They are then invited to introduce themselves and state their expectations). **Trainees' Expectations** *(The trainer requests the trainees to form groups and list their expectations)* **Module Objectives** *(The trainer presents module learning Objectives)* By the end of this sub-module training, the trainee should be able to: • Appreciate the role of agricultural policy frameworks in Kenya. • Understand climate-smart agriculture practices, options and approaches. • Understand the stages in climate-smart-sensitive policy cycle. • Understand the phases in the implementation of the climate-smart-sensitive policy at the county level. • Be able to evaluate and select financing and investments options for Climate-smart Agriculture. • Be able to understand the need of a technology policy.	• Summarize Trainees' Expectations and display. • PowerPoint Presentation • Distribute Participants Handouts on Module Objectives and Training Program
13.3.7.2 Agricultural Policy Frameworks in Kenya (1 hour)	
Plenary Presentation (30 minutes) The role of agricultural policy frameworks in Kenya **Practical Exercise (30 minutes)** *(The trainer requests the trainees to form groups and identify the gaps between agricultural policy frameworks and the existing agricultural policies).*	• PowerPoint presentation • Distribute participants' handouts • Group Exercise

13.3.7.3 Climate-smart agriculture practices, policy options and approaches (1 hour)	Session guide
Plenary Presentation (30 minutes) **Presentation highlighting:** • Considerations for climate-smart production systems • Existing systems, practices and methods suitable for climate-smart agriculture • Institutional and policy options • Ensuring farmer organizations for market access • Gendered approach **Practical Exercise and plenary Discussions (30 minutes)** *(The trainer requests the trainees to form groups and identify the existing climate-smart agriculture practices and the relevant policy options for implementation).*	• PowerPoint presentation • Distribute participants' handouts • Group Exercise
13.3.7.4 Climate-smart-sensitive policy cycle (20 minutes)	**Session Guide**
Plenary Presentation (10 minutes) • Stages in the climate-smart-sensitive policy cycle **Plenary Discussions (10 minutes)**	• PowerPoint presentation • Distribute participants' handouts
13.3.7.5 Implementation of the climate-smart-sensitive policy at the county level (50 Minutes)	**Session Guide**
Plenary Presentation (20 minutes) • Phases in the implementation of the climate-smart-sensitive policy at the county level **Practical exercise (30 minutes)** *(The trainer requests the trainees to form groups and develop a program showing steps, activities and stakeholders for the implementation of climate-smart policies).*	• PowerPoint presentation • Distribute participants' handouts • Practical Exercise

13.3.7.6 Policy financing and investments for Climate-smart Agriculture (1 hour)	Session Guide
Plenary Presentation (30 minutes) • Why financing is needed • Financing gaps • Sources of financing • Financing mechanisms • Connecting action to financing • Types of subsidies to farmers **Group exercises (30 minutes)** *(The trainer requests the trainees to form groups and identify potential sources of financing, financing mechanisms and connecting action to financing).*	• PowerPoint presentation • Distribute participants' handouts • Practical Exercise
13.3.7.7 Need of Technology Policy (20 minutes)	**Session guide**
Plenary Presentation (10 minutes) • What is a technology policy? • Why do we need technology policy? • Is technology policy inconsistent with a market oriented economy? • Technology policy in Kenya **Plenary Discussions (10 minutes)**	• PowerPoint presentation • Distribute participants' handouts
13.3.7.8 Sub-module review (30 minutes)	**Session guide**
(The trainer leads the trainees in reviewing the module) • Summarize the main points of the training and together with the trainees review the main points. • Participants lists the main points leant during the training • Discuss with trainees' new things learnt from this Module Ask the trainees what are some of the problems and issues that they have become more aware of in the sub-module.	• Q& A session • Recap the main points • Test understanding • Participatory evaluation of the session

13.3.8 Participants' Handouts

1. Hand out on Agricultural Policies in Kenya
2. Cassava production manual

13.9 References

1. Alila, P.O. & Atieno, R. (2006). A paper for the Future Agricultures Consortium workshop, Institute of Development Studies, 20-22 March 2006. Future Agricultures.
2. Chronic Poverty Advisory Network (2012). Agriculture Policy Guide 2. Meeting the challenge of a new Pro-poor agricultural paradigm: The role of agricultural policies and programs. www.chronicpovertynetwork.org
3. Chirwa, E.; Dorward, A.; Kathule, R.; Kumwenda, I.; Kydd, J., Poole, N.; Poulton, C. & Stockbridge, M. (undated). Farmer Organization for market access: Principles for policy and practice. Imperial College London. University of Malawi. Agricultural Policy Research Unit. http://www.imperial.ac.uk/agriculturalsciences/research/sections/aebm/projects/farmerorg.htm
4. Food and Agriculture Organization of the United Nations (2016). The Gender in Agricultural Policies Analysis Tool (GAPo). FAO 2016.16274EN/2/01.18
5. Food and Agriculture Organization of the United Nations (FAO) (2010). "Climate-Smart" Agriculture. Policies, Practices and Financing for Food Security, Adaptation and Mitigation.
6. Ha-Joon Chang (2002). African Technology Policy Studies Network (ATPS). Who needs Technology Policy? Published by The African Technology Policy Studies Network, Nairobi, Kenya. ISBN: 9966-916-18-0
7. RoK (2007). Kenya adopted Vision 2030.
8. RoK (2010). Kenya Constitution

ANNEX 1: TRAINING PROGRAM

KENYA CLIMATE SMART AGRICULTURE PROJECT

WORKSHOP TO PILOT TOT TRAINING FOR CASSAVA VALUE CHAIN FOR KISUMU, BUSIA AND LAMU COUNTIES

VENUE: ATC MABANGA, 30TH AUGUST– 11th SEPTEMBER 2020

TENTATIVE PROGRAMME

Time	**Day 0 Sunday 30th August 2020**	**Remarks / Facilitator**
2.00pm-5.00pm	Arrival of participants	All
Time	**Day 1 Monday 31st August 2020**	**Responsible**
8.30-9.00 am	Registration	KALRO Secretariat
8.40-9.10 am	Introductions	Dr. Theresia Munga
9.10-9.25am	KCSAP Project	Dr. Charles Lungaho
9.25-9.40am	Introduction: KCSAP cassava VC	Ms. Violet Kirigua
9.40-10.00am	Official opening Ceremony	Dr Felister Makini
10.00-10.30am	Introduction to the training program	Dr. Lusike Wasilwa
10.30-11.00 am	Tea Break (Group Photo)	**ALL**
11.00 – 1.00 pm	Climate Smart Agriculture • Causes of climate change • Principles of climate-smart agriculture • Climate change impacts on agriculture and food security • Climate Smart Agriculture TIMPs and some basic approaches to their validation and dissemination	Dr. Michael Okoti
1.00 - 2 .00 pm	**LUNCH BREAK**	**ALL**
2.00pm- 4.00 pm	• Climate smart agriculture practices e.g. soil management, crop management, Post-harvest Management and Value addition, irrigation systems, • How climate smart agriculture practices result in increased adaptation and resilience to climate change; and, in the reduction of GHG emissions. • Module review and discussions	Dr. Michael Okoti

4.00 - 4.30 pm	Coffee Break	**ALL**
4.30 - 5.00 pm	Group discussion	Dr. Theresa Munga
Close of Day 1		
Time	**Day 2 (Tuesday) 1st September 2020**	
8.00 – 8.30 am	**Registration**	
8.30 – 10.30 am	Farmer field and business school (FFBS) approach in Cassava production • Introduction And Levelling Expectations • Introduction To FFBS • Communication skills	
10.30-11.00 am	**HEALTH BREAK**	**ALL**
11.00 –1.00 pm	• The Key FFBS activities Steps in conducting FFBS • Designing an FFBS program	
1.00-2.00 pm	**LUNCH BREAK**	**ALL**
2.00 – 4.00 pm	• Facilitation skills • Organization, management and Leadership of FFBS	
4.00-4.30 pm	**HEALTH BREAK**	**ALL**
4.30 – 500 pm	Module Review and Group discussion	
End of day 2		
Time	**Day 3 Wednesday 2nd September 2020**	
8.00 – 8.30am	Registration	
8.30 – 10.30am	Cassava production niche and climatic requirements • Introduction, expectations and objectives • Importance of cassava in household's food security and Kenya's economy	Dr. Theresa Munga
10.30-11.00 am	**HEALTH BREAK**	**ALL**
11.00 - 1.00pm	• Cassava production niche and appropriate climatic conditions for optimal yield in Kenya • Module review and group discussion	Dr. Theresa Munga
1.00-2.00 pm	**LUNCH BREAK**	**ALL**

2.00 – 4.30 pm	Cassava variety selection • Introduction, objectives and expectations • Improved cassava varieties their attributes and target environment • Review of Module and Group discussion	Dr. Theresa Munga
4.30 - 5.00 pm	**HEALTH BREAK**	**ALL**
Close of Day 3		
Time	**Day 4 (Thursday) 3rd September 2020**	**Remarks / Facilitator**
8.00 - 8.30am	Registration	
8.30 – 10.00 am	Cassava variety selection • Review of Module and Group discussion	Dr. Theresa Munga
10.00-10.30 am	**HEALTH BREAK**	**ALL**
10.30 - 1.00 pm	Cassava seed system • Introduction, objectives and expectations • Introduction to Cassava clean seed system in Kenya • Requirements for production of cassava quality declared seed • Module review	Dr. Benjamin Kivuva
1.00-2.00 PM	**LUNCH BREAK**	**ALL**
2.00 – 3.30 pm	• Requirements for production of cassava quality declared seed • Module review	Dr. Benjamin Kivuva
3.30 – 4.00 PM	**HEALTH BREAK**	**ALL**
4.00 – 5.00 pm	Cassava agronomic management practices • Introduction, objectives and expectations	Dr, Muchemi
Close of Day 4		
Time	**Day 5 (Friday) 4th September 2020**	**Remarks / Facilitator**
8.00 – 8.30 am	**Registration**	

8.30 -10. 30pm	Cassava agronomic management practices • Good agronomic practices for optimal cassava yields	Dr. Muchemi
10.30-11.00 am	**HEALTH BREAK**	**ALL**
11.00 am-1.00pm	Cassava agronomic management practices • Appropriate inputs for optimal cassava production and their correct dose • Module review and discussion	Dr. Muchemi
1.00-2.00 pm	**Lunch Break**	**ALL**
2.00 - 4.30 pm	Cassava Crop Health • Introduction to the module and leveling of expectations • Cassava diseases • Cassava weeds • IPM and field sanitation • Safe and effective use of agro chemicals • Module review	Dr. Ajanga
4.30-5.00 pm	**Coffee Break**	**ALL**
Time	**Day 6 (Saturday) 5th September 2020**	**Remarks / Facilitator**
8.00 – 8.30 am	**Registration**	
8.30 – 10.30	Cassava Crop Health • Cassava pests • Cassava weeds	Dr. Mutisya
10.30 -11.00am	**HEALTH BREAK**	**ALL**
11.00 -1.00pm	Cassava Crop Health • IPM and field sanitation • Safe and effective use of agro chemicals • Module review	Dr. Sammy Ajanga
1.00-2.00pm	**LUNCH BREAK**	**ALL**

2.00 – 4.30pm	Integrated Soil and Water Management Practices for cassava • Introduction, objectives and expectations • Soil composition, properties and health • Soil and plant tissue sampling and analysis	Dr. Esilaba
4.30 -5.00pm	Coffee Break	**ALL**
4.30-5.00pm	Group discussion	
Close of Day 6		
	Day 7 Sunday 6th August 2020	
Time	**Day 8 (Monday) 7th September 2020**	**Remarks / Facilitator**
8.00-8.30am	Registration	
8.30-10.30am	• Soil fertility and plant nutrition • Soil health and ISFM for climate resilient cropping systems • Soil and water management and water harvesting technologies	Dr. Esilaba
10.30-11.00 am	Tea Break	**ALL**
11.00 am -1.00pm	• Soil degradation and reclamation • Problematic soils and their management • Module review and group discussion	Dr. Esilaba
1.00-2.00 PM	**LUNCH BREAK**	**ALL**
2.00 - 4.30pm	Post-Harvest Management • Introduction, objectives and expectations • Cassava Harvesting	Dr. Vincent Woyengo
4.30-5.00 pm	Coffee Break	**ALL**
Close of Day 8		
Time	**Day 9 (Tuesday) 7th September 2020**	**Remarks / Facilitator**
8.00-8.30 am	Registration	**ALL**
8.30- 11.00 am	• Post-harvest handling and storage of cassava roots. • Module review	Dr. Vincent Woyengo
11.00-11.30am	Tea break	ALL

11.00-1.00pm	Cassava Value Addition • Introduction, objectives and expectations • Role of cassava as a food and nutrition security crop • Cassava nutritional composition and its effect in human health	Dr. Mary Oyunga
1.00-2.00pm	Lunch Break	**ALL**
2.00 – 4.00 pm	Cassava Value Addition • Cassava-based value added products • Module review and discussion	Dr. Mary Oyunga
4.00 pm – 4.30	Coffee Break	All
4.30 – 5.30 pm	• Group Discussion	Dr. Theresia Munga
Close of Day 9		
Time	**Day 10 (Wednesday) 8th September 2020**	**Remarks / Facilitator**
8.00-8.30am	Registration	
8.30 – 10.30 am	Mechanization of cassava production activities • Introduction, objectives and expectations • Calibration of fertilizer placement • Cassava Chemical application implements and tools utilization	Dr. Nasirembe
10.30-11.00 am	**Tea Break**	**ALL**
11.00 – 1.00 pm	Mechanization of cassava production activities • Harvesting and post-harvest handling machines • Drying methods • Model review	Mr. Reuben Ruto
1.00 – 2.00 pm	**LUNCH BREAK**	**ALL**

2.00 – 4.30 pm	Cassava Business and Marketing • Introduction, learning expectations and outcomes • Subsistence and Commercial Cassava Production • Risk management in cassava farming business, Opportunities and Participation requirements for Cassava products in local and international markets	Mr. John Wambua
4.30 – 5.00 pm	Coffee Break	All
End of Day 10		
Time	**Day 11 (Thursday) 9th September 2020**	**Remarks / Facilitator**
8.00-8.30am	Registration	
8.30-10.30am	• Cassava Farm Business Record Keeping and developing a Business plan • Managing cassava business performance by developing Partial budget, Break-even, and Gross margin analysis	Mr. John Wambua
10.30-11.00 am	Tea Break	**ALL**
11.00 am -1.00pm	• Marketing of cassava products by developing Strengths, Weaknesses, Opportunities and Threats (SWOT) matrix, use of principles of 5 'Ps', Contract Farming and E-marketing • Module Review	Mr John Wambua
1.00-2.00 PM	**LUNCH BREAK**	**ALL**

2.00 - 4.00pm	Cassava Cross Cutting Issues i. Innovation Platforms, Gender mainstreaming and social inclusion and Policy • Introduction, objectives and expectations • An overview of attributes of an Agricultural Innovation Platform (The characteristics of an innovation platform) • Pre-formation stages –stakeholder mobilization and sensitization. -AIP Phases (Initiation, • Establishment, Management and Sustenance)	Dr. Jessica Ndubi
4.00-4.30 pm	Coffee Break	**ALL**
4.30-5.30pm	Module review and Group Discussions	**All**
Close of Day 10		
Time	**Day 12 (Friday) 10th September 2020**	**Remarks / Facilitator**
8.00-8.30 am	Registration	**ALL**
8.30- 11.00 am	ii. Gender mainstreaming and social inclusion • Gender mainstreaming in Cassava value chain • Youth empowerment in Cassava • Women empowerment in Cassava value chain value chain • Strategies for inclusion of vulnerable and marginalized groups	Dr. Jessica Ndubi
11.00-11.30am	Tea break	ALL
11.00-1.00pm	• Environmental and Social Management Framework Socio economic and environmental impact of Cassava activities • Module Review	
1.00-2.00pm	Lunch Break	**ALL**

2.00 – 4.00 pm	iii. Policy Issues • Introduction, learning expectations and outcomes • Agricultural Policy Frameworks in Kenya • Climate-smart agriculture practices, policy options and approaches • Climate-smart-sensitive policy cycle • Implementation of the climate-smart-sensitive policy at the county level • Financing and Investments for Climate-smart Agriculture • Technology Policy	Dr. Jessica Ndubi
4.00 pm – 4.30	Coffee Break	All
4.30 – 5.30 pm	Module Review and Group Discussion	Dr. Jessica Ndubi
Departure	**Day 13 Saturday (11th September 2020)**	

ANNEX 2. GENERAL REFERENCE MATERIALS

Cassava Growing

1. Cardoso, A. P.; Mirione, E.; Ernesto, M.; Massaza, F.; Cliff, J.; Haque, M. R.; Bradbury, J. H. 2005. Processing of cassava roots to remove cyanogen. Journal of Food Composition and Analysis, 18:451-460.

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3. **Food and Agriculture Organization; FAO (2012). Food outlook, Global market analysis – November 2012, Rome.**

4. Imungi, J.K., (2006). Limitations to impact of fortified food. In: Letter to the Editor. NutriView.2006/2: 8. Canadian Center of Science and Education; 2006.

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7. NEPAD. (2004). NEPAD targets cassava as Africa' top fighter against poverty. Nepad Dialogue: Focus on Africa. Number 36, 27 February 2004. http://www.un.org/special-rep/ohrlls/News

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Soils

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Soil, Water and Plant Testing Techniques For Soil Resource Management, Proceedings of a training course held in Ibadan, Nigeria, 16-27 September 1996.

3. FAO, CCAFS & International Maize and Wheat Improvement Center (CIMMYT). 2014. Conservation agriculture. Implementation guidance for policymakers and investors. http://www.fao.org/3/a-i4066e.pdf.

4. FAO. 2018. Climate-smart agriculture training manual − A reference manual for agricultural extension agents. Rome. 106 pp. Licence: CC BY-NC-SA 3.0 IGO.

5. International Institute of Rural Reconstruction (IIRT) & African Conservation Tillage Network (ACT). 2005. Conservation agriculture: A manual for farmers and extension workers in Africa. International Institute of Rural Reconstruction, Nairobi; and African Conservation Tillage Network, Harare.

6. Thomas, T.H. and Martinson, D.B. (2007). Roof Water Harvesting: A Handbook for Practitioners. Delft, The Netherlands, IRC International Water and Sanitation Centre. (Technical Paper Series; no. 49). 160 p.

7. Handbook on Rainwater Harvesting and Storage Options

8. Manual for Rooftop Rainwater Harvesting Systems in the Republic of Yemen

9. From Brad Lancaster's Rainwater Harvesting for Drylands and Beyond book series:www.HarvestingRainwater.com

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11. Itabari, J.K., Nguluu, S.N., Gichangi, E.M., Karuku, A.M., Njiru, E.N., Wambua, J.M., Maina, J.N. and Gachimbi, L.N. 2004. Managing land and water resources for sustainable crop production in dry areas: A case study of small-scale farms in semi-arid areas of Eastern, Central and Rift Valley Provinces of Kenya. Pp.31-42. In: Crissman, L. (Ed.). Agricultural Research and Development for Sustainable Resource Management and Food Security in Kenya. Proceedings of End of Program Conference, KARI HQ. 11-12 November 2003

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