Climate Smart Agriculture Technologies, Innovations and Management Practices for Coconut Value Chain

TRAINING OF TRAINERS' MANUAL

Muniu F.K., Menza M.K., Mwashumbe S.K., Ondiko C.N., Danda K.M., Ndubi J.M., Wandera F.M., Mwangi H.W., Wayua F.O., Nasirembe W.W., Mzingirwa A.M., Wambua J.M., Otieno M., Ndambuki J., Pole F.N., Mwangi H.W., Momanyi V., Kamau G.M., Maingi M.N., Kirigua V.O. and Wasilwa L.A.

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P O Box 57811-00200
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Email: directorgeneral@kalro.org **Tel. No(s):** +254-722206986/733333223

Compiled by: Muniu F.K., Menza M.K., Mwashumbe S.K., Ondiko C.N., Danda K.M., Ndubi J.M., Wandera F.M., Mwangi H.W., Wayua F.O., Nasirembe W.W., Mzingirwa A.M., Wambua J.M., Otieno M., Ndambuki J., Pole F.N., Mwangi H.W., Momanyi V., Kamau G.M., Maingi M.N., Kirigua V.O. and Wasilwa L.A.

Editors: Ouda J.O., Mukundi K.T., Nyabundi K.W. Mwirigi M.K., Maina F.W., Maina P. and Muniu F.K.

Editing and Publication coordination: Kirigua V.O. and Guto S.

Design and layout: Nyaola E. and Munene N.

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FOREWORD

The National Agricultural Rural and Inclusive Growth Project (NARIGP) tasked the Kenya Agricultural and Livestock Research Organization (KALRO) to develop and deliver context specific Climate Smart Agriculture (CSA) Technologies, Innovation and Management Practices (TIMPs). The TIMPS have been developed, validated and availed for dissemination and adoption. This Training of Trainers (ToT) Manual is an instructional guide to be used for teaching and learning step-by-step procedures of implementing CSA innovations for the Coconut value chain. The training content is drawn from the inventory of TIMPs that has been documented.

The contents of the training are arranged in progressive modules supported by extensive information from research and background data drawn from the TIMPs. Their relevance is based on the needs determined from the value chain and the project objectives. The training design takes into consideration the delivery system, the partners and their roles, the duration of training and logical flow of the sessions. The training is divided into modules, which have uniform outline that ensures every aspect of the TIMPs is fully covered in a way that the trainees can absorb and relate to. Training topics covering a thematic area are grouped together while the roles of the resource persons are tapped in the planning of the training sessions. Various delivery methods are deployed and where possible demonstrations and practical work are incorporated to enable the trainees experience the actual field situations. Furthermore, to ensure that the training across various groups is standardized, trainers' guidelines, program, training methods and training evaluation have been provided in the Manual. Adhering to the above, therefore, enables replicating the training in several locations while maintaining the quality regardless of whether the trainers are varied.

It is highly advised that the ToT manuals should be used in conjunction with the respective Coconut value chain TIMPs inventory document and facts sheets in order to provide valuable resource for both public and private extension service providers. The use of this Manual is therefore expected to enable achievement of the envisaged increased production, productivity and profitability.

I am greatly indebted to the value chain experts and all those who participated in the preparation of this Manual whose use is expected to epitomize a new way of delivering training content for the desired changes in the agricultural sector.

Eliud K Kireger, PhD, OGW
Director General, KALRO

PREFACE

The National Agricultural and Rural Inclusive Growth Project (NARIGP) is funded by the Government of Kenya and the World Bank. The project runs for five years and is implemented in 21 Counties in the country at an approximate cost of KES 22 billion. The project development objective is *"To increase agricultural productivity and profitability of targeted rural communities in selected Counties, and in the event of an Eligible Crisis or Emergency, to provide immediate and effective response."* To achieve the objective, the project is promoting adoption of climate smart agricultural technologies, innovations and management practices (TIMPs).

The project comprises of four (4) components: Component 1 involves strengthening (i) community-level institutions' ability to identify and implement investments that improve their agricultural productivity, food security and nutritional status and (ii) linkages to selected Value Chains (VCs) and Producer Organizations (POs). Component 2 deals with strengthening POs and VCs development by building capacity to support members of targeted rural communities, which include Common Interest Groups (CIGs) and Vulnerable and Marginalized Groups (VMGs). Component 3 undertakes strengthening the capacity of County governments to support community-led development initiatives identified under Components 1 and 2. Component 4 is on project coordination, management, and monitoring and evaluation.

Kenya Agricultural and 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 of prioritized VCs as an initial step towards promotion of their adoption. Of these, 13 are crop-based. They include roots and tubers (potatoes, sweetpotato); pulses (beans, green gram and cowpeas); vegetables (tomato, indigenous vegetables); cereals (sorghum), nuts (macadamia and coconut) and fruits (banana, mango and avocado). The four (4) animal production-based VCs are apiculture, indigenous chicken (meat and eggs), dairy (cattle) and red meat (sheep and goats). In addition, there are three (3) cross cutting themes on pastures and fodder, natural resource management, and animal health.

The TIMPs were categorized into those ready for up scaling and those requiring validation. In addition, gaps that required further research were identified for subsequent development of TIMPs. This ToT manual focuses on TIMPs that are ready for upscaling Coconut value chain. It should be used in training County extension staff, service providers, community based facilitators and lead farmers. Those trained are expected to cascade the training to beneficiaries in the targeted smallholder farming, agro-pastoral and pastoral communities in the 21 project Counties of Kirinyaga, Kiambu, Murang'a, Nakuru, Bungoma, Trans Nzoia, Nandi, Vihiga, Kisii, Nyamira, Migori, Homa Bay, Makueni, Meru, Kitui, Embu, Kilifi, Kwale, Narok, Samburu and Turkana.

The National Project Coordination Unit is grateful to all who participated in the development and production of this ToT manual for the Coconut value chain. It is my

hope that Counties and other users will adopt and optimally use the Manual to increase productivity and profitability, which in the overall will improve the livelihood of the targeted farming communities.

John Kimani
National Project Coordinator
National Agricultural Rural and Inclusive Growth Project

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LIST OF ABBREVIATIONS

AESA	Agro-ecosystems Analysis
AEZ	Agro-ecological zone
AFA	Agricultural Food Authority
AIP	Agricultural Innovation Platform
APVC	Agriculture Product Value Chain
ASALs	Arid and Semi-Arid Lands
B	Boron
CA	Conservation Agriculture
CBFs	Community based facilitator
CCP	Critical Control Point
CIG	Common Interest Group
CL	Critical Limit
CSA	Climate Smart Agriculture
CTT	Core Team of Trainers
ESMF	Environmental and Social Management Framework
FFBS	Farmer Field and Business Schools
FSMS	Food Safety Management System
GAP	Good Agricultural Practices
ha	Hectare
HACCP	Hazard Analysis Critical Control Points
IDM	Integrated Disease Management
INRM	Integrated Natural Resource Management
IPM	Integrated Pest Management
IPPM	Integrated production and Pest management
ISFM	Integrated Soil Fertility Management
IWM	Integrated Weed Management
K	Potassium
KALRO	Kenya Agricultural and Livestock Research Organization
kg	Kilogram
LF	Lead Farmer
Mo	Molybdenum
N	Nitrogen
NARIGP	National Agricultural and Rural Inclusive Growth
P	Phosphorus
PTD	Participatory Technology Development
S	Sulphur
SPs	Service providers
SSA	Sub - Saharan Africa
TIMPs	Technologies, Innovations and Management Practices
ToT	Training of Trainers
VMG	Vulnerable and Marginalized Group
Zn	Zinc

INTRODUCTION

About this manual

This training of trainers' manual consists of two parts. Part I comprises notes for the facilitators while part II is made up of training module in the value chain.

PART I

This part consists of four sections including the Background of the Coconut value chain, Content of the Training, Training Design and Facilitators Guidelines.

SECTION 1: BACKGROUND

1.1 The Role of Coconut in the Kenyan Economy

The coconut palm (Cocos nucifera) is one of the most important industrial crops in Kenya and produces nuts throughout the year, when climatic conditions are favorable. The palm is also regarded as the tree of life owing to its wide range of over 120 products for domestic and international markets. It was introduced to Kenya in the 16th Century by the Portuguese. Its cultivation spread rapidly and it became an industrial crop of considerable economic importance during the 20th Century. Its production and marketing were handled by the Arab traders and white settlers on big plantations until the 19th century when small-scale farmers started growing it.

Today the coconut palm is mainly cultivated by small-scale farmers, with over 80% of coastal farm households deriving their livelihood either directly or indirectly from the crop. In Kenya, majority of the coconut trees are found in the Coastal Counties of Kwale, Mombasa, Kilifi, Tana River and Lamu. Taita Taveta, a Coastal highland County also has a small population of coconut trees; with the area under production continually increasing on yearly basis. Other areas with potential for coconut production include Busia and Homa Bay in the Lake Victoria region and Tharaka Nithi in Eastern region. The total area under coconut farming in Kenya is estimated to be 200,000 acres. Many (92%) of the trees are in the ages of 20-60 years. The rest (8%) of the coconut tree population is beyond the economic age limit of 60 years, and are either low nut producers or non-productive at all.

The coconut palm is a multipurpose tree with most parts of the tree having important economic uses. The leaves are used in making baskets and roofing, immature fruits are used as juice, ripe coconuts are useful for extraction of virgin coconut oil for cooking and copra oil used industrially for making soap, the husks produce coir fibre for making ropes, door mats and coco peat for agricultural use. Coconut shell is used for making ornamental handicrafts and the trunk is used for building and timber and firewood. Coconut palms are used for landscaping and can also be tapped for wine.

1.2 Role of Coconut as a Food and Nutrition Security

Coconut is a drought tolerant tree. It is widely grown on a small scale, mainly in subsistence farming. It is a great source of digestion-friendly and satiating fiber and is rich in vitamin B6, iron, and minerals like magnesium, zinc, copper, manganese, and selenium. About half of the saturated fat in coconut comes from lauric acid, which can help raise levels of heart-protective HDL (“good”) cholesterol. Coconut water offers a good source of potassium, a mineral that helps balance sodium levels in the body and regulates blood pressure. Coconut flour, which is dried ground coconut meat, has 5 g of fiber in just 2 tbsp, making it an impressive replacement for the traditional white flour, especially for those following a gluten-free diet.

1.3 Coconut value chain as climate smart innovation

Coconut is an exceptionally suitable crop for upscaling climate smart technologies and building resilience to climate change among the smallholder growers. It is a perennial crop with a long development period of about 18 months. The long maturation period makes it resilient to severe or prolonged weather events, especially dry seasons. Proper fertigation of coconut has the potential to improve its water use efficiency by reducing extra chemical load. Scientists have also found that coconut-based mixed cropping systems can improve microclimatic conditions, influencing air and soil temperature and soil moisture content of plantations. Because of the large size of the endosperm inside the nut, Coconut seedling development does not depend on external environmental conditions and therefore this gives it an ability to tolerate harsh weather conditions at this initiation level where other tree crops may require more moisture.

1.4 Objectives of the Training

The objective of this training is to equip farmer trainers with knowledge and skills necessary to increase productivity through adoption of Good Agricultural Practices (GAP) principles and practices. Specifically, the objectives of this training are to:

1. Provide farmers trainers with relevant attitude, knowledge and skills in Coconut farming as a business and market assessment techniques for market led production
2. Enhance farmer trainers' knowledge and skills in Coconut GAP, including on-farm Coconut variety selection, establishment and management of fields
3. Equip farmers trainers' with knowledge and skills in post-harvest and value addition of Coconut
4. Provide farmer trainers with knowledge and skills in participatory techniques for effective facilitation of adult learning processes through FFBS and developing inclusive stakeholder partnership development for sustainable up scaling of the Coconut value chain

SECTION 2: TRAINING CONTENT

2.1 Orientation of the Module

The training content is organized into 14 modules, which are targeted and orientated to ensure the adoption and up-scaling of the Coconut value chain technology, innovation and management practices (TIMPs), for improved productivity and competitiveness in a market driven production system. The purpose of these modules is to enhance the knowledge and capacities of trainers in understanding and disseminating climate-smart Coconut practices to the intended beneficiaries, who are primarily farmers.

2.2 Module Outline

Each of the 14 modules consisting of 8 parts. These are:

a) **Introduction –** Context and background to training needs, knowledge and skills GAP being addressed

b) **Module learning outcomes –** What trainees are expected to learn

c) **Module target group-**Trainee categories

d) **Module users –** Facilitators

e) **Module duration –** Minimum number of hours the trainee is exposed to training content

f) **Module summary –** Sequence of sessions, training methods, materials and duration

g) **Facilitators guideline –** Detailed sessions, training methods, materials and session guides

h) **Participant's handouts –** Detailed notes and reference materials for trainees

The outline of the **14** modules is presented in **Table 1**.

Table 1: Summary of 14 module outlines for the Coconut value chain

No.	Module Name	Need Addressed	Expected Training Outcomes	Duration
1	Climate change and climate smart agriculture	• The impact of climate crisis to Coconut production • Adoption of climate smart technologies innovations and management practices (TIMPs) for Coconut value chain to mitigate climate change	• Potential impact of climate change on Coconut production explained • Climate smart techniques for Coconut outlined	3 hours
2	Farmer Field and Business School (FFBS) approach	• Develop skills for exploratory learning to enhance adoption and uptake of TIMPs	• Improved technologies/ innovations and agronomic practices for Coconut availed	5 hours 30 minutes
3	Good Agricultural Practices (GAP) and Food Safety Management System (FSMS) - Hazard Analysis Critical Control Points (HACCP) Plan	• Enhance food safety through lowering presence of hazardous solids, organisms and pollutants pathogens	• Food safety through prudent lowering of presence of hazardous solids/ organisms/ and pollutants pathogens enhanced	6 hours
4	Coconut production niche and climatic requirements	• Identify areas which are suitable for Coconut production	• Coconut production niches based on their suitability identified	4 hours
5	Coconut variety selection	• Awareness on improved Coconut varieties	• Knowledge on new improved varieties enhanced	3 hours 30 minutes
6	Coconut seed systems	• Formal and informal seed systems operations	• The formal and informal seed supply systems analyzed.	2 hours 30 minutes

7	Coconut climate smart agronomic practices	• Options for innovative climate smart agronomics practices for increased Coconut production	• Water and input manipulations analyzed	3 hours 30 minutes
8	Integrated soil and water management practices for Coconut production	• Soil, water and fertility enhancing techniques availed	• All techniques for integrated soil and water management practices analyzed for possible benefits	5 hours
9	Coconut crop health	• Major pests, diseases and weeds control mechanisms availed to the Master Trainers.	• Yield loss of Coconut by the major pests, diseases, and weeds identified	6 hours
10	Coconut harvesting and post- harvest management	• Proper maturity determination and storage technologies to reduce losses in quantity and quality	• Knowledge on proper harvesting techniques and storage facilities, hygiene and monitoring enhanced	3 hours
11	Coconut value addition	• Various Coconut products	• Value addition and Coconut products identified for the farming communities and business entities • Opportunities Identified and Prioritized	6 hours 30 minutes

12	Mechanization of Coconut production activities	• Adaptation of mechanized operations of Coconut from crop establishment, through management to post-harvest handling	• Options of reducing drudgery through mechanization and increased productivity availed to farmer groups.	4 hours
13	Coconut business and marketing	• Review available business options in Coconut value chain	• Type of aggregations by farmers availed for considerations	3 hours 20 minutes
14	Coconut cross cutting issues i) Innovation Platforms ii) Gender mainstreaming and social inclusion iii) Policy	• Articulate how voluntary marketing Groups can draw benefits from Coconut value chain • Options of employment opportunities in Coconut production • Sites for information profiled at the county levels	• Access to information on Coconut production enhanced • Opportunities for marginalized groups identified and gains made • Policy options for enhanced Coconut production identified	9 hours 40 minutes
	Total Duration			67 hours 30 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) A Core Team of Trainers (CTT) to trains farmer trainers (service providers) as facilitators of a ToT course will be established. This is done using this manual and modules contained therein.

b) Each of the Mater trainers will facilitate trainers of farmers and other stakeholders to acquire knowledge and skills in facilitating Farmer-led Field and Business Schools through practical demonstrations.

2. **Upscaling –**This will be done by selecting CBFs to be trained in facilitation skills.

3.2 Partners and their Roles

The partners envisioned in this training plan are:

a) Core Team of Trainers – Master trainers drawn from KALRO, Universities, and Tertiary Institutions offering agricultural sciences and State Department of Crop Development and Agricultural Research to facilitate initial training of trainers (ToTs) and other stakeholders. They will also provide backstopping services.

b) County Government- The County Government through NARIGP Coordinating Unit will select a team to be trained as TOTs. This will include County technical staff, service providers (SPs), CBFs and other experts who will further cascade the training to CIGs and VMGs. The CPCU will be expected to make follow up and backstop the TIMPs training.

c) Community Based Facilitators-The CBFs will facilitate the CIGs and VMGs. They will be expected to follow up to ensure appropriate adoption at farmers' level. The CBFs will also plan and organize exchange visits to learn best practices.

d) Lead Farmers-These are early adopters or role models at the community level. They are supposed to mentor the CIG and VMG members and to allow their farms to be used as learning sites

3.3 Training Duration

The proposed TOT course for Master Trainers consists of 14 modules, which shall take a total of 67 hours 30 minutes. This does not include break hours of mid-morning, afternoon and lunch breaks

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: (i) Introduce the module; (ii) Draw out the participant's expectations; (iii) Relate participants' expectations with module objectives or learning outcomes; (iv) Explore the concept and content, switching to different methods of delivery of the content(group exercise, brainstorming, excursions, plenary discussions, role plays) as the session progresses; (v) Review the module at the end using participatory approaches like one participant reads one summary message and its application; and, (vi) Distribute the participants' handouts.

SECTION 4: FACILITATOR GUIDELINES

4.1 Preparation of Training Materials

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

1. The facilitators should familiarize themselves and internalize the guidelines provided by this manual prior to the training.
2. 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.
3. Flip charts and good quality felt pens could be used interchangeably with projections. Each participant will require one felt pen while the trainers will require two sets of felt pens.
4. Visual aids like field equipment and tools should also be arranged in time before the sessions start.
5. There should be adequate copies of participants' handouts (one per participant) to be distributed at the end of each session or as may be suitable.
6. Copies of the modules are distributed at the end of each module.

4.2 Preparation of Training Venue and Sites

The training venue will include the training room, field demonstration sites and market areas.

a) Training Room – Should have adequate space for 25 participants 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, their training materials and projector, a flip charts holder and white wall to act as a projector screen.

b) Demonstration Site – Should be within a walking distance with at least five distinct plots for demonstrations.

c) Market Sites – these include retail outlets (kiosks, stalls, shops 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 10 minutes' drive.

4.3 The Trainees

The trainees who will participate are extension officers, lead farmers, educators, service providers and researchers with elaborate training back ground 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 facilitator 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. As a golden rule, do not lecture them but facilitate and listen and let them 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 and the corresponding days and time allocation **(Annex 1).**

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 participants. The choice of the methods has been informed by the competency issues being addressed, time available and experiences of the author 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 30 minutes continuously; but should be separated by the other participatory training methods. Table 2 presents a list of available training methods.

Table 2: Description of Training methods

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, buzz groups, visits and brainstorming sessions	To be considered where skills are an issue requiring sharing and trying
Role plays and problem-solving exercises	Plenary discussions have been considered as training methods where attitude is an issue
On-farm practical demonstration and exchange visits	To be considered where hands-on practical skills are acquired through sharing and demonstration

4.6 Planning Schedule and Guideline for ToT Preparation

The CTT leader should ensure the following before the training:

1. **Six weeks** – Recruit Master Trainers, compose CTT and have demonstration plots planted with Coconut

2. **Four weeks** – Send out invitation letters to participants and special guests detailing purpose, venue and program. Follow up on demonstration sites. Brief CTT members

3. **Two weeks** – Confirm names of participants; 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

4. **Four days** – Confirm training sites preparedness, prepare sitting arrangements, and brief assistants

5. **One day** - Arrange the training room furniture, place materials, equipment and stationery on the tables. Arrange for reception of trainees at residence proposed

6. **On 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
    - Welcoming to venue by host
    - Elaborate introduction of CTT and participants
    - Introduction to the project and training course
    - Ground rules
    - Groups formation

4.7 Evaluation of the Training

Half day has been allocated for planning for way forward and evaluation of the TOT on the last day of the training. This is as presented in the program just presented in section 4.4. The evaluation strategy should take two directions the first being the individual trainees evaluate through evaluation forms without conferring or refereeing to each other. The evaluation forms are then collected and analyzed by the CTT members.

Table 3: Sample Evaluation Form

Aspect / Module	Rating		
	Very Useful (3 marks)	Useful (2 marks)	Of Limited Use (1 marks)
1. Climate change and Climate smart Agriculture			
2. Farmer Field and Business School Approach in Coconut Production			
3. Good Agricultural Practices (GAP) and Food Safety Management Systems (FSMS)			
4. Coconut production Niches and Climatic Requirements			
5. Coconut variety selection and access to quality seeds.			
6. Coconut Seed Systems			
7. Climate Smart Agronomic Practices			
8. Integrated Soil and Water Management Practices for Coconut			
9. Coconut Crop Health			
10. Coconut Harvesting and Post-harvest Management			
11. Coconut Value Addition			
12. Mechanization of Coconut production Activities			
13. Coconut Business and Marketing			
14. Cross-Cutting Issues (Agricultural Innovation Platforms, Policy, Gender Mainstreaming and Social Inclusion)			

The second direction for evaluation is trainee's group evaluation. They retreat to one room and elect a chair and a secretary. Ask them 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 Key references

Two key references should be provided for each module plus a list of other relevant publications for reference.

Coconut reference material will consist of the following:

a) Coconut production manuals/ guides

b) Pamphlets/brochures

c) Factsheets on specific TIMPs

d) Journal Articles

4.8.1 Guide on the use of the information

The trainers will be advised to issue farmers with at most two publications for each of the training sessions. This is because if they go away with 10 publications in one visit, they may be overwhelmed with the material load and thus limit knowledge uptake. Also, some will just take away as many as they can if allowed. 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 stick, CD or portable hard drive to enable farmers easily access and if necessary, print any of them out at a local internet café.

Trainers will be advised to issue one general Coconut farming manual to be accompanied by two other publications e.g. information sheets, brochures, factsheets and poster. With subsequent training modules, they can develop their collection of publications

PART II: TRAINING MODULES

This part presents the content of 14 modules of training namely: Climate change and climate smart agriculture, Farmer Field and Business School (FFBS) approach, Coconut production niche and climate requirements, Good Agricultural Practices (GAP) and Food Safety Management System (FSMS), Coconut variety selection, Coconut seed systems,Coconut climate smart agronomics practices, Integrated soil and water management practices for Coconut, Coconut Crop Health, Coconut harvesting and Post-harvest management, Coconut value addition, Mechanization of Coconut production activities, Coconut business and Marketing, and Coconut Cross cutting issues (Innovation Platforms, Policy, gender mainstreaming and social inclusion).

All the modules will be divided into the following:

1. Introduction
2. Module learning outcomes
3. Module target group
4. Module users
5. Module duration
6. Module summary
7. Facilitator's guidelines
8. Participants' handouts

MODULE 1: CLIMATE CHANGE AND CLIMATE SMART AGRICULTURE

1.1 Introduction

The impacts of climate change and variability in agriculture, food systems and food security is a serious concern. Kenya's agricultural production systems are highly impacted upon, due to the low adaptive capacity and the high exposure to climate related risks. The major agricultural activities are prone to risks and uncertainties of nature, which is affected by climate change, either in intensity, scope or frequency. Climate change is expected to modify risks, vulnerabilities and the conditions that shape the resilience of agriculture systems as well as introducing new uncertainties.

Adoption of climate smart agriculture (CSA) through application of tools and technologies and effective communications of weather information reduces the negative impacts of climate change and enhances access to food security in a changing environment. Thus, there is need to mainstream suitable climate resilient technologies, innovations and management practices (TIMPs) to increase productivity, resilience to climatic shocks and mitigate the causes of climate change.

1.2. Module Learning Outcomes

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

1. Concept of the climatic change and variability discussed and explained.
2. Impacts of the climate change and variability on agricultural and food security shared.
3. Concept of climate smart agriculture (CSA) shared and explained.
4. Future climate scenarios and how to manage projected and appreciated.

1.3 Module Target Group

This module targets public and private agricultural extension agents, service providers and Community Based Facilitators (CBFs) based at sub-county and ward level.

1.4 Module Users

This module is intended for use by Master Trainers who are members of the core team of trainers (CTT) and the trained trainers. The trainers using this module should thoroughly familiarize themselves with the participants' handouts.

1.5 Module Duration

The module is estimated to take 3 hours

1.6. Module Summary

Module 1: Climate Change and Climate Smart Agriculture in Coconut Value Chain			
Sessions	**Training Methods**	**Training Materials**	**Duration**
1.6.1 Introduction and levelling expectations	• Personal Introduction • Plenary Presentation • Plenary discussion	• Projector • Laptop • Flip charts • Felt pens	30 minutes
1.6.2 Introduction to climate change and variability	• Plenary Presentation • Case study videos • Plenary discussion	• Projector • Laptop • Videos • Flip charts • Felt pens • Participants' handouts	50minutes
1.6.3. Concept of Climate Smart Agriculture (CSA) in Coconut	• Plenary Presentation • Plenary discussion	• Projector • Laptop • Videos • Flip charts • Felt pens • Participants' handouts	40 minutes
1.6.4 Projected future climate scenarios affecting Coconut and how to manage	• Plenary Presentation • Case study videos • Plenary discussion	• Projector • Laptop • Flip charts • Felt pens • Participants' handouts	40 minutes
1.6.5.Module review	• Participants' questions and comments • Facilitator' summary	• Module review • Flip charts • Felt pens	20 minutes
TOTAL			3 hours

1.7 Facilitator's Guidelines

1.7.1. Introduction and Levelling Expectations (30 minutes)	**Session Guide**
(The trainer introduces the trainees to this module on climate change and climate smart agriculture). **Trainees' expectation (20 minutes)** *The facilitator organizes the trainees into groups to state and list their expectations.*	• PowerPoint presentation • Distribute Participants' handouts

Module objectives (10 minutes) *(The trainer presents module objectives)* By the end of the module training, the trainee should be able to: • Explain climate change and adaptations. • Describe Climate Smart Agriculture (CSA). • Describe and explain available climate smart crop management practices in Coconut production. • Explain the benefits of selected climate smart crop management practices in Coconut production.	
1.7.2 Introduction to climate change and climate variability (50 minutes)	**Session guide**
(The trainer proceeds to introduce the module basics). **Plenary presentation (35 minutes)** • Basic terminologies used in the module (weather, climate, variability, adaptation, coping). • Explain climate change and climate variability. • The causes of climate change. • Climate risks impacting agriculture. • Proposed adaptation and mitigation measures **Case study videos and discussion (15 minutes)** The impact of climate change	• PowerPoint presentation • Plenary discussion • Video presentation
1.7.3 Concept of Climate Smart Agriculture (CSA) (40minutes)	**Session Guide**
(The trainer presents the principles underpinning CSA and the link to deliverable of project objectives). **Plenary Presentation (30 minutes)** • Definition of the CSA approach and their characteristics • The three pillars of CSA (productivity, Adaptation and Mitigation • Why CSA is needed **Plenary discussion (10 minutes)** Discussions on the CSA concept	

1.7.4 Projected Future Scenarios that will Impact Productivity (40 minutes)	Session guide
(The trainer presents and discusses the future climatic projections focusing on rainfall and temperature, which directly impacts on crop yields) **Plenary presentation (20 minutes)** • Projected impacts on food production and needed adaptation measures especially for Coconut. **Video presentation and discussion (20 minutes)** • Short video on showing projections of rainfall and temperature.	• PowerPoint presentation • Video presentation • Plenary discussion
1.7.5 Module Review (20 minutes)	**Session Guide**
(The trainer leads the trainees in summarizing the key points discussed in the module)	• Plenary discussion

1.8 Reference materials

1.8.1. Participants' handouts

- Climate Change and CSA factsheets
- Climate Change and CSA brochures and Leaflets

1.8.2. Further reading

1. Esilaba, A.O. et al. (2021). 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 COCONUT PRODUCTION

2.1. Introduction

Training of trainers is a cost-effective way of introducing new approaches that require new skills to trainers, facilitators and institutions that leads to a common vision and common methodology, for moving into new areas of extension and education. The vision inherent in Farmer Field and Business Schools (FFBS) is that trainers work alongside farmers as advisors and facilitators, encouraging independence, analysis and organization. The FFBS methods promote exploration, discovery and adaptation under local conditions. The "right way" means not only building on suitable science and technological methods, but also fitting into local ecological, social, economic and historical contexts. Finding the "right way" means that, all stakeholders need to participate and gain ownership of the process.

This module is designed for training on FFBS approach and concepts, which is a methodology for transfer of Technologies, Innovations and Management Practices (TIMPs) and enhancing communication and agri-business skills to farmers.

2.2. Module Learning Outcomes

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

1. Concept of Farmer Field and Business School approach, teaching and facilitating described and explained.
2. Approaches to effective facilitation and participatory learning for FFBS demonstrated and explained.
3. Knowledge and analytical skills to design simple experiments for testing options identified and demonstrated.
4. Shift from the traditional focus to improving productivity to farming business proposition explained and facilitated.
5. Development of a clear road map for dissemination of TIMPs in Coconut value chain through an action plan that is Specific, Measurable, Achievable, Realistic and Time bound (SMART) identified and explained.

2.3. Module Target Group

This module targets Public and private agricultural extension agents, service providers and Community Based Facilitators (CBFs) based at sub-county and ward level

2.4. Module Users

This module is intended for use by Master Trainers who are members of the core team of trainers (CTT) and trained trainers. The trainers using this module should thoroughly familiarize themselves with the participants' handouts.

2.5. Module Duration

The Module is estimated to take 5 hours 30 minutes.

2.6 Module Summary

Module 2: Farmer Field and Business School approach			
Sessions	**Training methods**	**Training materials**	**Time**
2.6.1 Introduction, climate setting, leveling of expectations and objectives.	• Setting norms and group discussion on expectations • Plenary presentation	• Laptop • Projector • Flip charts • Mark pens	30 minutes
2.6.2 Overview of FFBS key activities	• Plenary presentation • Plenary discussion	• Pictorials • Laptop • Projector	30minutes
2.6.3 Introduction to communication and communication skills	• Plenary presentation • Group exercise	• Projector • Laptop • Flip charts • Felt pens	30 minutes
2.6.4 Facilitation and leadership skills	• Plenary presentation • Plenary discussion	• Projector • Laptop	30 minutes
2.6.5 Organization and management in FFBS	• Plenary presentation • Plenary discussion	• Projector • Laptop	1 hour
2.6.6 Developing FFBS curriculum for the Coconut value chain	• Plenary presentation • Group Exercise	• Projector • Laptop • Flip charts • Felt pens	1 hour
2.6.7 SMART County action plan development of Coconut value chain on the transfer of TIMPs	• Plenary presentation • Group discussion	• Projector • Laptop • Flip charts • Felt pens	1 hour
2.6.7 Module review	• Plenary presentation • Plenary discussion	• Projector • Laptop • Flip charts • Felt pens	30 minutes
Total			**5 hours 30 minutes**

2.7 Facilitator's guidelines

2.7.1 Introduction, climate setting leveling of expectations and objectives (30 minutes)	Session guide
(The trainer welcomes trainees and thereafter invites them to state their expectations). **Trainee introduction and climate setting (20 minutes)** • Introduction of participants, setting training norms, formation of FFBS sub groups (working groups) and trainees to share their expectations **Module objectives (10 minutes)** *The facilitator presents modules objectives* By the end of the module, the trainee should be able to: • Describe and explain concept of Farmer Field and Business School approach, teaching and facilitation. • Demonstrate and explain approaches to effective facilitation and participatory learning for FFBS. • Identify and demonstrate knowledge and analytical skills to design simple experiments for testing options. • Explain and facilitate shift from the traditional focus to improving productivity to farming business proposition. • Identify and explain the development of a clear road map for dissemination of TIMPs in Coconut value chain through an action plan that is Specific, Measurable, Achievable, Realistic and Time bound (SMART)	• Provide a checklist to help trainees build confidence in participation • Summarize and display trainees' expectations • Assign roles to the sub groups • Set norms and nominate leaders • PowerPoint presentation
2.7.2 Overview of FFBS key activities (30 minutes)	**Session guide**
Plenary presentation (15 minutes) The facilitator takes the trainees through the main concepts and pillars of FFBS. • The definition of FFBS • Participatory Technology Development (PTD) for the Coconut value chain TIMPs • Agro ecosystems Analysis (AESA) of the Coconut value chain TIMPs • Concept of what is this, what is that	• PowerPoint presentation • Plenary discussion

• FFBS principle of Integrated Production and Pest Management (IPPM) • FFBS Business concept and opportunities in the Coconut value chain stages **Plenary discussion (15 minutes)** • Pillars of FFBS	
2.7.3 Introduction to communication and communication skills (30 minutes)	**Session guide**
Group exercise to gauge the understanding of trainees **(15minutes)** • What is communication? • Communication channels • Barriers to effective communication and • How to effectively communicate **Plenary Presentation (15 minutes)** • Communication and communication skills	• Group exercise • PowerPoint presentation • Participants' handouts
2.7.4 Facilitation and leadership skills (30 minutes)	**Session guide**
Plenary presentation (20 minutes) • Definition of facilitation, facilitator and effective facilitation. • Qualities of a good facilitator. • Golden rules of facilitation. • Roles and responsibilities of FFBS Facilitators. • Difference between facilitation and teaching • Definition of leadership • Elements of leadership • Types of leadership • Characteristics of a good leader **Plenary discussion (10 minutes)** • Discussion on facilitation	• PowerPoint presentation • Participants' handouts • Plenary discussion

2.7.5 Organization and management in FFBS (30 minutes)	Session guide
Plenary presentation (20 minutes) Steps of FFBS implementation framework: • Ground working. • Training of Facilitators. • Establishing PTDs at the FFBS. • Season long FFBS sessions. • Evaluation of PTDs. • Field days. • Graduation. • Establishment of Lead FFBS. • Follow ups. **Plenary discussion (10 minutes)** • FFBS implementation Framework	• PowerPoint presentation • Participants' handouts • Plenary discussion
2.7.6 Developing FFBS curriculum for the Coconut value chain (1 hour)	**Session guide**
Plenary presentation (30 minutes) Steps of Participatory Technology Development on the Coconut value chain production • Identify the major constraints to increased yields of Coconut value chain production • Ranking of constraints in order from highest. • Identify list of TIMPs to address the constraints • Rank the TIMPs in order from the most preferred • Develop PTD on the most preferred TIMP objective • Decide on the parameters for AESA • Develop FFBS curriculum using crop growth stage calendar for the Coconut value chain **Group exercises (30 minutes)** • Constraint identification and ranking • TIMPs options identification and ranking • Identification of the growth stages of the value chain • crop and development of FFBS training curriculum	• Group exercises • Presentations group exercises on flip chart • PowerPoint presentations on PTD and curriculum development

2.7.7 SMART County action plan development on Coconut value chain of transfer of TIMPs (1 hour)	Session guide
Plenary presentation Presentation of the action plan of Coconut county value chain that has; • Activities to be undertaken in the regular FFBS meetings • Time frame of the activities • Who is responsible for each of the activities • Required resources for the specific activity • Means of verification for the activity **Group exercise** The trainees do a group exercise of the action plan based on Sub counties and wards represented	• PowerPoint presentation • Group Exercise
2.7.8 Module review (30 minutes)	**Session guide**
• Participants questions and answers • Facilitators Summary • Guideline on FFBS Coconut plans	• PowerPoint presentation • Plenary discussion • Module summary

2.8 Reference materials

2.8.1. Participants' handouts

- FFBS Factsheets
- FFBS Guides

2.8.2. Further reading

1. FAO (2010) Food safety manual for Farmer field Schools: A training reference guide for food safety in global FFS programme
2. Sustainet East Africa (2010) Farmer Field School: A Technical Manual
3. FAO (2006) Farmer Field School FFS Manual
4. Khisa G. (2004). Farmer Field School Methodology: Training of Trainers Manual.

MODULE 3: GOOD AGRICULTURAL PRACTICES (GAP) AND FOOD SAFETY MANAGEMENT SYSTEMS (FSMS)

3.1. Introduction

Declining food safety, reduced food quality, unsustainable farming practices and negative environmental impact from agricultural activities plague the food sector and pose risk to the agricultural sector. These can be mitigated by adoption of Good Agricultural Practices (GAP). The GAP mitigate risks through risk prevention, risk analysis and promotion of sustainable agriculture by means of Integrated Pest and Disease Management (IPDM) and Integrated Crop Management (ICM). On the other hand, worker safety and health along with traceability requirements are a major concern to modern consumers. The GAP are vital in protecting consumer health by ensuring safety within the food chain. It is imperative to operate from the table upstream to include suppliers of agricultural inputs and providers of logistics and farm equipment. Therefore, GAP constitute a certification system for agriculture, specifying procedures that must be implemented to produce and supply food that is safe for consumers and wholesome use of sustainable methods.

Food safety assures food quality based on the absence or occurrence of hazards that are risky to human and animal health. Hazards are common along food value chains that lack effective control measures and may be due to 'bad' agronomic practices or are introduced along the supply chain from the farm to fork continuum. Currently, there is an increasing public concern on the negative environmental and health impacts of agro-chemicals as well as microbial pathogens and their toxins. Control of the hazards occurrence is done by implementation of an effective Food Safety Management Systems (FSMS) through Hazard Analysis Critical Control Points (HACCP) protocols. It involves a seven step management system that provides the framework for monitoring the entire food chain. This makes it more of a preventive, rather than a reactive tool designed to identify and control potential problems before they occur.

This module is designed for training and exposing trainees to good agricultural practices and food safety management system along the Coconut value chain.

3.2. Module Learning Outcomes

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

1. GAP on food safety and enhanced quality along the Coconut value chains discussed and appreciated.
2. Knowledge on optimization and utilization of resources (water, soil, manure, fertilizers and other inputs), environmental protection and conservation acquired and described.
3. Worker safety and health within the Coconut production system explained

4. Traceability in food safety and quality along the Coconut value chain mapped and implemented.

3.3. Module Target Group

This module targets Public and private agricultural extension agents, service providers and Community Based Facilitators (CBFs) based at the sub-county and ward levels

3.4. Module Users

This module is intended for use by Master Trainers who are members of the core team of trainers (CTT) and trained trainers. The trainers using this module should thoroughly familiarize themselves with the participants' handouts.

3.5. Module Duration

The Module is estimated to take 5 hours 30 minutes

3.6 Module Summary

Module 3. Good Agricultural Practices (GAP) and Food Safety Management Systems (FSMS)			
Sessions	**Training methods**	**Training materials**	**Time**
3.6.1 Introduction, objectives and levelling of expectations	• Groups to bring out expectations • Plenary presentation	• Marker pens • Flip charts • Projector • Laptop	30 minutes
3.6.2 Understanding what is GAP and its application in the Coconut value chain	• Plenary presentation • Plenary discussion	• Flip charts • Marker pens • Projector • Laptop • Pictorials/video clips	30 minutes
3.6.3 Discussion of what factors to consider when selecting a site for agricultural activities through Risk Assessment	• Plenary presentation • Plenary discussion	• Flip charts • Marker pens • Projector • Laptop • Pictorials/video clips • Data sheets	20 minutes

3.6.4 Review of GAP requirements for audit and types of protocols possible	• Plenary presentation • Plenary discussion	• Data forms • Flip charts • Marker pens • Projector • Laptop • Pictorials/video clips • Data sheets	30 minutes
3.6.5 Introduction to site selection	• Plenary presentation • Plenary discussion	• Projector • Laptop	20 minutes
3.6.6 GAP checklists and audit	• Plenary Presentation • Group exercise	• Flip charts • Marker pens • Projector • Laptop	30 minutes
3.6.7 Safe use of pesticides and calibration of sprayers and nozzles	• Group work on nozzles • Rate of discharge • Safety guidelines	• Pictorials/video clips • Knapsacks • Measuring cylinders • Tape measure • Nozzles • Empty clean pesticide containers	30 minutes
3.6.8 Understanding of food safety management system in crop value chains	• Plenary presentation • Plenary discussion	• Flip charts • Marker pens • Projector • Laptop, • Pictorials/video clips	30 minutes
3.6.9 Determination of food safety risk/ hazards in crop value chains (hazard analysis)	• Plenary presentation • Group exercise	• Projector • Laptop • Flip charts • Marker pens • Participants' hand outs	30 minutes
3.6.10 Determination of Critical Control Points (CCPs) and Critical limits (CLs) in Coconut value chain	• Plenary Presentation • Group exercise	• Projector • Laptop • Flip charts • Marker pens	30 minutes
3.6.11 Prevention and corrective measures for CCPs in Coconut value chain	• Plenary Presentation • Group exercise	• Flip charts • Marker pens • Powerpoint projector • Laptop • Pictorials/video clips	30 minutes

3.6.12 Module review	• Participants' questions and comments • Facilitator's summary	• Participants' hand outs • Module review	20 minutes
Total			**6 hours**

3.7 Facilitator's Guidelines

3.7.1 Introduction and levelling of expectations (30 minutes)	**Session guide**
The facilitator welcomes trainees to the module **Trainees' introductions and expectations (20 minutes)** The facilitator invites the trainees to state their expectations after brain storming in their respective county groups **Module objectives (10 minutes)** *The facilitator presents module's objectives.* By the end of the module, the trainee should be able to: • Appreciate GAP's on matters of food safety and quality along the crop value chain. • Describe optimization and utilization of resources (water, soil, manure, fertilizers, and other inputs), environmental protection and conservation. • Explain worker safety and health within the crop production system. • Map and implement traceability in food safety and quality along the crop value chain	• Summarize trainees' Expectations on a flipchart • PowerPoint presentation
3.7.2 Understanding what is GAP and its application in the Coconut value chain (30 minutes)	**Session guide**
Facilitator leads discussions on understanding of GAP and its relevance to actors in the Coconut value chain **Plenary presentation (20 minutes)** • Understanding GAP in the context of crop production • Explain the role of GAP in safe and sustainable food production system for growers and consumers.	• Powerpoint presentation • Participants' handouts • Plenary discussion

• Understanding GAP as the key to high commodity market destinations **Plenary discussion (10 minutes)** GAP application in the Coconut value chain	
3.7.3 Discussion of what factors to consider when selecting a site for agricultural activities through risk assessment (20 minutes)	**Session guide**
Facilitator guides discussions on the key determinants of site suitability for agricultural activities. **Plenary presentation and discussion (20 minutes)** • Factors to be considered in an agricultural site selection (Site history, slope of land, type of soil versus crop, water sources and physical quality, soil and water analysis) • The need for documentation in a farm assurance system • Types of mandatory farm records • General guidelines to conservation agriculture (CA)	• Powerpoint presentation • Participants' handouts • Plenary discussion
3.7.4 Review of GAP requirements for audit and types of protocols possible (30 minutes)	**Session guide**
(The facilitator leads the trainees in summarizing the key points discussed in the module) **Plenary presentation and discussion (30 minutes)** • Methods and procedures required at on-farm level to obtain GAP certification in crops production. • Good soil management practices (appropriate crop rotations, manure application) • Careful management of water resources and efficient use of water for rain-fed crop production via irrigation. • Selection of crop types and varieties to meet local consumer needs. • Adoption of IPM practices to minimize the potential impact of pest control actions on workers, food, and environmental and health safety. • Minimizing contamination at harvest, on-farm processing and storage.	• Powerpoint presentation • Participants' handouts • Plenary session

3.7.5 Introduction to site selection (20 minutes)	Session guide
The facilitator introduces the various factors involved in site selection through Pictorials/video clips PPT's and farm walk **Plenary presentation and discussions (20 minutes)** • Factors to be considered in an agricultural site selection (Site history, slope of land, type of soil versus crop, water sources and physical quality, soil and water analysis) • The need for documentation in a farm assurance system • Types of mandatory farm records • General guidelines to conservation agriculture (CA)	• Powerpoint presentation • Participants' handouts
3.7.6 GAP checklists and audit (30 minutes)	**Session guide**
Facilitator guides the trainees on self-assessment (Internal audit and corrective measures for non-compliance) **Plenary presentation (15 minutes)** • Need for mandatory records in GAP • Internal Audit procedures • Practical on mock audits • Interpretation of audit reports • Compliance and corrective actions **Group exercise (15 minutes)** • Groups audit a farm or a process within the training site • Present audit results and verdict and corrective actions	• Powerpoint presentation • Global GAP checklists • Participants' handouts • Group exercise
3.7.7 Safe use of pesticides and calibration of sprayers and nozzles(1 hour)	**Session guide**
The facilitator organizes the groups to identify the level of knowledge on pesticide use and safety; Determination of less hazardous pesticides, fungicides and herbicides, quantities to apply and respective PHIs	• Powerpoint presentation • Pesticide containers • Knapsack sprayers • Nozzles

Group exercise (30 minutes) Practical session on how to handle different types of pesticides, fungicides and herbicides together with their calibrations **Plenary presentation (30 minutes)** • Guided knapsack calibration • Different types of nozzles and their uses • Pesticide safety	• Participants hand outs • Group exercise
3.7.8 Understanding food safety (30 minutes)	**Session guide**
The facilitator introduces the food safety system by defining it and sharing its benefits with the trainees). **Plenary presentation and discussion** • Overview of Food Safety Management Systems (FSMS). • Why food safety is important in crops production systems. • Risks to human/animal health due to chemical, biological and physical hazards exposure. • Legal and market requirements for food safety practice. • Food safety practices that reduce risks/hazards. • Use of HACCP tool/system for monitoring crop production	• Powerpoint presentation • Participants' handouts • Plenary discussion
3.7.9 Determination of food safety risks/hazards (30 minutes)	**Session guide**
Facilitator should guide discussions on the steps of identification of food safety hazards FSMS **Plenary Presentation (15 minutes)** • Explain the concept of risk identification (Hazard analysis) in crop production chain. • Listing the types of hazards that cause illness or death. • Determine and identify factors influencing likely occurrence/severity of hazards. • List hazards alongside the possible control measures	• Powerpoint presentation • Participants' hand outs • Group exercise

• Explain the concept in a flow diagram **Group Exercise (15 minutes)** • Groups to identify major risk/hazards at points of crop production • Produce flow diagrams for the crop	
3.7.10 Determination of Critical Control Points (CCP) in crop value chains (30 minutes)	**Session guide**
The facilitator introduces the topic on determination of critical control points (CCP) **Plenary presentation (15 minutes)** • Why is important to determine CCP in production chain (preventing, eliminating or reducing risks). • How to monitor and measure the CCP (point, step or procedure). • How to document the CCP. • How to establish critical limits (from standards or guidelines) for each CCP. **Group Exercise (15 minutes)** • Groups to identify and establish critical control points and critical limits.	• Powerpoint presentation • Participants' handouts • Group exercise
3.7.11 Prevention and corrective measures for CCP in crop value chains (30 minutes)	**Session guide**
The facilitator introduces the topic on prevention and control of possible hazards **Plenary presentation (15 minutes)** • Establishment of corrective actions against CCP • Establish verification procedures for CCP • Establish record-keeping and documentation procedures • How to develop HACCP plan and Food safety tool kit for the crop value chain **Group exercise (15 minutes)** Groups to identify and establish corrective actions and verification procedures for crop value chain.	• Powerpoint presentation • Participants' handouts • Group exercises

3.7.12 Module Review (20 minutes)	Session guide
(The facilitator leads the trainees in summarizing the key points discussed in the module)	• Plenary discussion • Plenary presentation

3.8. Reference materials

3.8.1. Participants' Handouts

- Good Agricultural Practices (GAP) handbook
- HACCP hand book for crop production
- Farm management and production hand book

3.8.2. Further reading

1. GlobalG.A.P. (2019). Global G.A.P. General Requirements. Version 5.2 GlobalG.A.P., Cologne, Germany
2. Hazard Analysis Critical Control Point Principles and Application Guidelines – HACCP (2018). National Advisory Committee on Hazards Criteria for Foods
3. FAO. (2010) Food Safety Manual for Farmer Field Schools: A training reference guide on food safety in global FFS Programmes. Food and Agriculture Organization

MODULE 4: COCONUT PRODUCTION NICHES AND CLIMATIC REQUIREMENTS

4.1 Introduction

Coconut is of tropical origin and well adapts to warm climate thus, grows best during summer. The crop has the ability to grow well in infertile and saline soils, tolerate short inundations of the roots in salt water, and thrive in a pH range of 5.5 to 7. The crop requires a mean annual temperature of between 21 and 30°C. Most of its production is rainfall dependent with an annual rainfall requirement ranging from 1500 to 2500 mm. With the unpredictable rainfall patterns, prolonged droughts and increasing demand for food supply, the need for knowledge on the production niches and climatic conditions for coconut production is crucial for improved productivity and commercialization of the crop.

This module intends to enhance the capacity of farmer trainers towards understanding the different agro-climatic zones which prescribe ideal altitudes, soils, temperature, and rainfall levels among other characteristics for coconut production. While these agro-climatic factors are critical for growth and yield performance of coconut, they also provide favorable conditions for pests, diseases, weeds and beneficial soil-borne microbes. It is therefore important for farmers to be trained on the suitable agro-ecological zones and innovative management practices for better coconut performance and yields.

4.2 Module Learning Outcomes

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

1. Importance of coconut in Kenya's economy explained and appreciated
2. Knowledge of altitudes and soil types/characteristics for coconut production enhanced
3. Climatic conditions (temperatures, rainfall and humidity) required for coconut production understood and applied
4. Specific county agro-ecological zones for coconut production. explained and understood

4.3 Module Target Group

This module targets Public and private agricultural extension agents, service providers and Community Based Facilitators (CBFs) based at sub-county and ward level

4.4 Module Users

This module is intended for use by Master Trainers who are members of the core team of trainers (CTT) and trained trainers. The trainers using this module should thoroughly familiarize themselves with the participants' handouts.

4.5 Module Duration

The Module is estimated to take 4 hours

4.6 Module Summary

Module 4: Coconut production niches and climatic requirements			
Sessions	**Training methods**	**Training materials**	**Time**
4.6.1 Introductions and climate setting	• Self-introduction • Setting norms & rules • Plenary discussion • Group exercise	• Flips charts • Felt pens • Laptop • Projector	30 minutes
4.6.2 Importance of coconut in Kenya's economy	• Presentations • Plenary discussion	• Flips charts • Felt pens • Laptop • Projector • Participants' handouts	30 minutes
4.6.3 Coconut production ecological/ climatic requirements for optimal yields	• Presentations • Plenary discussion	• Flips charts • Felt pens • Laptop • Participants' handouts • Projector	1 hour
4.6.4 Coconut production Agro-ecological zones (AEZs)- average yields, and constraints in the target Counties	• Group exercise • Plenary Presentation • Plenary discussion	• Flips charts • Felt pens • Laptop • Projector	1 hour
4.6.5 Gain practical knowledge on specific county agro-ecological zones for coconut production	• Group exercise • Presentations • Plenary discussion • Video/photo show	• Flips charts • Felt pens • Laptop • Projector	40 minutes
4.6.6 Module review	• Discussions/ conclusion and way forward	• Flip charts • Felt pens • Laptop	20 minutes
Total			**4 hours**

4.7 Facilitator Guidelines

Module 4: Coconut production and appropriate climatic requirements	
4.7.1.Introductions and climate setting (30 minutes)	**Session guide**
(The facilitator welcomes trainees to the module and thereafter invites them to introduce themselves and state their expectations) **Expectations (20 minutes)** The trainees to form groups (e.g. county based) and list their expectations, norms and rules. *The facilitator presents module objectives* **Objectives (10 minutes)** By the end of the module, the trainee should be able to: • Define the importance of coconut in Kenya's economy. • Indicate and describe altitudes and soil types/ characteristics for coconut production. • Describe climatic conditions (temperatures, rainfall and humidity) required for coconut production. • Gain practical knowledge on specific county agro-ecological zones for coconut production. • Understand and be able to apply innovative coconut production and management technologies in the suitable counties.	• Summarize the facilitator/ trainees involvement in Coconut value chains • Powerpoint presentation
4.7.2 Importance of coconut in Kenya's economy (30 minutes)	
Plenary presentation (20 minutes) • Origin of coconut • Coconut in Kenyan households • Key counties producing coconut in Kenya • General coconut production trends in Kenya • Coconut consumption and markets **Guided discussions by the facilitator (10 minutes)** Questions/answers/comments	• Powerpoint presentation • Participants' handouts • Plenary discussion

4.7.3 Coconut production ecological/climatic requirements (1 hour)	
Plenary presentation (45 minutes) • Altitude and Agro-ecological zones for coconut production • Climatic conditions (rainfall, temperatures and humidity) • Soils (soil types, pH, general fertility for coconut) **Facilitator's guided discussion (15 minutes)** Questions/answers/comments	• Powerpoint presentation • Participants' handouts • Plenary discussion
4.7.4. Coconut production AEZs (villages), average yields, and constraints in the target Counties (1 hour)	**Session guide**
Plenary presentation (30 minutes) Facilitator guides in reviewing and discussing suitability map (County by County) **Group exercise (15 minutes)** Trainees to bring out specific county or sub-county AEZs, land size, yields and constraints to coconut production and present in the plenary: • Agro-ecological zones (AEZs) and % area suitable for coconut • Average land/farm size under coconut production in Kenya • Average yield of coconut per unit farm area • Constraints to coconut production • Opportunities to addressing the constraints **Discussions/presentations from the groups (15 minutes)** Let the trainees/groups share the group exercise outcomes	• Powerpoint presentation • Group work • Open discussions with the guidance of the facilitator • Plenary discussion
4.7.5. Practical knowledge on specific county agro-ecological zones for coconut production (40 minutes)	**Session guide**
Plenary presentation (20 minutes) • Facilitator guides trainees on the practical knowledge applicable to specific county agro-ecological zones for Coconut production **Plenary discussions and video/photo show (20 minutes)**	• Powerpoint presentation • Video/photo show • Plenary discussion • Plenary discussion

4.7.6. Module review (20 minutes)	Session guide
(The facilitator leads the trainees in reviewing the module) Summary of the main points from the training **(10 minute)** • Objectives and expectations (review done on basis of the expectations listed earlier) • Trainees to recall the coconut production ecological/ climatic requirements, coconut production AEZs (villages) average yields, and constraints in the target Counties • Trainees to indicate new sets of skills and knowledge acquired from the module. The results are recorded per county presented • Trainees to randomly identify the issues for the way forward. **Facilitator's guided discussion (10 minutes)**	• Participants' handouts • Summarize the main points of the module on a flip chart and display • Plenary discussion

4.8 Reference material

4.8.1 Handouts for participants

- Coconut production guides
- Coconut leaflets and brochures
- Coconut factsheets

MODULE 5: COCONUT VARIETY SELECTION

5.1. Introduction

Coconut varieties are classified as either tall or dwarf based on the height of production of the coconut palm tree. It has three varieties designated as East African tall, dwarf and hybrid. Coconut palms produce hard shelled nuts with white oily flesh. It is important to select a variety that is suited for the immediate agro-ecological settings and market acceptability. In addition, a variety should have the acceptable yield and the highest level of preferred attributes. This module therefore builds capacity for trainees and exposes them to the improved coconut varieties recommended for various agro-ecological zones. The improved high yielding varieties are key to achievement of increased incomes as well as food and nutrition security. While introducing the improved varieties good agricultural practices will be mainstreamed into the process to ensure the technologies are environmentally sustainable and safe to consumers.

5.2 Learning Outcomes

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

1. Climatic and ecological requirements for coconut described
2. Various improved coconut varieties, their ecological areas of cultivation and their uses identified and compared
3. Coconut varieties suited for counties of interest identified

5.3 Module Target Group

This module targets Public and private agricultural extension agents, service providers and CBFs based at sub-county and ward level

5.4 Module users

This module is intended for use by Master Trainers who are members of the core team of trainers (CTT) and trained trainers. The trainers using this module should thoroughly familiarize themselves with the participants' handouts.

5.5 Module Duration

The Module is estimated to take 3 hours 30 minutes

5.6 Module Summary

Module 5. Coconut variety selection			
Sessions	**Training methods**	**Training materials**	**Time**
5.6.1. Introduction, objectives and expectations	• Plenary presentation • Group discussion and presentation of expectations	• Flips charts • Felt pens • Laptop • Projector	30 minutes
5.6.2. Introduction to improved coconut varieties, their ecological requirements, attributes and uses.	• Group Exercises to identify local coconut landraces and varieties • Plenary Presentations • Plenary discussion	• Flips charts • Felt pens • Laptop • Projector • Manila papers	1 hour
5.6.3 Recommended varieties for specific regions	• Plenary Presentation • Group exercise • Field demonstration	• Flips charts • Felt pens • Laptop • Projector • Manila papers	1 hour
5.6.4 Guidelines on sourcing of certified seed and clean seedling production explained and applied	• Plenary Presentation • Group exercise • Plenary discussions	• Flips charts • Felt pens • Laptop • Projector • Manila papers	30 minutes
5.6.5 Module review	• Group exercise • Facilitator's summary	• Participants' handouts • Flip charts • Felt pens	30 minutes
Total			**3 hours 30 minutes**

5.7. Facilitator's Guidelines

Module 5: Coconut variety selection	
5.7. 1 Introduction and levelling of expectations and objectives (30 minutes)	**Session guide**
Introduction (15 minutes) *(The facilitator welcomes trainees to the module and then Invites them to introduce themselves and state their expectations.* **Module objectives (15 minutes)** (The facilitator presents modules objectives) By the end of the module the trainee should be able to: 1. Describe the Coconut crop and its climatic and ecological requirements. 2. Identify and compare the various improved coconut varieties their ecological areas of cultivation and their uses. 3. Identify the varieties suited to the counties of interest.	• Summarize trainees' "expectations" and display. • Distribute participants' handouts • Module objectives,
5.7.2 Introduction to coconut and the various improved Coconut varieties and their uses (1 hour)	**Session guide**
(The facilitator describes the coconut crop and guides the trainees in identifying the various improved varieties of coconut and their uses). **Group exercise and discussion (30 minutes)** Ask trainees highlight and describe some of the coconut varieties they know. **Plenary presentation (30 minutes)** • Improved coconut varieties. • Categories of coconut varieties and comparison of various hybrid varieties. *Show trainees the photographs of each variety and the full description and its uses.*	• Distribute participants' handouts • Group exercise • Plenary discussion

5.7.3 Recommended coconut varieties for the target counties (1 hour)	Session guide
Plenary presentation(15 minutes) • Varieties for the target counties • Coconut growing regions and the new regions being targeted for coconut cultivation in Kenya. • Coconut varieties suited for each county • Climate conditions for target county (semi-arid, rain-fed and irrigated) **Group exercises (15 minutes)** Trainees discuss and come up with coconut varieties in their county **Field demonstration (3 hours)** *(Identify farmers' fields with various coconut varieties).* • Visit coconut plots with the trainees and assist them in identifying various varieties. • After the field visit facilitate them to recall what they learned and discuss on any issue that may arise. (can also use coconut fruit samples/pictures for the various varieties)	• Distribute participants' handouts • Powerpoint presentation • Group exercise • Field demonstration
5.7.4 Instructions on seed package interpreted and applied (30 minutes)	**Session guide**
Plenary presentation (15 minutes) • Certified seedling sources for coconut identified and adopted. • Information on seeds and seedlings understood in preferred variety identified. **Group exercise (15 minutes)** *Circulate samples of certified coconut seedlings and identify key information on coconut seedlings provided*	• Distribute Participants' handouts • Group exercise • Plenary discussion
5.7.5 Module review (30 minutes)	**Session guide**
(The facilitator should be able to lead the trainees in reviewing the module) Together with the trainees review the main points about improved coconut varieties • 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 coconut varieties? • What questions do you still have about identification of coconut varieties?	• The last Participants' Handouts • Summary of the main points from the module.

5.8. Reference materials

5.8.1. Participants' handouts

- Coconut leaflets and brochures
- Coconut factsheets

MODULE 6: COCONUT SEED SYSTEMS

6.1 Introduction

A seed system is the channel through which farmers get seeds of the new crop varieties. Effective seed systems have the potential to increase production and transform the livelihoods of farmers. They give farmers access to good-quality seed and knowledge of improved practices to substantially improve their yields. Informal seed systems models are commonly adopted by most farmers across various crop value chains but lack the capacity to increase yields. In most coconut growing areas, farmers have established the crop using their own seeds, or source seeds from their neighbors. The development of impact-oriented seed systems can contribute importantly to theSustainable Development Goals envisioned by the government through the agriculture sector. Coconut growing requires appropriate seed variety for optimal yields; hence theneed to select high yielding commercial varieties that will improve farmers' incomes, while at the same time the technologies are friendly to the environment in terms of pest, disease and drought tolerance.

This module builds capacity for trainees and exposes them to the various plant propagation systems and the importance of quality planting materials in coconut production. It also covers community plant seedling production and gives direction on how to interface public and private seedling production to enable farmers venture into commercial coconut seedlings production.

6.2 Module learning outcomes

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

1. The main Coconut seed systems in Kenya explained and appreciated.
2. Knowledge on coconut seedling production in public and private seedling nurseries enhanced and applied.
3. The importance of private nurseries, community nurseries and its interface with public nurseries for enhanced production of quality coconut explained and understood.

6.3 Module Target Group and Categories

This module targets public and private agricultural extension agents, service providers and Community Based Facilitators (CBFs) based at sub-county and ward level

6.4 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 Coconut value chain target Counties. The facilitators using this module should thoroughly familiarize themselves with the participants' handouts (training materials).

6.5 Module Duration

The module is estimated to take 2 hours 30 minutes

6.6 Module Summary

Module 6: Coconut Seed System			
Sessions	**Training methods**	**Training materials**	**Time**
6.6.1 Introduction, objectives and expectations	• Self-introduction • Presentations • Plenary discussions	• Flips charts • Marker pens • Powerpoint presentation	30 minutes
6.6.2 Definition of seed and seed system in Kenya	• Group work • Presentations	• Flips charts • Marker pens • Powerpoint Presentation	30 minutes
6.6.3 Formal seed system in Kenya	• Presentations • Discussions	• Powerpoint Presentation • Flips charts • Marker pens	30 minutes
6.6.4 Informal seed system in Kenya	• Presentations • Discussions	• Powerpoint Presentation • Flips charts • Marker pens	30 minutes
6.6.5 Module review and discussions	• Group work • Discussions • presentation	• Flips charts	30minutes
Total			**2 hours 30 minutes**

6.7 Facilitator's Guidelines

Module 6: Coconut Seed System	
6.7.1. Introduction and leveling of expectations and objectives (30 minutes)	**Session guide**
Introduction (20 minutes) *(The facilitator welcomes trainees to the module on the main Coconut seed systems before inviting trainees to introduce themselves and state their expectations.* **6.7.1. Module objectives (10 minutes)** *(The facilitator presents modules objectives)* By the end of the module the trainee should be able to: 1. Describe and explain Coconut seed systems in Kenya. 2. Describe Coconut seedling production systems in public and private seedling nurseries 3. Explain the role of private nurseries, community and public nurseries in the production of quality coconut.	• Summarize trainees' "expectations" and display. • Powerpoint Presentation • Distribute Participants' Handouts
6.7.2. Definition of seed and seed system in Kenya (30 minutes)	**Session guide**
Group work and presentation (15 minutes) • What is quality seed? **Plenary Presentation (15 minutes)** • Definition a seed system and characteristics of main seed systems (formal and informal seed system) • Commodity corridors	• Group work • Powerpoint presentation • Participants' handouts
6.7.3 Formal seed systems in Kenya (30 minutes)	**Session guide**
Plenary presentation and discussion (30 minutes) • Legal requirements for seed certification • Seed certification process • Post certification activities for enforcing the seed act cap 326 • Post certification activities for seed quality assurance • Seed importation and exportation requirements.	• Powerpoint Presentation • Distribute Participants' Handouts • Brochures, Leaflets

6.7.4 Informal seed system in Kenya (30 Minutes)	Session guide
Plenary presentations: (10 hour) • Seed multiplication • Coconut seed standards and commercial production • Informal seed system • Synergies for formal and informal seed systems **Group work and discussion (20 minutes)** Calculate seedling requirements for the county/ward/farmer group and present.	• Group work • Powerpoint Presentation • Distribute Participants Handouts • Brochures, Leaflets,
6.7.5 Module review (30 minutes)	**Session Guide**
(The facilitator leads the trainees in reviewing the module) **Plenary discussion and presentation** Summarize the module together with the trainees and have a recap of the main components in: • Coconut seed systems and their characteristics • Importance of using certified seed • Informal seed *(Discuss the knowledge acquired and skills learnt from this module with the trainees. What are the observations made by trainees from this module?)*	• The last Participants' Handouts • Summarize the main points from the module on a flip chart and display

6.8 Reference Materials

6.8.1 Participants' Handouts

- Coconut production Guides
- Coconut farming hand book

MODULE 7: CLIMATE SMART AGRONOMIC PRACTICES FOR COCONUT

7.1 Introduction

The main cause of low coconut yield is failure by farmers to adopt improved crop management practices developed by agricultural researchers. Some of these practices include, timely land preparation, use of recommended fertilizer types, seed selection techniques, correct plant spacing, pest and disease management strategies for increased production, knowledge of physiological maturity indices and how to improve on harvesting techniques to avoid losses

In order to optimize productivity of coconut, farmers need to adopt specific agronomic packages, without which the yield potential of improved varieties cannot be achieved. In addition, the weather vagaries occasioned by climate change effects make it necessary to incorporate adaptation or mitigation measures which can enable coconut farmers increase yields. In this respect, climate smart agronomic practices come to the fore. Therefore, farmer facilitators from the targeted counties should be equipped with skills and knowledge that will enable them train farmers on innovative climate smart coconut agronomic practices.

7.2 Module Learning Outcomes

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

1. Agronomic practices for coconut production described and explained.
2. Region specific agronomic practices for coconut production optimization outlined.
3. Appropriate inputs and their correct application rates for coconut production described.
4. Timing for operations or inputs application in coconut production described and explained.

7.3 Module Target Group and Categories

This module targets Public and private agricultural extension agents, service providers and County Based Facilitators (CBFs) based at the sub-county and ward levels.

7.4 Module Users

This module is intended for use by Master Trainers who are members of the core team of trainers (CTT) and trained trainers. The trainers using this module should thoroughly familiarize themselves with the participants' handouts.

7.5. Module Duration

The module is estimated to take a duration of 3 hours 30 minutes

7.6 Module Summary

Module 7: Coconut climate smart agronomic practices			
Sessions	**Training methods**	**Training materials**	**Time**
7.6.1 Introductions and climate setting, objectives and expectations	• Self-introduction • Setting norms & rules • Plenary presentation • Plenary discussion • Group exercise	• Flips charts • Felt pens • Laptop • Projector	30 minutes
7.6.2 Introduction to agronomic practices for coconut production	• Presentations • Group exercise (groups tour nearby farm for layout demonstration) • Plenary discussions (from the farm visit)	• Flips charts • Felt pens • Laptop • Projector • Participants' handouts	1 hour 30 minutes
7.6.3 Appropriate inputs and their recommended application rates for optimum production of coconut	• Presentations • Group exercise (trainees enlist inputs and application rates for different counties) • Plenary discussions (share group work results)	• Flips charts • Felt pens • Laptop • Projector • Participants' handouts	1 hour
7.6.4 Module review and discussion	• Discussion/ conclusion and way forward	• Flip charts • Felt pens • Laptop • Projector	30 minutes
Total			**3 hours 30 minutes**

7.7 Guidelines for Facilitators

7.7.2. Agronomic practices for coconut production (1 hour)	Session guide
Plenary presentation (20 minutes) The facilitator presents critical factors on: • Factors for selecting coconut production as an enterprise • Climate smart land preparation practices • Climate smart planting • Weed control • Pests and disease control • Cropping systems • Spacing (inter-and intra-row spacing) • Conservation agriculture principles/benefits **Practical exercise (30 minutes)** Guided groups tours to model farms to observe various planting and management techniques **Plenary discussion (10 minutes)** Questions/answers and comments	• Powerpoint Presentation • Plenary discussion • Distribute participants' handouts/training materials • Practical exercise
7.7.3. Appropriate inputs for the optimal production of coconut and their correct/recommended application rates (1 hour)	**Session guide**
Group exercise (40 minutes) • The facilitator guides trainees to list or/and present the required inputs for use in coconut production • The trainees get into county groups to provide lists of coconut production inputs and their application rates as practiced by farmers. • The groups present their results in the plenary - opening up for questions, answers and discussion. **Plenary presentation and plenary discussion (20minutes)** • The recommended coconut production inputs (seeds, seedlings, fertilizers, manures, among others.), their rates and their time of application for optimal yields	• Powerpoint Presentation • Distribute participants' handouts • Groups exercise • Plenary discussion

7.7.4. Module review (30 minutes)	Session guide
(The facilitator leads the trainees in reviewing the module) Summary of the main points from the training • Objectives and expectations (review done on basis of the objectives and expectations listed earlier) • *Trainees to randomly indicate new sets of skills and knowledge learnt from the module. The results are recorded per county presented* • Randomly (average of 10 cases) trainees identify key issues for the way forward issues.	• Participants' handouts • Summarize the main points of the module on a flip chart and display

7.8. Reference material

7.8.1. Handouts for participants

- Coconut production guides.
- Coconut leaflets and brochures
- Coconut Factsheets

MODULE 8: INTEGRATED SOIL AND WATER MANAGEMENT PRACTICES FOR COCONUT PRODUCTION

8.1 Introduction

Poor soil conditions and unreliable availability of moisture in most smallholder farming systems have been the main causes of low crop yields. Generally, crop yields have continued to decline over the years due to increased soil acidity, mining of nutrients not supplied in theapplied fertilizers and poor soil structure caused by failure to use the available sources of organic matter. Macronutrients [nitrogen (N), phosphorus (P), potassium (K) and Sulphur (S)] and micronutrients [zinc (Zn), Molybdenum (Mo) and Boron (B)] have been identifiedas deficient in Kenyan soils. Additionally, climate change has accelerated the decline of the agricultural sector performance through limited and unpredictable water availability for the Onion production systems. Integrated Soil Fertility Management (ISFM), through conservation agriculture offers the best options for improving soil fertility in the advent of climate change adaptation. Coconut is mostly cultivated by smallholder farmers with minimal inputs. Drought management technologies to mitigate drought effects in onion production are available. However, farmers have not realized the full benefits dueto limited integration of the developed Integrated Natural Resource Management (INRM) and sustainable intensification practices in their production systems. This module exposes public and private extension agents, service providers, lead farmers and facilitators to the integrated soil and water management practices for enhanced onion production

8.2 Module learning outcomes

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

1. Soil composition, the various physical, chemical and biological properties and what constitutes a healthy soil, including soil classification explained and appreciated.

2. Soil and plant tissue sampling for laboratory analysis, interpretation and utilization of results from accredited laboratories in Kenya discussed and described.

3. Soil health and Integrated Soil Fertility Management (ISFM) for climate resilient cropping explained.

4. Water harvesting technologies, soil and water management discussed and explained

5. Temporary or permanent decline of land productive capacity and various solutions to soil degradation identified.

6. Problematic soils and their management identified and described.

8.3 Module Target Group and Categories

This module targets public and private agricultural extension agents, service providers and Community Based Facilitators (CBFs) based at sub-county and ward level.

8.4 Module Users

This module is intended for use by Master Trainers who are members of the Core Team of Trainers (CTT) and trained trainers. The facilitators using this module should be well conversant with the participants' handouts.

8.5 Module Duration

The Module is estimated to take 5 hours

8.6 Module Summary

Module 8: Integrated soil and water management practices for Coconut production			
Sessions	**Training methods**	**Training materials**	**Duration**
8.6.1 Introduction, objectives and expectations	• Self-introduction • Plenary presentation • Plenary discussion	• Flip charts • Marker pens • Projector • Laptop	30 minutes
8.6.2 Soil composition, properties and health,	• Plenary presentations • Plenary discussion	• Flip charts • Marker pens • Projector • Laptop • Participants' handouts	30 minutes
8.6.3 Soil and plant tissue sampling and analysis	• Plenary presentations • Field demonstrations (Conduct soil and plant tissue sampling and analysis)	• Projector • Laptop • Participants' handouts • Soil and plant tissuesampling tools	1 hour
8.6.4. Soil fertility and plant nutrition	• Plenary presentation • Plenary discussion	• Flip charts • Marker pens • Projector • Laptop • Participants' handouts	30 minutes

8.6.5 Soil health and (ISFM) for climate resilient cropping systems	• Plenary presentation • Plenary discussion	• Flip charts • Marker pens • Laptop • Projector • Participants' handouts	30 minutes
8.6.6 Soil and water management and water harvesting technologies	• Plenary presentation • Plenary discussion	• Flip charts • Marker pens • Laptop • Projector • Participants' handouts	30 minutes
8.6.7 Soil degradation and reclamation	• Presentations • Plenary discussion	• Flip charts • Marker pens • Projector • Laptop • Participants' handouts	30 minutes
8.6.8 Problematic soils and their management	• Presentations • Plenary discussion	• Flip charts • Marker pens • Projector • Laptop • Participants' handouts	30 minutes
8.6.9 Module review and discussion	• Discussion	• Flip charts	30minutes
Total			**5 hours**

8.7 Facilitator's Guidelines

Module 8: Integrated soil and water management practices for Coconut production	
8.7.1. Introduction, objectives and expectations (30 minutes)	**Session guide**
The facilitator welcomes trainees to the module and thereafter invites them to introduce themselves and state their expectations) **Module objectives (30 minutes)**	• Summarize trainees'

((The facilitator presents modules objectives) By the end of the module, the trainee should be able to: • Appreciate soil composition and what constitutes a healthy soil, including soil classification. • Describe soil and plant tissue sampling for laboratory analysis, interpretation and utilization of results from accredited laboratories in Kenya. • Explain soil health and Integrated Soil Fertility Management (ISFM) for climate resilient cropping systems. • Explain water harvesting technologies, soil and water management. • Identify temporary or permanent decline of land productive capacity and provide various solutions to soil degradation. • Identify and describe problematic soils and their management.	• "Expectations"and display. • PowerPoint presentation • Participants' handouts
8.7.2. Soil composition, properties and health (30 minutes)	**Session guide**
(The facilitator presents on soil composition, properties andhealth) **Plenary presentation (20 minutes)** Soil composition, properties and health • Description of soil composition • Description of soil properties • Describe what soil health is all about **Plenary discussion (10 minutes)** Let the trainees recall what they learnt and discuss any issuesthat may arise	• PowerPoint presentation • Participants' handouts • Plenary discussion
8.7.3. Soil and plant tissue sampling and analysis (1 hour)	**Session guide**
Plenary Presentation (30 minutes) • 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 (30 minutes)** • soil sampling methods	• PowerPoint presentation • Participants' handouts • Practical exercise and demonstration

8.7.4. Soil fertility and plant nutrition (30 minutes)	Session guide
Plenary presentation (20 minutes) • Potential role of different soil management techniquesin addressing soil fertility challenges in Coconut smallholder farming systems • Integrated Soil Fertility Management techniques • Soil management guidelines **Plenary discussion (10 minutes)** Let the trainees recall what they learnt and discuss any issuesthat may arise.	• PowerPoint presentation • Plenary discussion • Participants' handouts
8.7.5 Soil health and (ISFM) for climate resilient cropping systems (30 minutes)	**Session guide**
Plenary Presentation (20 minutes) • Soil health • Introduce integrated soil fertility management(ISFM) • Soil health and ISFM for a climate resilient croppingsystem • Manure management, mulching, organic amendmentsand composting for increased use of organic manure for improving agricultural production • Conservation agriculture as a climate smartagriculture practice • Coconut intercrops and crop rotation as climateresilient cropping systems **Plenary discussion (10 minutes)** Let the trainees recall what they learnt and discuss any issues that may arise	• PowerPoint presentation • Plenary discussion • Participants' handouts
8.7.6 Soil and water management and water harvesting technologies (30 minutes)	**Session guide**
Plenary Presentation (20 minutes) • Principles of soil management for increased Coconut productivity • Methods of tillage systems that conserve water for Coconut use. • Principles of soil fertility management for increased Coconut productivity • Methods of soil fertility management for increased Coconut productivity	• PowerPoint presentation • Participants' handouts • Plenary discussion

Plenary discussion (10 minutes) Let the trainees recall what they learnt and discuss any issues that may arise.	
8.7.7 Soil degradation and reclamation (30 minutes)	**Session guide**
Plenary presentation (20 minutes) • Overview of soil degradation and reclamation. • Reclamation measures of degraded soil • Identification of the causes of soil degradation • Identification of reclamation measures of degraded soil **Plenary discussion (10 minutes)** Let the trainees recall what they learnt and discuss any issues thatmay arise.	• PowerPoint presentation • Participants' handouts • Plenary discussion
8.7.8 Problematic soils and their management (30 minutes	**Session guide**
Plenary presentation (20 minutes) • Problematic soils and their management • Soils with unsuitable biological properties • Soils with unsuitable chemical properties • Soils with unsuitable physical properties **Plenary discussion (10 minutes)** Let the trainees recall what they learnt and discuss any issues that may arise	• Power point presentation • Participants' handouts
8.7.9. Module review (30 minutes)	**Session guide**
• Summarize the main points of the training review the main points together with the trainees. • Discuss with trainees about new things learnt from this Module. Let them identify some of the problems and any other issues arising from the module	• Participants' handouts • Summarize the main points from the module on a flip chart and display

8.8 Reference materials

8.8.1 Participants' Handouts

- Soil management factsheets
- Soil Management brochures

8.8.2 Further Reading

1. Esilaba, A.O. et al. (2021). KCEP-CRAL Integrated Soil Fertility and Water Management Extension Manual. Kenya Agricultural and Livestock Research Organization, Nairobi, Kenya

MODULE 9: COCONUT CROP HEALTH

9.1 Introduction

Coconut production is often constrained by damage caused by a range of insects, diseases and weeds. Further, an acute shortage of knowledge among Coconut farmers on the recommended crop health management options lead to low production. Pests such as scales and mealy bugs suck cellular sap from young tender plant tissues, rendering infested plants unable to manufacture food, translocate nutrients to various utilization locations of the plants and eliminate metabolic waste products and also serve as vectors to viral infections.

Rhinoceros beetle, termites, and mites, feed on the various parts of plants by chewing, and tunnelling. These create wounds for the entry of bacterial, fungal and viral phytopathogen, thus causing death leading to lowering crop yields. Phytopathogens cause plant diseases, which alter the sequence of metabolic activities such as respiration, photosynthesis, nutrient translocation, growth and development. Weeds present competition for growth and development resources needed by the Coconut crop i.e. moisture, nutrients, light and space. This has significantly reduced productivity and profitability of Coconut over time. This module is therefore meant to help trainess understand the ecology, impact and recommended management practices for diseases, pests and weeds to reduce production costs and improve Coconut yields.

9.2 Module Learning Outcomes

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

1. Major pests, diseases and weeds identified.
2. Integrated pest, disease and weed management in Coconut described and explained.
3. Knowledge on major diseases, their development, economic losses and their control.
4. Integrated Disease Management approaches and scouting for threshold determination.
5. Integrated weed management strategies for Coconut.
6. Safe use of agro-chemicals (pesticides, fungicides and herbicides) explained and appreciated.

9.3 Module Target Group

This module targets Public and private agricultural extension agents, service providers and Community Based Facilitators (CBFs) based at sub-county and ward level

9.4 Module Users

This module is intended for use by Master Trainers who are members of the core team of trainers (CTT) and trained trainers. The trainers using this module should thoroughly familiarize themselves with the participants' handouts.

9.5 Module Duration

The facilitation of this module is estimated to last for a period of 6 hours.

9.6 Module Summary

Module 8: Crop Health			
Sessions	**Training methods**	**Training materials**	**Time**
9.6.1 Introduction, objectives and expectations	• Self-introductions • Group exercise • Plenary presentation • Plenary discussion	• Flips charts • Marker pens • Laptop • Projector	30 minutes
9.6.2 Major Coconut pests that cause economic losses and their control methods;	• Group work • Plenary presentation • Plenary discussion • Practical exercise	• Flips charts • Marker pens • Projector • Laptop • Participants' handouts	1 hour
9.6.3 Sustainable Integrated Pests Management practices and scouting for threshold determination in Coconut	• Plenary presentation • Plenary discussion	• Flip charts • Marker pens • Projector • Laptop • Participants' handouts	30 minutes
9.6.4 Major Coconut diseases that cause economic losses and conditions that favor their development including their control methods	• Group work • Plenary Presentation • Plenary discussion • Practical session	• Flip charts • Marker pens • Projector • Laptop • Participants' handouts	1 hour
9.6.5 Sustainable Integrated Management of Coconut diseases and scouting for threshold determination	• Presentations • Plenary discussion • Field demonstration	• Flip charts • Marker pens • Projector • Laptop • Participants' handouts	1 hour

9.6.6 Integrated weed management (Major weeds of Coconut)	• Plenary Presentation • Plenary discussion • Field demonstration	• Flip charts • Marker pens • Projector • Laptop • Participants' handouts	1 hour
9.6.7 Safe use of agro-chemicals and update source for registered agro-chemicals (PCPB registered products)	• Presentations • Practical exercise • Plenary discussion	• Projector • Laptop • Flip charts • Marker pens • Participants' handouts	30 minutes
9.6.8 Module Review	• Discussion/ Recap of the module • Take away messages	• Flip charts • Marker pens • Participants' handouts	30 minutes
Total			**6hours**

9.7 Facilitator's Guidelines

Module 9: Coconut Crop Health	
9.7.1. Introduction and levelling of expectations and objectives(30 minutes)	**Session Guide**
Introduction (15 minutes) *(The facilitator welcomes trainees to the module and thereafter invites them to introduce themselves and state their expectations)* **Module Objectives (15 minutes)** *(The facilitator presents modules objectives)* By the end of the module, the trainee should be able to: • Identify major pests, diseases and weeds. • Describe and explain integrated pest, disease and weed management in Coconut. • Explain safe use of agro-chemicals (pesticides, fungicides and herbicides).	• Summarize trainees' "Expectations" • Powerpoint presentation • Participants' handouts

9.7.2. Major Coconut pests that cause economic losses and their control methods; emerging/migratory pests(1 hour)	Session Guide
(The facilitator makes a presentation on the common Coconut pests that are of economic importance) **Group work (15 minutes)** • Trainees to share Coconut pest information from their respective Counties **Plenary Presentation (20 minutes)** • Names of pests and their descriptions • Symptoms of their infestation/type of damage • Data on economic significance of the common Coconut pests **Practical exercise (15 minutes)** • Identification of Coconut pests from provided specimens **Discussion (10 minutes)** • Let the trainees recall what they learned and discuss any issue that may arise	• Powerpoint presentation • Group exercise • Practical exercise • Participants' handouts
9.7.3. Sustainable Integrated Pest Management (IPM) practices in Coconut; scouting and threshold determination(30 minutes)	**Session Guide**
Plenary Presentation (20 minutes) • IPM principles; how to implement them with a focus on cultural, physical, biological and chemical pest management options. • Critical considerations for proper scouting • Threshold determination and when to implement control measures • An overview on the safe use of agro-chemicals (demonstration on how to select most suitable pesticides, for the management of pests in Coconut). **Discussion (10 minutes)** Let the trainees recall what they learned and seek clarification on the principles of sustainable IPM options	• Powerpoint presentation • Participants' handouts

9.7.4. Major Coconut diseases that cause economic losses, conditions that favour their development and their control methods (1 hour)	Session Guide
Group work (15 minutes) • Determination of Coconut diseases in specific Counties **Plenary Presentation (15 minutes)** • Presentations on Coconut diseases and conditions that favor their development **Practical Exercise (30 minutes)** • Identification of major disease species causing economic damage based on samples presented	• Powerpoint presentation • Participants' handouts • Disease identification guidelines • Practical exercise
9.7.5. Sustainable Integrated Diseases Management (IDM); scouting and threshold determination (1 hour)	**Session Guide**
Plenary presentation (30 minutes) • Critical considerations for scouting and when to implement Coconut disease control measures • Presentation on Integrated Disease Management (IDM) in Coconut • An overview on the safe use of recommended agro-chemicals (demonstration on how to select most suitable fungicides for the management of major Coconut diseases). **Field visit (30 minutes)** Visit to a nearby Coconut field for collection and identification of diseased Coconut samples	• Powerpoint presentation • Participants' handouts • Disease management guidelines • Field demonstration
9.7.6 Integrated weed management (Major weeds of Coconut) (1 hour	**Session Guide**
Plenary presentation (45 minutes) • Identification of weeds • Major types of weed in the Coconut field • Integrated Weed control measured **Plenary discussion (15 minutes)** Integrated weed management	• Powerpoint presentation • Participants' handouts • Plenary discussion

9.7.7. Safe Use of agro-chemicals and sources of registered chemicals (PCPB registered products) (30 minutes)	Session Guide
Practical (20 minutes) Trainees go into their groups and discuss: • Ways used by farmers in mixing of pesticides/ ITK products; and their consideration on safe use of pesticides • Representative group leaders give presentation on findings of the discussion **Plenary presentation (10 minutes)** Facilitator makes presentation on: • Safe use of pesticides • Let the trainees ask questions on any of the covered topical issues and critical areas to share with farmers on safe use of pesticides	• Powerpoint presentation • Demonstration • Distribute participants hand-outs (brochures, leaflets and manuals) • Pest, disease and weed management guidelines
9.7.7. Module review (30 minutes)	**Session Guide**
(The facilitator leads the trainees in reviewing the module) Summarize the main points of the training: The facilitator should review the following main points about climatic conditions suitable for Coconut production: • Major pests of Coconut and their economic impacts on Coconut production. • Integrated Pest Management (IPM) options for Coconut • Major diseases of Coconut and their economic impact on Coconut production. • Integrated Disease Management (IDM) options for Coconut • Major weeds of Coconut and their economic impacts on Coconut production. • Integrated Weed Management (IWM) options for Coconut *(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

9.8. Reference Materials

9.8.1. Participants' Handouts

- Fact sheets on Coconut pest identification and control
- Factsheets on Coconut disease identification and their control
- Factsheets on Coconut weeds identification and their management

9.8.2 Further Reading

1. Mwangi, H.W. Weed Management manual. KALRO-Kabete

MODULE 10: COCONUT HARVESTING AND POSTHARVEST MANAGEMENT

10.1 Introduction to the Module

Inappropriate harvesting, and postharvest handling methods are major challenges in coconut. Coconut is harvested at two stages – the tender nut and mature nut, and this are utilized in different ways. Farmers incur losses due to incorrect timing of harvest, inappropriate maturity indices; and lack of awareness on maturity indices, inappropriate harvesting methods, inefficiencies in traditional manual dehusking processes and inefficient drying of copra. Harvesting losses could be as high as 10% of the total harvest. Pests such as beetles cause losses of more than 15% of copra during storage and also negatively affect quality .Lack of awareness on appropriate technologies for postharvest handling has resulted to under-exploitation of coconut. Dissemination of the available climate smart TIMPs through farmer awareness, training and demonstrations can reduce the losses and enhance livelihoods of farmers and other value chain actors. This module is intended to improve the knowledge and skills of trainees on Coconut harvesting and postharvest.

10.2 Module Learning Outcomes

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

1. The whole range of postharvest practices for coconut explained.
2. Constraints and opportunities in coconut postharvest value chain explained.
3. Climate smart and gender-friendly postharvest practices for minimizing the losses and enhancing quality of coconut explained and demonstrated.

10.3 Module Target Group

This module targets Public and private agricultural extension agents, service providers and Community Based Facilitators (CBFs) based at sub-county and ward level

10.4 Module Users

This module is intended for use by Master Trainers who are members of the core team of trainers (CTT) and trained trainers. The trainers using this module should thoroughly familiarize themselves with the participants' handouts.

10.5 Module Duration

The Module is estimated to take 3 hours.

10.6 Module Summary

Module 19: Coconut Harvesting and Postharvest Management			
Sessions	**Training Methods**	**Training Materials**	**Time**
10.1 Introductions, expectations and objectives	• Personal introduction • Group work • Plenary presentation	• Flip charts • Felt pens • Projector • Laptop	20 minutes
10.2. Constraints and opportunities in postharvest management of coconut	• Group exercise • Plenary presentations	• Flip charts • Participants' handouts, • Videos	40 minutes
10.3. Coconut postharvest TIMPs • Maturity indices • Harvesting • Field assembly and packaging • Dehusking • Drying of copra • Sorting and grading • Storage of copra • Control of storage pests	• Group work • Brainstorming sessions • Plenary presentation • Practical demonstration	• Projector • Laptop • Participants' handouts • Materials for demos (coconut, netted polythene bags, gunny bags, etc.)	1 hours 30 minutes
10.4. Module review	• Facilitator's summary • Group exercise	• Flip charts • Projector • Laptop • Module evaluation forms	30 minutes
TOTAL			**3 hours**

10.7 Facilitators Guidelines

Module 10. Harvesting and Postharvest Management	
10.7.1 Introduction and levelling of expectations and objectives (20 minutes)	**Session Guide**
(The facilitator welcomes trainees to the module and invites trainees to introduce themselves and state their expectations) **Introduction and Module Objectives (10 minutes)** *(The facilitator presents module's objectives)* By the end of the module trainees should be able to: • Explain the correct maturity indices and harvesting practices for coconut • Explain the whole range of postharvest practices for coconut • Explain the constraints and opportunities in coconut postharvest value chain • Explain climate smart and gender-friendly postharvest TIMPs for minimizing the losses and enhancing quality of coconut **Expectations (10 minutes)** *Assist the trainees to state their expectations based on the objectives*	• Participants' handouts • Training Program • Powerpoint presentation • Summarize trainees' "Expectations" and display on flip chart/ board.
10.7.2 Constraints and opportunities in postharvest handling of coconut (40 minutes)	**Session Guide**
(Highlight the coconut postharvest value chain harvesting, field assembly and packaging, sorting and grading, deshusking, drying of copra, storage, cooling, control of postharvest pests) **Group work (30 minutes)** • Trainees discuss constraints in the postharvest handling of coconut, and suggest solutions **Group presentation (10 minutes)** Trainees present results of group work in plenary	• Powerpoint presentation • Participants' handouts

10.7.3 Coconut postharvest value chain TIMPs (1 our 30 minutes)	Session Guide
Plenary Presentation (1 hour) • Maturity indices and harvesting of coconut (importance of harvesting at the right maturity index, advantages and disadvantages of harvesting too early or too late) • Preparations farmers need to make prior to harvesting • Coconut harvesting methods • Field assembly and packaging • Dehusking • Drying of copra • Sorting and grading • Storage • Control of storage pests **Practical demonstrations (30 minutes)** • Harvesting of coconut at the field • Sorting and grading (Coconut purchased from the market and grading into various grades with reference to existing standards) • Practical on dehusking machine	• Powerpoint presentation • Participants handouts • Materials for demos (coconut, knives, solar dryers, dehusking machine)
10.4 Module review (30 minutes)	**Session Guide**
(The facilitator leads the trainees in reviewing the module) **Plenary presentation (10 min)** Together with the trainees, summarize the main points of the training. **Group Exercise (20 min)** Together with the trainees review the main points about coconut harvesting and post-harvest handling • 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 harvesting and post harvesting? • What questions do you still have about post-harvest handling?	• Summary of the main points from the Module

10.8. Reference Material

10.8.1. Participant's Handouts

- Coconut factsheet
- Coconut leaflets
- Coconut TIMPs manual

MODULE 11: COCONUT VALUE ADDITION

11.1. Introduction

Coconut is an important food security crop for communities along the Kenyan coast. Several value added products can be processed from coconut. The value added products are described four sub-themes: products from the husks; shell, meat and water. These can be made from coconut harvested at the two main maturity stages – tender nut and mature nut. However, the technology of processing these products is not widespread among the coconut farmers and other value chain actors. Processing of virgin coconut oil avails high quality edible oil for household and industrial use. This makes use of locally available resource and saves on foreign exchange used to import edible oils (about KES 25 billion annually). Coconut shells pose environmental dangers and processing them into various products such as ear rings, bangles, cups, charcoal / activated carbon minimises this danger. There is high demand for value added coconut products in rural and urban consumers. Coconut processing creates cottage industries for income generation.

This module is intended to develop the skills of trainees and farmer facilitators on Coconut value addition. This will address the challenges of utilization, food and nutrition security at the household, community and industrial levels. The module covers the various coconut value added products, constraints in value addition and their suggested solutions.

11.2 Module Learning Outcomes

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

1. Role of coconut as a food security crop explained.
2. Nutritional composition of coconut, health benefits, food security and income described.
3. Constraints in value addition and utilization of coconut, and suggest solutions identified
4. Coconut-based value added products identified and explained.

11.3 Module Target Group

This module targets Public and private agricultural extension agents, service providers and Community Based Facilitators (CBFs) based at sub-county and ward level

11.4 Module Users

This module is intended for use by Master Trainers who are members of the core team of trainers (CTT) and trained trainers. The trainers using this module should thoroughly familiarize themselves with the participants' handouts.

11.5. Module Duration

The Module is estimated to take 6 hours 30 minutes.

11.6. Module Summary

Module 11. Coconut value addition			
Sessions	**Training Methods**	**Training Materials**	**Time**
11.6.1. Introduction, Objectives Expectations	• Personal introduction • Group work • Plenary Presentation	• Flip charts • Projector • Laptop	30 minutes
11.6.2 Role of coconut as a food and nutrition security crop	• PowerPoint Presentation • Group exercise • Plenary Presentation	• Flip charts • Felt pens • Projector • Laptop • Participants' handouts	30 minutes
11.6.3. Nutritional composition of coconut and its role in human health	• PowerPoint • Plenary presentation • Group exercise	• Projector • Laptop • Flip charts • Felt pens • Participants' handouts	45 minutes
11.6.4. Constraints in value addition and utilisation of coconut	• Group exercise • Plenary Presentation	• List of value added products • Checklist for prioritization • Pair wise ranking tool • Flip charts • Felt pens • Participants' handouts • Projector • Laptop	45 mintes
11.6.5 Coconut based value added products:	• Plenary Presentations • Plenary discussion • Practical demonstration • Sensory evaluation of value added coconut products • Field visit to processing firms / groups	• Projector • Laptop • Participants' handouts • Assorted value addition equipment and ingredients • Sensory evaluation forms	3 hours 30 min

11.6.6. Module review	• Plenary discussion • Presentations	• Flip charts • Powerpoint presentations • Module evaluation forms	30 minutes
TOTAL			**6 hours 30 minutes**

11.7. Facilitator's Guidelines

Module 11. Coconut value addition	
11.7.1 Introduction, expectations and objectives (30 minutes)	**Session Guide**
Introduction and expectations (15 minutes) *(The facilitator welcomes trainees to the module on value addition of coconut. They are then invited to introduce themselves and state their expectations)* **Module objectives (15 minutes)** *(The facilitator presents modules objectives.)* By the end of the module, the trainee should be able to • Appreciate the role of coconut as a food and nutrition security crop. • Describe nutritional composition of coconut, health benefits, food security and income. • Identify constraints in value addition and utilization of coconut, and suggest solutions. • Explain how to make coconut-based value added products.	• Participants' handouts • PowerPoint Presentation • Summarize trainees' expectations and display on flip chart/board.
11.7.2 Role of coconut as a food and nutrition security crop (30 minutes)	**Session Guide**
(The facilitator presents on malnutrition cases in Kenya and the importance of coconut in addressing food security and malnutrition challenges) **Plenary Presentation (15 minutes)** Powerpoint presentation highlighting the critical elements: • Micronutrient malnutrition cases in Kenya • Dietary nutrient requirements (focusing on VMGs) **Group Exercises (15 minutes)** Trainees discuss in groups, the main malnutrition challenges in their respective counties / regions	• Powerpoint presentation • Participants' handouts • Recipe books • Sample coconut and other processing ingredients • Group exercise

11.7.3 Coconut nutritional composition and impact of consumption on human health (45 minutes)	Session Guide
Plenary presentation (45 minutes) • Overview of the documented coconut nutritional composition and their role in human health and nutrition	• Powerpoint presentation • Participant handouts • Brochures, leaflets, manual, factsheets, posters
11.7.4. Constraints in value addition and consumption of coconut, and suggested solutions (45 minutes)	**Session Guide**
Group exercise(30 mintes) Groups discuss the constraints in coconut value addition and utilization **Plenary presentation (15 minutes)** Overview of constraints in value addition and utilization of coconut	• Powerpoint presentation • Group Exercise
11.7.5 Coconut based value added products (3 hours 30 min)	**Session Guide**
Plenary presentation (30 min) • Overview of coconut based value added products • Meaning of value addition • Requirements for value addition of coconut • Coconut based value added products; sensory evaluation of the products **Practical exercise (3 hours)** • Demonstration on formulation of coconut based products • Practical on sensory evaluation of value added coconut products	• Participants handouts • Powerpoint presentation • Recipes • Sensory evaluation forms • Assorted value addition equipment and ingredients
11.7.6 Training review (30 minutes)	**Session Guide**
(The facilitator leads the trainees in reviewing the module) Review the main points about coconut value addition together with the trainees. • 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 coconut value addition? • What questions do you still have about coconut value addition?	Summary of the main points from the Module.

11.8. Reference Materials

11.8.1. Participants' Handouts

- Coconut value addition factsheet
- Coconut value addition pamphlets and leaflets.
- Coconut TIMPs manual
- Coconut recipe books

MODULE 12: MECHANIZATION OF COCONUT PRODUCTION ACTIVITIES

12.1 Introduction to the module

Agricultural mechanization supports through enhancing production, productivity and profitability in agriculture by achieving timeliness of farm operations. It comes along with precision in metering and placement of inputs, reducing susceptibility to input losses, increasing utilization efficiency of costly inputs (seed, chemical, fertilizer, irrigation, water. etc.), reducing unit cost of production, enhancing profitability and competitiveness in the cost of operation. It also benefits conservation of agricultural produce and by-products from qualitative and quantitative 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 coconut farming in Kenya especially when applied to planting, weeding, pest control, harvesting and post-harvest activities.

12.2 Module Learning Outcomes

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

1. Concept of mechanization of Coconut production discussed and explained.
2. Impacts of mechanization on Coconut production explained.
3. Future trends in mechanization of Coconut production projected and appreciated.

12.3. Module Target Group and Categories

This module targets Public and private agricultural extension agents, service providers and Community Based Facilitators (CBFs) based at sub-county and ward level

12.4. Module Users

This module is intended for use by Master Trainers who are members of the core team of trainers (CTT) and trained trainers. The trainers using this module should thoroughly familiarize themselves with the participants' handouts.

12.5. Module Duration

The Module is estimated to take 4 hours

12. 6. Module Summary

Module 12. Mechanization of coconut production activities			
Sessions	**Training methods**	**Training materials**	**Duration**
12.6.1 Introduction, objectives and expectations	• Personal introductions • Presentations • Plenary discussions	• Flip charts • Felt pens • Projector • Laptop	20 minutes
12.6.2 Coconut climate smart land preparation tools and equipment	• Presentations • Plenary discussions	• Flip charts • Felt pens • Projector • Laptop	30 minutes
12.6.3 Bush clearing machines	• Presentations • Plenary discussions	• Flip charts • Felt pens • Projector • Laptop	30 minutes
12.6.4 Land cultivation by Tractor mounted hole digger	• Presentations • Plenary discussions	• Flip charts • Felt pens • Projector • Laptop	15 minutes
12.6.5 Semi-automatic coconut harvesting machines and harvesting robot (30 minutes)	• Presentations • Plenary discussions	• Flip charts • Felt pens • Projector • Laptop	30 minutes
12.6.6 Coconut pest control equipment and tools usage	• Presentations • Plenary discussions	• Flip charts • Felt pens • Projector • Laptop	1 hour
12.6.7 Mechanized harvesting of coconuts	• Presentations • Plenary discussions	• Flip charts • Felt pens • Projector • Laptop	15 minutes
12.6.8 Mechanized de-husking of coconuts.	• Presentations • Plenary discussions	• Flip charts • Felt pens • Projector • Laptop	30 minutes
12.6.9 Coconut grating by use of machines	• Presentations • Plenary discussions • Demonstrations	• Flip charts • Felt pens • Projector • Laptop	15 minutes

12.6.10 Module review	• Presentations	• Flip charts • Felt pens • Projector • Laptop	15 minutes
Total			**4 hours**

12.7 Facilitator's Guidelines

Module 12: Mechanization of coconut production activities	
12.7.1 Introduction, objectives and expectations (20 minutes)	**Session guide**
(The facilitator welcomes trainees to the module) **Module objectives (20 minutes)** The facilitator presents module objectives By the end of the module the trainee should be able to: • Identify and explain climate smart tillage options. • Understand the use of bush clearing machines • Appreciate the use of tractor mounted hole auger • Understand the use of semi-automatic harvesting robot equipment • Appreciate the use of coconut climbing machines • Explain the use of pest control implements and tools. • Explain the use of tree crop power harvesters • Understand the use of a de-husking machine/ equipment • Understand the use of grating machines and equipment demonstrated *In each case stating approximate prices and availability of machines, tools and equipment required*	• Summarize trainees' "expectations" and display. • PowerPoint presentation • Distribute participants' handouts
12.7.2. Coconut climate smart land preparation tools and equipment (30 minutes)	**Session guide**
(The facilitator presents on the commonly known land preparation tools and equipment) **Plenary presentation (20 minutes)** Powerpoint presentation highlighting: • Overview of the coconut mechanization activities • Climate smart tillage options	• PowerPoint presentation • Distribute participants' handouts

Plenary discussion (10 minutes) Let the trainees recall what they learned and discuss any issue that may arise	
12.7.3. Bush clearing machines (30 minutes)	**Session guide**
Plenary presentation (20 minutes) • Description and explanation of bush clearing machines **Discussion (10 minutes)** Let the trainees recall what they learned and discuss any issue that may arise.	• Powerpoint presentation • Distribute participants' handouts
12.7.4. Tractor mounted hole digger (15 minutes)	**Session guide**
Plenary presentation (10 minutes) Powerpoint presentation highlighting on: • Description and explanation of tractor mounted hole auguring operations **Discussion (5 minutes)** Let the trainees recall what they learned and discuss any issue that may arise.	• Powerpoint presentation • Distribute participants' handouts • Brochures, leaflets and manual
12.7.5. Semi-automatic coconut harvesting machines and harvesting robot (30 minutes)	**Session guide**
Plenary presentation (20 minutes) Powerpoint presentation highlighting on: • Description and explanation of tractor mounted harvesters as well as other harvesting machines including the harvesting robot **Discussion (10 minutes)** Let the trainees recall what they learned and discuss any issue that may arise.	• Powerpoint presentation • Distribute participants' handouts • Brochures, leaflets and manual

12.7.6. Coconut pest control equipment and tools usage (40 minutes)	Session guide
Plenary presentation 30 minutes) Powerpoint presentation highlighting on: • Description and explanation of coconut climbing tools, machines and equipment **Discussion (10 minutes)** Let the trainees recall what they learned and discuss any issue that may arise.	• Powerpoint presentation • Distribute participants' handouts • Brochures, leaflets and manual
12.7.7. Mechanized harvesting of coconuts (15 minutes)	**Session guide**
Plenary presentation (10 minutes) Powerpoint presentation highlighting on: • Description and explanation of de-husking implements and tools and their usage **Discussion (5 minutes)** Let the trainees recall what they learned and discuss any issue that may arise.	• Powerpoint presentation • Distribute participants' handouts • Brochures, leaflets and manual
12.7.8. Mechanized de-husking of coconuts	**Session guide**
Plenary presentation (20 minutes) Powerpoint presentation highlighting on: • Description and explanation of coconut grating machines and equipment **Discussion (10 minutes)** Let the trainees recall what they learned and discuss any issue that may arise.	• Powerpoint presentation • Distribute participants' handouts • Brochures, leaflets and manual
12.7.9. Coconut grating by use of machines (15 minutes)	**Session guide**
Plenary presentation (10 minutes) Powerpoint presentation highlighting on: • Techniques and methods of harvesting machine operating **Discussion (5 minutes)** Let the trainees recall what they learnt and discuss any issues that may arise	• Powerpoint presentation • Distribute participants' handouts

12.7.10 Module review (15 minutes)	Session guide
(The facilitator leads the trainees in reviewing the module) • Summarize the main points of the training and together with the participants and review the main points: *(Discuss with trainees about issues that may arise from the the module)*	• participants' handouts • Summarize the main points from the module on a flip chart and display

12.8. Reference Material

12.8.1. Participants' Handouts

- Coconut Manuals
- Pamphlets, leaflets.

MODULE 13: COCONUT BUSINESS AND MARKETING

13.1 Introduction

Coconut is mainly produced in Coastal Region in the counties of Kwale, Mombasa, Kilifi, Tana River and Lamu. Coconut tree can yield up to 100-150 per tree per year under good rainfall environment. In the drier average yields are usually 75-100 nuts per tree per year. Markets and marketing of coconut is a major issue of concern to small scale farmers and other actors in the value chain in Kenya, particularly inconsistency in supplying sufficient volumes required for trade, seasonal supply and price fluctuations. The low production volumes and bulkiness of the produce also limit farmers to the local markets, where demand is low and hence prices. To strengthen the Coconut value chain, it is important to equip farmer facilitators with the skills and knowledge on coconut farming business and marketing strategies. This module is designed to build skills of farmer facilitators in coconut farming business and marketing in Kenya.

13.2 Module Learning Outcomes

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

1. The business concept and emerging farming business models explained and appreciated.
2. Planning a farm business using SWOT Analysis, farm budgeting and business plan described.
3. Tools for implementing a farm business, record keeping, break-even, gross-margin and entrepreneurship explained and described.
4. Various marketing approaches of coconut identified.

13.3 Module Target Group

This module targets Public and private agricultural extension agents, service providers and Community Based Facilitators (CBFs) based at sub-county and ward level

13.4 Module Users

This module is intended for use by Master Trainers who are members of the core team of trainers (CTT) and trained trainers. The trainers using this module should thoroughly familiarize themselves with the participants' handouts.

13.5 Module Duration

The Module is estimated to take 3 hours 20 minutes.

13.6 Module Summary

Module 13. Coconut Business and Marketing			
Sessions	**Training methods**	**Training materials**	**Time**
13.6.1. Models for market-oriented production of coconut. (levelling of participants' expectations about the module and objectives)	• Introduction • Plenary discussion	• Projector • Laptop • Flip charts • Marker pens • Masking tapes/flip chart holders	20 minutes
13.6.2. Developing a pusiness plan for coconut farm business i. (Business concept and emerging and farming business models) ii) Planning a farm business: SWOT analysis, farm budgeting and business plan	• Plenary presentation • Plenary discussion • Group exercise	• Projector • Laptop • Flip charts • Marker pens • Masking tapes/flip chart holders	1 hour
13.6.3. Marketing as a group - collective marketing	• Presentation and • Plenary discussions • Role play exercise	• Projector • Laptop • Flip charts • Marker pens • Masking tapes/flip chart holders	30 minutes
13.6.4 Profitability analysis - reviewing performance of coconut agro enterprise (Implementing a farm business: record keeping, break-even, gross margin analysis, entrepreneurship	• Plenary presentation • Plenary discussion	• Projector • Laptop • Flip charts • Marker pens • Masking tapes/flip chart holders	20 minutes
13.6.5 Scaling up plan of coconut agro-enterprise development approach	• Group work • Plenary discussions	• Projector • Laptop • Flip charts • Marker pens • Masking tapes/flip chart holders	30 minutes

13.6.6 Marketing approaches (contracted coconut production model, coconut marketing entrepreneurship model and internet/online/mobile marketing)	• Plenary presentation • Plenary discussion	• Projector • Laptop • Flip charts • Marker pens • Masking tapes/flip chart holders	20 minutes
13.6.7. Module review	• Facilitator's summary • Plenary presentation • Plenary discussion	• Module review • Participants handouts	20 minutes
Total			**3 hours 20 minutes**

13.7 Facilitators Guidelines

Module 13. Coconut business and marketing	
13.7.1 Levelling participants' expectations about the module (20 minutes)	**Session guide**
(The facilitator welcomes trainees to the module and thereafter invites them to state their expectations) *(The facilitator presents module objectives)* By the end of this module, the trainee is expected to: • Appreciate business concept and appreciate emerging and inclusive farmer-market linking models. • Describe how to plan a farm business using SWOT analysis, farm budgeting and business plan. • Describe and explain the tools for implementing a farm business: cost of production, record keeping, break-even, gross margin and entrepreneurship. • Identify the marketing approaches of coconut.	• Summarize trainees' "Expectations" and display on flip chart/board. • Participants handouts • Powerpoint presentation

13.7.2 Developing a business plan for coconut farm business (1 hour)	Session guide
(The facilitator to highlight elements of business concept and emerging farming business models) **Plenary Presentation (10 minutes)** • Business concept and emerging farming business models **Group Exercise (10 minutes)** • Discuss areas of adjustments in the models **Planning a farm business using SWOT Analysis, farm budgeting and business plan –(20 minutes)** *(The facilitator highlights the components of SWOT matrix and their interactions to generate opportunities based on the other components)* **Plenary Presentation (10 minutes)** • SWOT analysis • Budgeting • Business planning **Group Exercise (10 minutes)** List the strengths, weaknesses, opportunities and threats in Coconut farming as a business and marketing	• Powerpoint presentation • Participants' handouts • Group exercise
13.7.3 Marketing as a group - collective marketing (30 minutes)	**Session guide**
(The facilitator highlights the importance and benefits of collective and group marketing **Presentation and discussions (10 minutes)** • Collective Marketing **Role play exercise (20 minutes)** • In groups of two, the trainees will do a role play, where they sell individually and where sell as a group.	• Participants 'handouts • Group exercise

13.7.4 Profitability analysis - Reviewing performance of coconut agro enterprise (20 minutes)	Session guide
(*The facilitator highlights the importance of the tools in managing Coconut production as a farm business)* **Plenary presentation (10 minutes)** • The farmer as an entrepreneur • Record keeping • Profitability assessment (cost of production, break-even & gross margin) **Plenary discussion (10minutes)** • Profitability analysis	• Powerpoint presentation • Participants' handouts • Plenary discussion
13.7.5 Scaling up plan of coconut agro-enterprise development approach (30 minutes)	**Session guide**
Group and plenary discussions (30 minutes) • In groups threes groups the participants discuss how to scale up coconut agro-enterprise *The group leaders in each group present back to the whole plenary and discuss the outcomes.*	• Plenary discussion • Group exercise
13.7.8 Marketing strategies (20 minutes)	**Session guide**
Plenary presentation (10 minutes) (*The facilitator highlights the marketing strategies for the Coconut farm business)* • Market research • Producer organizations • Contract farming • Online/internet marketing **Plenary discussion (10 minutes)**	• Powerpoint presentation • Participants' handouts

13.7.9 Training review (20 minutes)	Session guide
(The facilitator leads the trainees in reviewing the module. Conclude by thanking the trainees) **Plenary presentation (10 minutes*)*** *Summarize the main points of the training*	• Plenary presentation • Summary of the main points from the Module.

13.8. Reference Material

13.8.1. Participants' Handouts

- Coconut Business and Marketing factsheets
- Coconut production manual

13.8.2. Further reading

1. MoALF-Kenya. (2015). Economic Review of Agriculture (ERA).Nairobi Kenya: Central Planning and Project Monitoring Unit. Ministry of Agriculture Livestock and Fisheries.

2. Mwangi M. and Kariuki S. (2015). Factors Determining Adoption of New Agricultural Technology by Smallholder Farmers in Developing Countries.

3. Tawedzegwa M. (2012). Farming as a family business. Training manual. Zimbabwe agricultural competitiveness program.

MODULE 14. COCONUT CROSS-CUTTING ISSUES (AGRICULTURAL INNOVATION PLATFORMS, POLICY, GENDER MAINSTREAMING AND SOCIAL INCLUSION)

Introduction

This module on cross-cutting issues comprises of issues that influence the uptake and upscaling of TIMPs within the Coconut value chain. The issues are namely Agricultural Innovation Platforms (AIPs), Gender mainstreaming and agricultural policy.

The Agricultural Innovation Platform sub module addresses how to facilitate the coming together of relevant value chain stakeholders for interaction and development of innovations to address value chain challenges and opportunities. The gender mainstreaming sub module exposes participants on how to apply a gender lens within the value chain to ensure a level operational ground for all gender categories. Agricultural policy formulation creates awareness on policy formulation and the various rules and regulations that facilitate value chain development. The methodology of delivery for each of these sub modules are presented

SUB MODULE 14.1. AGRICULTURAL INNOVATION PLATFORMS

14.1.1. Introduction

This sub module builds capacity and exposes the participants to an agricultural innovation systems based configuration or organization of stakeholders called the Agricultural Innovation Platform (AIP). It is an organizational model for stimulating innovation and development and brings stakeholders together in a way that pools together skills and knowledge to address challenges and utilize opportunities. The AIP configuration emanated from the realization that innovations arise from multiple sources and have to be adapted to specific contexts. The adaptation process requires systems that foster partnerships and reflexive institutions which allow for learning and innovation. The stakeholders within agricultural innovation platforms include individuals, private companies and public sector organizations, policy makers and other value chain stakeholders. These actors are brought together to seek technical, institutional or organizational solutions to critical challenges hindering agricultural productivity within a value chain. The Agricultural Innovation Platform facilitates actors to interact, innovate, learn and change as they seek a solution to the common challenge. In an innovation platform every actor's contribution is valued and benefits accrue to all in a win-win situation. The AIP is a useful methodology for developing, testing and scaling of innovations in the Coconut value chain.

14.1.2. Sub-Module learning Outcomes

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

1. The definition of agricultural innovation systems and innovations clearly described and understood

2. The characteristics of an innovation platform described and understood.
3. Mobilization of stakeholders for initiation, establishment, management and sustainability of an Agricultural Innovation Platform explained and demonstrated
4. The benefits and challenges of Innovation Platforms explained and understood

14.1.3 Sub-Module Target Group and Categories

This module targets Public and private agricultural extension agents, service providers and CBFs based at sub-county and ward level

14.1.4 Sub-Module Users

This module is intended for use by Master Trainers who are members of the core team of trainers (CTT) and trained trainers. The trainers using this module should thoroughly familiarize themselves with the participants' handouts.

14.1.5 Sub-Module Duration

The Module is estimated to take 3 hours

14.1.6 Module Summary

Sub-Module 14.1 Agricultural Innovation Platforms (AIP)			
Sessions	**Training methods**	**Training materials**	**Time**
14.1.6.1 Introduction, objectives and expectations	• Personal introduction • Plenary Presentation • Plenary discussion	• Flips charts • Felt pens • Projector • Laptop	20 minutes
14.1.6.2 Definition of Agricultural Innovation Systems and different types of innovations (technical, institutional and organizational	• Plenary Presentation • Plenary discussion • Group exercise	• Flips charts • Felt pens • Projector • Laptop	30 minutes
14.1.6.3 Characteristics of an Agricultural Innovation Platform	• Plenary Presentation • Plenary discussion	• Flip charts • Felt pens • Projector • Laptop • Participants' handouts	30 minutes

14.1.6.4 Phases of an innovation platform (Initiation, Establishment, Management and Sustainability)	• Plenary presentation • Plenary discussion • Group Exercise	• Flips charts • Felt pens • Projector • Participants' handouts • Laptop	45 minutes
14.1.6. 5 Case studies of successful Agricultural Innovation Platforms	• Plenary presentation • Plenary discussion • Role plays	• Flips charts • Felt pens • Projector • PPT Presentation • Participants' handouts	15 minutes
14.1.6. 6 Benefits and challenges of Agricultural Innovation Platforms	• Plenary presentation • Plenary discussion • Role plays	• Flips charts • Felt pens • Projector • PPT presentation • Participants' handouts	10 minutes
14.1.6.7 Module review	• Plenary discussion	• Flip Charts • Felt pens • Fact Sheets	30 minutes
Total			2 hours

14.1.7 Facilitator's Guidelines

Sub Module 14.1 Agricultural Innovation Platform (AIP)	
14.1.7.1.Introduction, levelling of expectations and objectives (20 minutes)	**Session guide**
(The facilitator welcomes trainees to the and thereafter invites them to introduce themselves and state their expectations)	• Summarize Trainees' "Expectations" and display. • Powerpoint Presentation

Module objectives (The facilitator presents modules objectives and levels out expectations) By the end of the module, the trainee should be able to: • Define agricultural innovation systems, innovation process and innovations • Describe characteristics of an innovation platform • Explain how to initiate, establish, manage and sustain an Agricultural Innovation Platform • Explain the benefits and challenges of Agricultural Innovation Platforms	
14.1.7.2 A definition of Agricultural Innovation Systems and different types of innovations (technical, institutional and organizational) (30 minutes)	**Session guide**
Plenary presentation and discussion (30 minutes) • Past progression of research and extension models and their shortcomings • Agricultural Innovation Systems model and actualization through Agricultural Innovation Platforms • Definition of innovation process • Types of innovations (products of innovation process)	• Powerpoint Presentation • Plenary discussion
14.1.7.3.Characteristics of an Agricultural Innovation Platform (30minutes)	**Session guide**
The facilitator should present an overview of innovation platforms and their main characteristics **Plenary presentation (20 minutes)** • Characteristics of Agricultural Innovation Platforms • Why Agricultural innovation platforms are used • Where to form Agricultural Innovation Platforms • Establishment of linkages between value chain actors in agricultural innovation platforms **Plenary discussion (10 minutes)** Let the trainees recall what they learned and discuss any issue that may arise.	• Powerpoint Presentation • Participants' handouts • Plenary discussion

14.1.7.4 Phases of an innovation platform (initiation, establishment, management and sustenance (45 minutes)	Session guide
Plenary presentation (30minutes) **Initiation phase** • Mobilization of stakeholders in the Coconut value chain for challenge identification • General description of the value chain within a specific area **Establishment phase** • Clear prioritization of the key value chain challenge or compelling agenda in the (weakness in the chain) • Vision of the AIP formulated with clear goals • Development of a business plan with clear milestones to guide operations of the AIP • Formation of a main committee to coordinate platform activities. • Formation of diverse sub-committees with clear roles **Management phase** • Keeping stakeholders focused on the business plan 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 and scaling phase** • Changing roles of initiator, local stakeholders and Private sector • Local stakeholders lead and own AIP while initiator backstops and private sector supports and seize opportunity • Embarking on fresh issues or challenges • Maintaining capacity acquired to address new issues or challenges in subsequent cycles. **Plenary discussion (15 minutes)** Let the trainees recall what they learned and discuss any issue that may arise.	• Powerpoint Presentation • Participants' handouts • Plenary discussion
14.1.7.5 Case studies of successful AIPS (15 minutes)	**Session guide**
Plenary presentation and discussion • successful innovation platforms and their achievements	• Powerpoint Presentation • Plenary discussion

14.1.7.6 Benefits and challenges of AIPS (10 minutes)	Session guide
Plenary presentation • Benefits of Agricultural innovation platforms • Challenges of Agricultural Innovation platforms	• Powerpoint Presentation • Plenary discussion
14.1.7.7. 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 trainees and review the main points on: • Agricultural Innovation Systems, Innovation process and different Innovations • AIP characteristics, why and where to form them • The four Phases of Innovation Platforms • The benefits and challenges of innovation Platforms *(Discuss with trainees' new things learnt from this Module. What are some of the problems and issues that they have become more aware of in the module?)*	• Participants' Handouts • Summarize the main points from the module on a flip chart and display

14.1.8 Reference material

14.1.8.1. Participants' handouts

- Kamau G. (2020) Agricultural Innovation Platform factsheet
- Kamau G. (2020) Agricultural Innovation Platform Phases factsheets

14.1.8.2. Further reading

1. 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)

2. Makini FW, Mose LO, Kamau GK, Salasya B, Mulinge WW, Ongala J Makelo MN and Fatunbi AO (2017). Innovation opportunities in Coconut Production in Kenya. Forum for Agricultural Research in Africa (FARA).

3. Makini, F.W., Kamau, G., Makelo, M., Mose L.O., Salasya B., Mulinge, W. and Ongala J (2016) Status of Agricultural Innovation Platforms and Innovations Investment. PARI Project country Report. Republic of Kenya. Forum for Agricultural Research in Africa (FARA) Ghana

4. Makini F., Kamau G., Makelo M., Adekunle A., Mburathi G., (2013). Operational field guide for developing and managing local agricultural innovation platforms KARI ISSBN 978-9966-30-004-1

SUBMODULE 14.2 COCONUT GENDER, VULNERABLE AND MARGINALIZED GROUPS (VMGs), SOCIAL AND ENVIRONMENTAL CONCERNS

14.2.1 Introduction to the Sub module

Coconut is an upcoming agro-enterprise in parts of the country involving all the gender categories (men, women, youth vulnerable marginalized groups (VMGs) in its value chain from production, marketing and consumption. Women perform most of the crop's production activities comprising weeding while men mostly perform the task of marketing.

Although the women's contribution is substantial, gender inequalities still exist in all areas of the Coconut value chain. Some 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 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 access to financial resources. Gender analysis examines the productive, community 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.

Coconut value chain TIMPs interventions, when designed and implemented with gender equitable principles, can hasten 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 Coconut value chain are enhanced by the field agricultural practitioners and extension officers in an effort geared towards achieving Climate Smart Agriculture in target counties.

14.2.2 Sub module learning outcomes

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

1. The concept of gender mainstreaming and social inclusion in Coconut value chain appreciated.
2. Youth empowerment in Coconut value chain explained.
3. Women empowerment in Coconut value chain explained and understood.
4. Strategies for inclusion of vulnerable and marginalized groups in Coconut value chain understood and applied.

5. Knowledge on environmental and social management framework (ESMF) tool explained and demonstrated.

14.2.3 Sub module Target Group

This module targets Public and private agricultural extension agents, service providers and CBFs based at sub-county and ward level

14.2.4 Sub module Users

This module is intended for use by Master Trainers who are members of the core team of trainers (CTT) and trained trainers. The trainers using this module should thoroughly familiarize themselves with the participants' handouts.

14.2.5 Sub module Duration

The Module is estimated to take 1 hour and 30 minutes.

14.2.6 Module Summary

Sub module 14.2: Gender mainstreaming and social inclusion in the Coconut value chain			
Sessions	**Training methods**	**Training materials**	**Duration**
14.2.6.1 Introduction, expectations and objectives	• Personal introduction • Presentations • Plenary discussion	• Flips charts • Felt pens • projector • Laptop • Participants' handouts	20 minutes
14.2.6.2 Gender mainstreaming in Coconut value chain	• Powerpoint Presentations • Group Exercise • Plenary discussion	• Flips charts • Felt pens • Projector • Participants handouts	20 minutes
14.2.6.3 Youth empowerment in Coconut value chain	• Powerpoint Presentations • Group exercise • Plenary discussion	• Flips charts • Felt pens • Projector • Participants handouts	10 minutes
14.2.6.4 Women empowerment in Coconut value chain	• Powerpoint Presentations • Plenary discussion	• Flips charts • Felt pens • Projector • Participants handouts	10 minutes

14.2.6.5 Strategies for inclusion of vulnerable and marginalized groups	• Powerpoint Presentations • Plenary discussion	• Flips charts • Felt pens • Projector • Participants handouts	10 minutes
14.2.6.6 Environmental and Social Management Framework	• Powerpoint Presentations • Plenary discussion	• Flips charts • Felt pens • Projector • Participants handouts	10 minutes
14.2.6.7 Sub module review	• Plenary discussion	• Flips charts • Felt pens	10 minutes
Total			**1 hours 30 minutes**

14.2.7 Facilitator's Guidelines

Sub module 14.2: Gender mainstreaming and social inclusion in Coconut value chain	
14.2.7.1 Introduction, objectives and expectations (20 minutes)	**Session guide**
(The facilitator welcomes trainees to the sub module and thereafter invites them to introduce themselves and state their expectations). **Sub module objectives (20 minutes)** *The facilitator presents modules objectives* By the end of the module training, the trainee should be to: 1. Appreciate gender mainstreaming and social inclusion, in Coconut value chain. 2. Explain youth empowerment in Coconut value chain. 3. Appreciate women empowerment inCoconut value chain. 4. Recognize strategies for inclusion of vulnerable and marginalized groups in Coconut value chain. 5. Explain the environmental and social management framework (ESMF) tool.	• Summarize trainees "expectations" and display. • Powerpoint Presentation • Group exercise • Objectives and Training Program

14.2.7.2 Gender mainstreaming and social inclusion in Coconut value chain (20 minutes)	Session guide
(The facilitator presents and explain what gender mainstreaming is, who does what activity, who has access to what resources among others. and why gender mainstreaming is important in Coconut value chain). **Plenary presentation (20 minutes)** • Definition of gender • What is gender mainstreaming and why it is important? • Who does what? (gender division of roles in Coconut value chain) • Who owns what? (access and control of resources & benefits) • Who makes which decisions? • Existing policies in support of gender mainstreaming. **Group exercise and discussion** Let the trainees recall what they learned and discuss any issues that may arise	• Powerpoint presentation, group exercise • Plenary discussion • Participants' handouts • Group exercise • Plenary discussion
14.2.7.3 Youth empowerment in Coconut value chain s (10 minutes)	**Session Guide**
Plenary presentation (10 minutes) • Why agriculture is not attractive to youth • Youth's role in the value chain • Strategies to empower youth in Coconut value chain. **Group exercise and discussion (20 Minute)** Let the trainees recall what they learned and discuss any issues that may arise.	• Powerpoint Presentation • Group exercise • Plenary discussion • Participants' handouts
14.2.7.4 Women empowerment in Coconut value chain (30 minutes)	**Session guide**
Plenary presentation (10 minutes) • Women's role in the value chain • Challenges facing women in the value chain • Strategies for empowering women in the value chain **Plenary discussion** Let the trainees recall what they learned and discuss any issues that may arise.	• Powerpoint Presentation • Distribute participants' handouts • Plenary discussion • Participants' handouts

14.2.7.5. Strategies for inclusion of vulnerable and marginalized groups in Coconut value chain (10 minutes)	Session guide
Plenary presentation (10 minutes) • Who are vulnerable and marginalized groups (VMGs) • Why gender inequality exists • Social inclusion and why • Strategies of inclusion of VMG. **Plenary discussion** Let the trainees recall what they learned and discuss any issues that may arise.	• Powerpoint Presentation • Plenary discussion • Participants' handouts
14.2.7.6. Environmental and social management framework (ESMF) (10 minutes)	**Session guide**
Plenary presentation (10 minutes) • Objective of ESMF in Coconut value chain • Environmental and social safeguards of Coconut • Safeguard policies triggered by the project **Plenary discussion** Let the trainees recall what they learned and discuss any issues that may arise.	• Powerpoint Presentation • Plenary discussion
14.2.7.7 Sub module review (10 minutes)	**Session guide**
(The facilitator leads the participants 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 Coconut value chain • Women empowerment in Coconut value chain • Strategies for inclusion of vulnerable and marginalized groups in Coconut value chain • Environmental and Social Management Framework of Coconut activities. Let the trainees recall what they learned and discuss any issues that may arise.	• Summary of the main points on from the module on a flip chart and display

14.2.8 Reference Materials

14.2.8.1 Participants' handouts

- Gender mainstreaming and social inclusion factsheets
- Gender mainstreaming and social inclusion guides

14.2.8.2 Further reading

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

SUB-MODULE 14.3 CLIMATE SMART POLICY OPTIONS

14.3.1 Introduction

Kenya adopted Vision 2030 in 2007 as a new blueprint and roadmap for political, social and economic development of the country in the next two decades. The Vision also identifies Agriculture as the engine of growth through transformation of smallholder and subsistence agriculture to innovatively and commercially oriented agriculture. Kenya promulgated the new constitution in 2010 which proposes 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, agricultural sector financing and related activities 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 Master Trainers to 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.

14.3.2 Module Learning Outcomes

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

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

14.3.3 Module Target Group

This module targets Public and private agricultural extension agents, service providers and CBFs based at sub-county and ward level

14.3.4 Module Users

This module is intended for use by Master Trainers who are members of the core team of trainers (CTT) and trained trainers. The trainers using this module should thoroughly familiarize themselves with the participants' handouts.

14.3.5 Module Duration

The Module is estimated to take3 hours.

14.3.6 Module Summary

Module14.3:Climate-Smart Agricultural Policy Options			
Sessions	**Training methods**	**Training materials**	**Time**
14.3.6.1 Introduction, learning expectations and outcomes	• Personal introductions • Group discussion • Plenary discussions • Plenary presentation	• Flip charts • Felt pens • Projector • Laptop	20 minutes
14.3.6.2 Agricultural Policy Frameworks in Kenya	• Presentations • Practical exercise • Plenary discussion	• Flips charts • Felt pens • Projector • Laptop	30 minutes
14.3.6.3 Climate-smart agriculture practices, policy options and approaches	• Presentations • Practical exercises • Plenary discussion	• Flips charts • Feltpens • Projector • Laptop • Participants handouts	30 minutes
14.3.6.4 Climate-smart-Sensitive policy cycle	• Presentations • Plenary discussion	• Flips charts • Felt pens • Projector • Laptop • Participants handouts	30 minutes
14.3.6.5 Implementation of the climate-smart-sensitive policy at the county level	• Presentations • Practical exercise • Plenary discussion	• Flips charts • Felt pens • Projector • Laptop • Participants handouts	20 minutes

14.3.6.6 Financing and Investments for Climate-smart Agriculture	• Presentations • Practical exercise • Plenary discussion	• Flips charts • Felt pens • Projector • Laptop • Participants handouts	30 minutes
14.3.6.7 Technology Policy	• Plenary Presentation • Plenary discussions	• Flips charts • Felt pens • Powerpoint • Laptop • Participants Handouts	20 minutes
14.3.6.8Module review	• Plenary discussion	• Flipcharts • Felt pens	20 minutes
Total			**3hours 20 minutes**

14.3.7 Facilitator's Guidelines

Sub-Module14.3: Climate-Smart Agricultural Policy options	
14.3.7.1 Introduction, expectations and outcomes (20 minutes)	**Session guide**
(The facilitator welcomes trainees to the module and then invites them to introduce themselves and state their expectations). **Trainees expectations (10 minutes)** *(The facilitator requests the participants to form groups and list their expectations)* **Module objectives (10 minutes)** *(The facilitator presents module learning objectives)* By the end of this module the trainee should be able to: • Explain the role of agricultural policy frameworks in Kenya • Identify climate-smart agriculture practices, options and approaches • Recount the stages in climate-smart-sensitive policy cycle • Describe the phases in the implementation of the climate-smart-sensitive policy at the county level • Evaluate and select financing and investments options for Climate-smart Agriculture • Explain the need for technology policy	• Summarize • Participants' expectations" • Powerpoint presentation • Distribute participants handouts

14.3.7.2 Agricultural Policy Frameworks in Kenya (30 minutes)	
Plenary presentation (20 minutes) • The role of agricultural policy frame works in Kenya **Practical exercise (10 minutes)** *(The facilitator requests the trainees to form groups and identify the GAP between agricultural policy frameworks and the existing agricultural policies).*	• Powerpoint presentation • Distribute participants' handouts • Group exercise
14.3.7.3 Climate-smart agriculture practices, policy options and approaches (30 minutes)	**Session guide**
Plenary presentation(15 minutes) • 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 (15minutes)** *(The facilitator requests the trainees to form groups and identify theexistingclimate-smartagriculturepracticesandtherelevantpolicyoptionsforimplementation).*	• Powerpoint presentation • Distribute participants' handouts • Group exercise
14.3.7.4 Climate-smart-sensitive policy cycle (30 minutes)	**Session guide**
Plenary presentation (15 minutes) • Stages in the climate-smart-sensitive policy cycle **Plenary discussions(15 minutes)** • Climate-smart-sensitive policy cycle	• Powerpoint presentation • Distribute participants 'handouts • Plenary discussion
14.3.7.5 Implementation of the climate-smart-sensitive policy at the county level (20 minutes)	**Session guide**
Plenary presentation (10minutes) • Phases in the implementation of the climate-smart-sensitive policy at the county level **Practical exercise (10minutes)** *(The facilitator requests the trainees to form groups and develop a programme showing steps, activities and stakeholders for the implementation of climate-smart policies).*	• Powerpoint Presentation • Distribute participants' handouts • Practical exercise

14.3.7.6 Policy financing and investments for Climate-smart Agriculture (30 minutes)	Session guide
Plenary presentation (20minutes) • Why financing is needed • Financing GAP • Sources of financing • Financing mechanisms • Connecting action to financing • Types of subsidies to farmers **Group exercises (10minutes)** *(The facilitator requests the trainees to form groups and identif y potential sources of financing, financing mechanisms and connecting action to financing)*.	• Powerpoint presentation • Distribute • Participants 'handouts • Practical exercise
14.3.7.7NeedofTechnologyPolicy(20minutes)	**Session guide**
Plenary presentation (10minutes) • 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(10minutes)** • Technology policy	• Powerpoint • presentation • Distribute participants' handouts
14.3.7.8 Module review(20 minutes)	**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. • Trainees 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 module	• Q&Asession • Recap the mainpoints • Test understanding • Participatory evaluation of thesession

14.3.8. Reference Material

14.3.8.1. Participants' handouts

- Climate-Smart Agricultural Policy Options factsheets
- Climate-Smart Agricultural Policy Options guide

14.3.8.2. Further reading

1. FAO (2016) The Gender in Agricultural Policies Analysis Tool(GAP). Agriculture. Policies, Practices and Financing for Food Security, Adaptation and Mitigation.

2. FAO (2016) “Climate-Smart” Agriculture Policies, Practices and Financing for Food

3. Chronic Poverty Advisory Network (2012). Agriculture Policy Guide2.Meeting the challenge of a new Pro-poor agricultural paradigm: The role of agricultural policies and programmes.

4. GoK (2007). Kenya adopted Vision 2030

5. Alila, P.O. and Atieno, R. (2006). Agricultural policy in Kenya: issues and processes: A paper for the Future Agricultures Consortium workshop, Institute of Development Studies, 20-22 March 2006. Future Agricultures.

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.

ANNEXES

ANNEX 1: TRAINING PROGRAM

The training program presented here assumes that the trainees report on Sunday evening as the first day.

KENYA CLIMATE SMART AGRICULTURE PROJECT
COCONUT VALUE CHAIN TRAINING OF TRAINERS WORKSHOP
TRAINING VENUE
DATES:
(DRAFT PROGRAMME)

Time	Activity	Duration	Responsible
Day 0: Sunday	Travel and Arrival at the training venue	Whole day	Secretariat
Day 1: Monday	**Chair:** **Rapporteur:**		
8.00 a.m.- 8.30 a.m.	Registration	30 minutes	Secretariat
	Opening prayer and introductions		
8.30 a.m.- 10.00 a.m.	**Official opening of the Coconut value Chain ToT workshop**	1 hour 30 minutes	
	Coconut ToT workshop objectives		
	Remarks from Director Crops Systems and welcoming of the Deputy Director General – Crops		
	Remarks from Deputy Director General - Crops and official opening		
	GROUP PHOTO		ALL
10.00 a.m.-10.30 a.m.	Climate setting and class organization	30 minutes	
10.30 a.m.-11.00 a.m.	**HEALTH BREAK**	**30 minutes**	
11.00 a.m.– 12.00 noon.	Farmer field and business school (FFBS) approach in Coconut production	1 hour	

Time	Activity	Duration	Responsible
12.00 noon –1.00 p.m.	Climate Change and Climate Smart Agriculture in Coconut value chain	3 hours	
1.00 p.m.- 2 .00 p.m.	**LUNCH BREAK**	**1hour**	
2.00 p.m. – 4. p.m.	Coconut variety selection	2 hours	
4.00 p.m. – 4.30 p.m	**HEALTH BREAK**	**30 minutes**	
Close of Day 1			
Day 2: Tuesday	**Chair:** **Rapporteur:**	**Period**	
8.00 a.m. – 8.30 a.m.	Registration, prayer Recap of day1 activities	30 minutes	
8.30 a.m. – 10.30 a.m.	Coconut Production Niches and Climatic requirements	2 hours	
10.30 a.m.-11.00 a.m.	**HEALTH BREAK**	**30 minutes**	
11.00 a.m.–1.00 p.m.	Coconut Climate smart agronomic practices	2 hours	
1.00 p.m.-2.00 p.m.	**LUNCH BREAK**	**1hour**	
2.00 p.m.– 4.00 p.m.	Coconut Seed Systems	2 hours	
4.00 p.m.	**HEALTH BREAK**	**30 minutes**	
Close of day 2			
Day 3 Wednesday	**Chair:** **Rapporteur:**	**Period**	
8.00 a.m. – 8.30 a.m.	Registration, prayer and pecap of day 2 activities	30 minutes	
8.30 a.m.–10.30 a.m.	Coconut Crop Health (pests, diseases and weeds).	2 hours	
10.30 a.m.-11.00 a.m.	**HEALTH BREAK**	**30 minutes**	
11.00 a.m.–12.00 noon	Integrated soil and water management practices for coconut production part 1	2 hours	
1.00 p.m.-2.00 p.m.	**LUNCH BREAK**	1 hour	
2.00 p.m.–4.30 p.m.	Integrated soil and water management practices for coconut production part II	2 hours 30 minutes	
4.30 p.m. – 5.00 p.m.	**HEALTH BREAK**	**30 minutes**	
Close of day 3			
Day 4 Thursday	**Chair:** **Rapporteur:**	**Period**	
8.00 a.m. – 8.30 a.m.	Registration, prayer and recap of day 3 activities	30 minutes	

Time	Activity	Duration	Responsible
8.30 a.m. – 10.30 a.m.	Mechanization of coconut production	2 hours	
10.30 a.m.-11.00 a.m.	**HEALTH BREAK**	**30 minutes**	
11.00 a.m. – 1.00 p.m.	Coconut harvesting and postharvest management	2 hours	
1.00 p.m.-2.00 p.m.	**LUNCH BREAK**	1 hour	
2.00 p.m.–4.00 p.m.		2 hours	
4.00 p.m. – 4.30 pm	**HEALTH BREAK**	**30 minutes**	
Close of day 4			
Day 5: Friday	**Chair:** **Rapporteur:**	**Period**	
8.00 a.m.– 11.00 a.m.	Registration, prayer and travel to a coconut farm.	3 hours	
11.00 a.m.-11.30 a.m.	**HEALTH BREAK**	**30 minutes**	
11.30 a.m.–1.30 p.m.	Field excursion: in a coconut farm	2 hours	All
1.00 p.m.-2.00 p.m.	**LUNCH BREAK**	1 hour	
2.00 p.m.-5.30 p.m.	Travel back to the training venue	3 hours 30 minutes	All
5.00 p.m. – 5.30 pm	**HEALTH BREAK**	**30 minutes**	
Close of Day 5			
Day 6 Saturday	**Chair:** **Rapporteur:**	**Period**	
8.00 a.m. – 8.30 a.m.	Registration, prayer and recap of day 4 &5 activities	30 minutes	
8.30 a.m.–10.30 a.m.	Food Safety Management System (HACCP) and Good Agricultural Practices (GAP) in Coconut value chain.	2 hours	
10.30 a.m.-11.00 a.m.	**HEALTH BREAK**	**30 minutes**	
11.30 a.m. – 1.30 p.m.	Coconut value addition part I: (theory on the importance of value addition, value added products and their nutritional benefits)	2 hours	
1.30 p.m.-2.15 p.m.	**LUNCH BREAK**	1 hour	
2.15 p.m. – 4.45 p.m.	Coconut value addition part II: (Demonstration of recipes for various value-added products of coconut).	2 hours 30 minutes	
4.45 pm – 5.15 p.m.	**HEALTH BREAK**	**30 minutes**	
Close of Day 6			
Day 7: Sunday	**Chair:** **Rapporteur:**	**Period**	

Time	Activity	Duration	Responsible
8.00 a.m. – 8.30 a.m.	Registration, prayer and recap of Day 6 activities	30 minutes	
8.30 a.m. - 10.30 a.m.	Coconut business and marketing	2 hours	
10.30 a.m.-11.00 a.m.	**HEALTH BREAK**	**30 minutes**	
11.00 a.m.– 1.00 p.m.	Agricultural Innovation Platforms (AIPs)	2 hours	
1.00 p.m.-2.00 p.m.	**LUNCH BREAK**		
2.00 p.m.-4.30 p.m.	Agricultural policy	2 hours 30 minutes	
4.30 p.m – 5.00 pm	**HEALTH BREAK**	**30 minutes**	
Close of Day 7			
Day 8: Monday	**Chair:** **Rapporteur:**	**Period**	
8.00 a.m. – 8.30 a.m.	Registration, prayer and recap of day 7 activities	30 minutes	
8.30 a.m.-9.30 a.m.	Agricultural policy	1 hour	
9.30 a.m.– 11.00 a.m.	• Gender mainstreaming and social inclusion in Coconut value chain	1 hour 30 minutes	
11.00 a.m. -11.30 a.m.	**HEALTH BREAK**		
11.30 a.m.– 1.30 p.m.	• Gender mainstreaming and social inclusion in Coconut value chain	2 hours	
1.30 pm – 2.30 pm	**LUNCH BREAK**	1 hour	
2.30 p.m.– 3.00 p.m.	• Course evaluation	30 minutes	
3.00 p.m. – 3.30 p.m.	Presentations of County action plans	30 minutes	
3.30 p.m.-4.00 p.m.	• Way forward	30 minutes	
4.00 p.m.-5.00 p.m.	**Official closing of ToT workshop** • Remarks by the group leader (Governor) • Remarks by the CPC • Remarks by KCSAP Crops coordinator- **Ms. Violet Kirigua** • Remarks by KCSAP NPCU -**Dr. Charles Lungaho** • Issuance of Certificates –**Dr. Lusike Wasilwa** Official closing address by Director Crops- **Dr. Lusike Wasilwa** • Closing prayer	1 hour	
Day 9 Tuesday	Departure from the training venue		
8.00 a.m.	Registration, prayer and departure		**ALL**

ANNEX 2: GENERAL REFERENCE MATERIALS

No.	Category / Modules	Publication title	Reference types	No Pages	Farmer Category A= New entrant/ Coconut Elite farmer B= Elite Coconut Farmer
1	Climate change and climate smart agriculture	Coconut factsheets			**AB**
2	Farmer Field Business School (FFBS) approach	Khisa Godrick: (2004) Farmer Field School Methodology: Training of Trainers Manual. Sustainet East Africa; (2010) Farmer Field School: A Technical Manual	Field Booklet Field Booklet	42 41	**AB** **AB**
3	Good Agricultural Practices (GAP) and Food Safety Management System (FSMS) - Hazard Analysis Critical Control Points (HACCP) Plan	Hazard Analysis Critical Control Point Principles and Application Guidelines", Adopted August 14, 1997,	Book	120	**AB**
4	Coconut production niches and climatic requirements	Factsheets on coconut production niche and climatic requirements	Factsheet		**AB**
5	Coconut variety selection	Coconut variety factsheets	Factsheets		**AB**
6	Coconut seed systems	Coconut seed system factsheets	Factsheets		**AB**

7	Coconut climate smart agronomic practices	Factsheets on coconut climate smart agronomic practices	Factsheets		**AB**
8	Integrated soil and water management practices for coconut production	Isaya V. Sijali, 2001. Drip Irrigation: Options for smallholder farmers in eastern and southern Africa. Technical Handbook No. 24. Published by SIDA's Regional Land Management Unit, Nairobi. FAO, 2014. Irrigation Techniques for Small-scale Farmers: Key Practices for DRR Implementers. Rome: Food and Agriculture Organization of the United Nations (FAO). http://www. fao.org/3/a-i3765e. pdf	Manual Manual	35	**AB** **AB**
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10	Coconut harvesting and post-harvest management	Coconut harvest and post-harvest factsheets	Factsheets		**AB**
11	Coconut value addition	Coconut Value addition factsheets	Factsheets		**AB**
12	Mechanization of Coconut production activities	Coconut Mechanization factsheets	Factsheets		**AB**

13	Coconut business and marketing	Coconut Business and Marketing factsheets	Factsheets		**AB**
14	**Coconut cross cutting issues**				
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ANNEX 3: FFBS LEARNING MATERIALS

PARTICIPATORY TECHNOLOGY DEVELOPMENT (PTD) AND CURRICULUM ON COCONUT SOIL FERTILITY MANAGEMENT:

Value Chain	Coconut
Learning Enterprise	Coconut
Funded Enterprise	Coconut VC at production level
Background Problem	Low Coconut production due to poor soil fertility
Objective	To increase production through improved soil fertility management strategies

Factors to consider:

- Land topography
- Runs (blocks should face East to West)
- Certified seeds of preferred Coconut variety
- Organic and inorganic fertilizer use management

Setting the P.T.D blocks:

1. 6 trees are selected randomly in 4 equal blocks of the orchard to be the plots
2. Improved Coconut varieties
3. The blocks must be right angled.
4. Different soil fertility management treatments
5. During data collections: collect the data using 3-4 plants in the midst of each block.
6. Other TIMPs should be applied equally in each block.
7. Weeding and spraying should also be done the same time

Parameters Measurement

- No of nuts per plant
- Average weight of per Nut
- Thickness of flesh
- Wt of shell plus flesh
- Yield /unit area

Setting of Blocks

Plot 1 Inorganic fertilizer P source	-	Plot 2 Inorganic fertilizer compound fertilizer		Plot 3 Inorganic compound fertilizer plus organic Fertilizer		Plot 4 Farmers practice

AGRO ECOSYSTEMS ANALYSIS (AESA) ON COCONUT

AESA NO ……

General information

Variety …….

Fertilizer ……

Planting date……

Weather: …….

Agronomic data

No of nuts per plant……

Average weight per nut…...…

Thickness of flesh…..……..

Weight of shell plus flesh……

Yields per unit area……

Time of observation: ……..…..

Diagram of pests and natural enemies observed:……..

Natural enemies	**Insects observed**
1	1.
2.	2
3.	3
4.	4.
Observations	**Recommendations**
Weeds	Weeding after 2 weeks
Holes on leaves	Pest and disease scouting
Yellow leaves	Pest/disease control

National Agricultural and Rural Inclusive Growth Project
(NARIG),
P.O. Box 8073-00200 Nairobi, Kenya
Capitol Hill Towers, 5th Floor, Cathedral Road
Website: www.narigp.go.ke