



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

## TRAINING OF TRAINERS' MANUAL



Njuguna J.K., Gathambiri C.W, Otipa M., Wasike V.W., Ndung'u J.M., Kiarie S. M., Too A.,  
Ndambuki J., Kamau G.M., Ndubi J., Ndung'u J.N., Nyaga A., Nasirembe W.,  
Mwangi H., Momanyi V.M., Otieno M., Maingi M.N., Kivuva A.W., Kirigua V.O. and  
Wasilwa L.A.

OCTOBER 2021



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Innovations and Management Practices for  
Avocado Value Chain**

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KALRO Secretariat

P O Box 57811-00200

Nairobi, KENYA

Email: [directorgeneral@kalro.org](mailto:directorgeneral@kalro.org)

Tel. No(s): +254-722206986/733333223

**Compiled by:** Njuguna J.K., Gathambiri C.W, Otipa M., Wasike V., Ndung'u J.M., Kiarie S.M., Too A., Ndambuki J., Kamau G., Ndubi J., Ndung'u J.N., Nyaga A., Nasirembe W., Mwangi H., Momanyi V.M., Otieno M., Maingi M., Kivuva A., Kirigua V.O. and Wasilwa L.A.

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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 to impart knowledge and skills of CSA interventions for the Avocado value chain contained in the inventory of TIMPs.

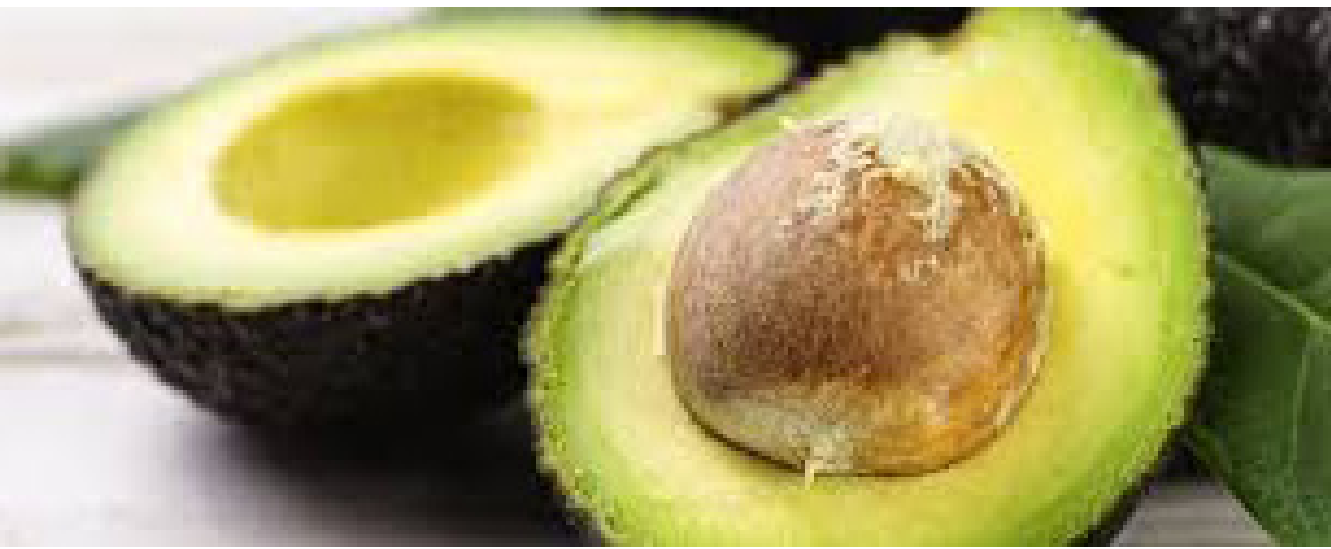
The content of training is arranged in progressive modules supported by extensive information from research and background data drawn from the TIMPs. Its relevance is based on the needs teased out of the value chain and NARIGP objectives. The training design takes into consideration the delivery system, partners and their roles, duration of training and logical flow of the sessions. The Manual 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 learn by participating in the actual field activities. Furthermore, to ensure that the training across various groups is standardized, facilitators' 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 without loss of details regardless of varied facilitators.

It is highly advised that the ToT manuals should be used in conjunction with the respective value chain TIMPs inventory document and handouts 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 Project objectives, which are to maximize productivity, increase profitability and enhance commercialization.

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 optimize a new way of delivering training content in a changing agricultural environment.

**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 Avocado 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 Avocado 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 and Rural Inclusive Growth Project**



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## LIST OF ABBREVIATIONS

<b>AEZs</b>	Agro-ecological zones
<b>AESA</b>	Agro ecosystems Analysis
<b>AIP</b>	Agricultural Innovation Platform
<b>CBFs</b>	Community Based Facilitators
<b>CCPs</b>	Critical control points
<b>CIGs</b>	Common Interest Group
<b>CLs</b>	Critical limits
<b>CSA</b>	Climate Smart Agriculture
<b>CTT</b>	Core Team of Trainers
<b>ESMF</b>	Environmental and Social Management Framework
<b>FFBs</b>	Farmer Field and Business School
<b>FSMS</b>	Food Safety Management System
<b>GAPs</b>	Good Agricultural Practices
<b>HACCP</b>	Hazard Analysis Critical Control Points
<b>HCD</b>	Horticultural Crops Directorate
<b>IDM</b>	Integrated Disease Management
<b>IPM</b>	Integrated Pest Management
<b>ISFM</b>	Integrated Soil Fertility Management
<b>KALRO</b>	Kenya Agricultural and Livestock Research Organization
<b>KCSAP</b>	Kenya Climate Smart Agriculture Project
<b>LF</b>	Lead Farmers
<b>PTD</b>	Participatory Technology Development
<b>SMART</b>	Specific, Measurable, Achievable, Realistic and Time bound
<b>TIMPs</b>	Technologies, Innovations and Management Practices
<b>ToTs</b>	Training of Trainers





## INTRODUCTION

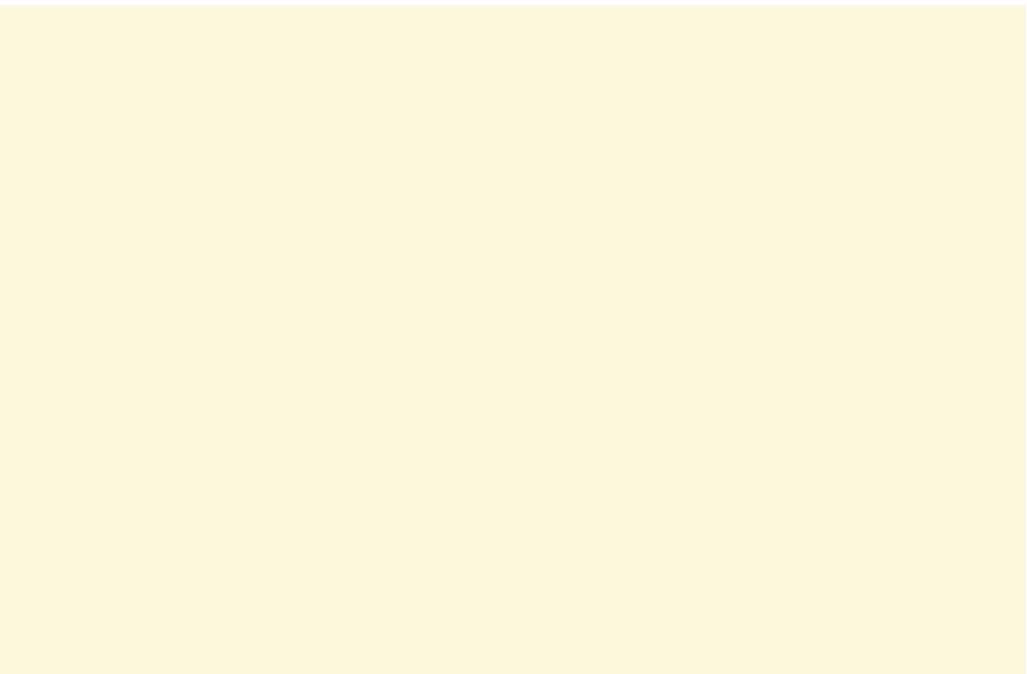
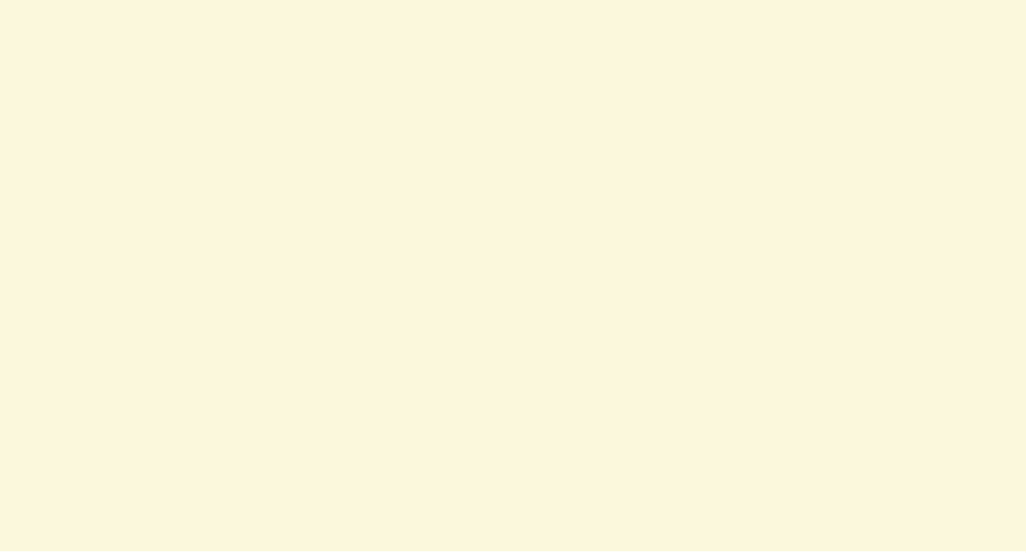
### About this manual

This training of trainers' manual consists of two parts; namely part 1 and part II. 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 avocado value chain, Content of the training, training design and facilitators' guidelines.





## SECTION 1:BACKGROUND

### 1.1 The Role of Avocado in the Kenyan Economy

Avocado production in Kenya is dominated by small-scale farmers who contribute about 80 % of the total production. In 2019, Kenya was the leading exporter of avocado fruits in Africa, however only 10% of the total production was exported. The main varieties grown are Hass, Fuerte, Pinkerton, Puebla and Entigger. According to Horticultural Crop Directorate (HCD) report of 2019, the area under avocado production increased by 43% while volume increased by 33%. This was attributed to promotion and planting of new orchards in non-traditional areas of the Rift valley and Western Kenyan counties. In terms of production the leading county was Murang'a (32%) followed by Kiambu (13), Kisii (13%) and Bomet (5%) and Nyamira (5%), respectively. Despite avocado's great potential for economic and nutritional security, especially for the smallholder farmers, it remains under exploited largely due to challenges at various segments of the value chain. The main challenges facing avocado farmers are limited knowledge on orchard management especially crop nutrition, pest, diseases and pollination management. Regarding crop nutrition, majority of the farmers have limited information on site-specific fertilizer requirements and application regimes which lead to low productivity, poor fruit quality and physiological disorders. After production, the main challenges are immature fruits, postharvest losses of about 40 % and lack of access to the prime markets mainly due to quality concerns.

### 1.2 Role of Avocado in Food and Nutrition Security

Avocado fruit has a great potential in contributing to food, economic and nutritional security in the country. Avocado fruit is a source of income for small holder farmers and foreign exchange for the country. It has important nutritional and medicinal properties due to their high oil (12-30 %) and protein (1.5 - 2.5 %) content. It also contains carbohydrates, vitamins, and minerals thus can be regarded as health food. Currently avocados are grown on large scale for commercial purposes for oils and pharmacological products while also providing employment to many skilled and semi-skilled laborers working in the agro processing industries.

### 1.3 Avocado value chain as climate smart innovation

Avocado is an exceptionally suitable crop for upscaling as a climate smart technology and for building resilience to climate change among the smallholder growers in the avocado growing areas due to the following key factors:

- Avocado is an ever green tree thus contributing to reduction carbon dioxide in the atmosphere.
- Avocado is amenable to intercropping with short duration crops such as beans, pigeon pea, green gram and other high value crops such as coffee. Thereby greatly improving the production of the land unit.
- There is high and increasing demand for fresh avocado fruits locally and internationally.



- There are many opportunities for economic participation by women, youth, marginalized and vulnerable groups along various nodes in the avocado value chain. Adoption of avocado production will meet the great food and nutritional demand.

#### **1.4 Objectives of the Training**

The purpose of the training is to provide farmer trainers with knowledge and skills on facilitating and supporting farmers, for increased productivity through adoption of avocado GAPs and food safety. Specifically, the objectives of this training are to provide farmer trainers with:

1. Relevant attitude, knowledge and skill in farming as a business and market assessment techniques for market-led production including establishment and management of avocado nurseries and tree orchards.
2. Knowledge and skills on avocado pre-harvest, post-harvest management and value addition.
3. Knowledge and skills in participatory techniques for effective facilitation of adult learning processes through FFBS and developing inclusive stakeholder partnerships for sustainable up scaling of avocado.
4. Knowledge on improved avocado varieties, and GAPs.

After the training, the Trainer of Trainers as facilitators will train Community Based Facilitators (CBFs) lead farmers (LF) in various aspects of avocado value chain in respective selected counties. The training will involve providing the LFs with techniques in participatory preparation, mobilization, planning, implementation, monitoring and evaluation of training sessions. The CBFs, LFs and county extension personnel will thereafter up scale the adoption of GAPs through farmer groups in their villages and those in the neighborhood.

## SECTION 2: TRAINING CONTENT

### 2.1 Orientation of the Module

This section of the training manual deals with the training content. It outlines the orientation and outline of the 14 modules, which are orientated so as to ensure adoption and up scaling of avocadoTIMPs, to improve productivity, resilience and mitigation of harmful greenhouse gases. The purpose of these modules is to enhance the knowledge and capacities of trainers in understanding and disseminating the climate-smart avocado practices to the intended beneficiaries, who are primarily farmers.

### 2.2 Module Outline

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

- a) **Introduction** – context and background to training needs, knowledge and skills gaps 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 of exposure to materials
- 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 avocado value chain**

No.	Module Name	Need Addressed	Expected Training Outcomes	Duration
1	Climate change and climate smart agriculture	<ul style="list-style-type: none"> <li>Understand the impact of climate crisis on avocado production</li> <li>Avail climate smart technologies for avocado value chain</li> </ul>	<ul style="list-style-type: none"> <li>The potential impact of climate change on Avocado production understood</li> <li>Climate smart techniques for avocado described</li> </ul>	4 hours
2	Farmer Field and Business School (FFBS) approach in avocado value chain	<ul style="list-style-type: none"> <li>Improved skills/ technologies for production, processing and marketing</li> </ul>	<ul style="list-style-type: none"> <li>Improved technologies/ innovations and management practices for avocado for dissemination described</li> </ul>	4 hours 30 minutes
3	Good Agricultural Practices (GAPs) and Food Safety Management System (FSMS)	<ul style="list-style-type: none"> <li>Enhance food safety through lowering presence of hazardous solids/ organisms/ and pollutants pathogens</li> </ul>	<ul style="list-style-type: none"> <li>Techniques for determining pollutants in food material explored for adoption in avocado value chain</li> </ul>	6 hours 30 minutes
4	Avocado production niches and climate requirements	<ul style="list-style-type: none"> <li>Identify areas that are suitable for avocado production</li> </ul>	<ul style="list-style-type: none"> <li>Avocado niches in the respective counties explained</li> </ul>	4 hours
5	Avocado variety selection	<ul style="list-style-type: none"> <li>Awareness on improved avocado varieties</li> </ul>	<ul style="list-style-type: none"> <li>The new improved varieties described</li> </ul>	4 hours 30 minutes
6	Avocado seed systems	<ul style="list-style-type: none"> <li>Awareness on both formal and informal seed systems and their operations.</li> </ul>	<ul style="list-style-type: none"> <li>The formal and informal seed supply systems understood.</li> </ul>	4 hours

7	Climate smart agronomics practices for avocado production	<ul style="list-style-type: none"> <li>• Avail sustainable options for innovating increased avocado production</li> </ul>	<ul style="list-style-type: none"> <li>• Benefits of both water and input manipulations analyzed and understood</li> </ul>	4 hours 30 minutes
8	Integrated soil fertility and water management practices for avocado production	<ul style="list-style-type: none"> <li>• Avail soil water and fertility enhancing techniques availed.</li> </ul>	<ul style="list-style-type: none"> <li>• All techniques for ISFM described</li> </ul>	5 hours
9	Avocado crop health	<ul style="list-style-type: none"> <li>• Avail all major pests (invertebrate and vertebrate), diseases and weeds control mechanisms.</li> </ul>	<ul style="list-style-type: none"> <li>• Reduction of yield loss of Avocado by the major pests and diseases explained</li> </ul>	6 hours
10	Avocado harvesting and Post- harvest management	<ul style="list-style-type: none"> <li>• Avail postharvest technologies that reduce losses in quantity and quality</li> </ul>	<ul style="list-style-type: none"> <li>• Proper harvesting techniques and storage facilities, hygiene and monitoring described</li> </ul>	3 hours
11	Avocado value addition	<ul style="list-style-type: none"> <li>• Awareness on various avocado value added products</li> </ul>	<ul style="list-style-type: none"> <li>• Value addition and Avocado products identified for the farming communities and business entities</li> <li>• Opportunities Identified and Prioritized</li> </ul>	6 hours
12	Mechanization of Avocado production activities	<ul style="list-style-type: none"> <li>• Awareness of mechanization of operations along the avocado production value chain</li> </ul>	<ul style="list-style-type: none"> <li>• Options of mechanization for increased yields understood.</li> </ul>	4 hours
13	Avocado business and Marketing	<ul style="list-style-type: none"> <li>• Awareness of business options are available in avocado value chain</li> </ul>	<ul style="list-style-type: none"> <li>• Type of aggregations by farmers available for considerations and contract farming outlined</li> </ul>	2 hours

14	<p>Avocado Cross cutting issues</p> <p>(i) Innovation Platforms</p> <p>(ii) Gender mainstreaming and social inclusion</p> <p>(iii) Policy</p>	<ul style="list-style-type: none"> <li>• Articulate how Voluntary Marketing Groups can draw benefits from Avocado value chain</li> <li>• Awareness of the options of employment opportunities in avocadoproduction</li> <li>• Profiled sites for information at the county levels</li> </ul>	<ul style="list-style-type: none"> <li>• Opportunities for marginalized groups identified</li> </ul>	6 hours
<b>Total Duration</b>				<b>65 hours</b>



## SECTION 3: TRAINING DESIGN

### 3.1 Delivery System

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

- a) **Establishment of a team of facilitators**
  - A Core Team of Trainers (CTT) to train farmer trainers (service providers) as facilitators of a ToT course will be established. This is done using this manual and modules contained therein.
  - Each of the Master 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.
- b) **Up scaling** – This will be done by identifying and selecting lead farmers (LF) 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 experts. They will also provide backstopping services.
- b) **County Government**- The County Government through NARIGP Coordinating Unit will select a team to be trained as Trainers of Trainers. 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 and ensure appropriate adoption at farmers' level. The CBFs will also plan and organize exchange visits for farmers 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 for 14 modules in the avocado value chain shall take a total of 65 hours of training period. 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 such 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 filing of participants' handouts.
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 and socially distanced 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 LCD 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 cereal 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 skills. 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**).

### 4.4 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 Method**

<b>Training Method</b>	<b>Description of Method</b>
Plenary presentations	Use of PowerPoint 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

## 4.5 Planning Schedule and Guideline for ToT Preparation

While planning for this training, the CTT leader should ensure the following before the training:

1. **Six weeks** – recruit master trainers, compose CTT and identify demonstration plots with appropriate avocado varieties
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 for 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 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 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

## 4.6 Evaluation of the Training

Half a day has been allocated for planning for way forward and evaluation of the ToTon 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 Avocado Production			
3. Good Agricultural Practices (GAPs) and Food Safety Management Systems (FSMS)			
4. Avocado production Niches and Climatic Requirements			
5. Avocado variety selection and access to quality seeds.			
6. Avocado Seed Systems			
7. Climate Smart Agronomic Practices			
8. Integrated Soil and Water Management Practices for Avocado			
9. Avocado Crop Health			
10. Avocado Harvesting and Post-harvest Management			
11. Avocado Value Addition			
12. Mechanization of Avocado production Activities			
13. Avocado 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.

## **4.7 Facilitator's Training Notes and Reference Materials**

### **4.8 Key references**

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

#### **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, compact disc 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 avocado 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, Avocado production niche and climate requirements, Good Agricultural Practices (GAPs) and Food Safety Management System (FSMS), Avocado variety selection, Avocado seed systems, Avocado climate smart agronomics practices, Integrated soil and water management practices for Avocado, Avocado Crop Health, Avocado harvesting and Post-harvest management, Avocado value addition, Mechanization of Avocado production activities, Avocado business and Marketing, and Avocado 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 (CC) 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.

- Concept of the climatic change and availability discussed and explained.
- Impacts of the climate change and variability on agricultural and food security shared.
- Concept of climate smart agriculture (CSA) shared and explained.
- 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 lead farmers 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 (training materials).

## 1.5 Module Duration

The module is estimated to take 4hours

## 1.6. Module Summary

<b>Module 1: Climate Change and Climate Smart Agriculture in Avocado Value Chain</b>			
<b>Sessions</b>	<b>Training Methods</b>	<b>Training Materials</b>	<b>Duration</b>
1.6.1 Introduction and leveling of expectations	<ul style="list-style-type: none"> <li>• Personal</li> <li>• Introduction</li> <li>• PowerPoint presentations</li> <li>• Plenary discussion</li> </ul>	<ul style="list-style-type: none"> <li>• Projector</li> <li>• Laptop</li> <li>• Flip charts</li> </ul>	30 minutes
1.6.2 Introduction to climate change and variability	<ul style="list-style-type: none"> <li>• PowerPoint presentations</li> <li>• Case study videos</li> <li>• Plenary discussion</li> </ul>	<ul style="list-style-type: none"> <li>• Projector</li> <li>• Laptop</li> <li>• Videos</li> <li>• Flip charts</li> <li>• Participants' handouts</li> </ul>	1 hour 30 minutes
1.6.3. Concept of Climate smart agriculture (CSA) in Avocado	<ul style="list-style-type: none"> <li>• PowerPoint presentations</li> <li>• Plenary discussion</li> </ul>	<ul style="list-style-type: none"> <li>• Projector</li> <li>• Laptop</li> <li>• Videos</li> <li>• Flip charts</li> <li>• Participants' handouts</li> </ul>	1 hour
1.6.4 Projected future climate scenarios affecting Avocado and how to manage them	<ul style="list-style-type: none"> <li>• PowerPoint presentations</li> <li>• Case study videos</li> <li>• Plenary discussion</li> </ul>	<ul style="list-style-type: none"> <li>• Projector</li> <li>• Laptop</li> <li>• Flip charts</li> <li>• Participants handouts</li> </ul>	40 minutes
1.6.5. Module review	<ul style="list-style-type: none"> <li>• Participants' questions and comments</li> <li>• Facilitator' summary</li> </ul>	<ul style="list-style-type: none"> <li>• Module review</li> </ul>	20 minutes
<b>TOTAL</b>			<b>4 hours</b>

## 1.7 Facilitator’s Guidelines

1.7.1. Introduction and Leveling Expectations (30 minutes)	Session Guide
<p><i>(The trainer introduces the trainees to this module on climate change and climate smart agriculture).</i></p> <p><b>Trainees’ expectation (20 minutes)</b></p> <p><i>The facilitator organizes the trainees into groups to state and list their expectations.</i></p> <p><b>Module objectives (10minutes)</b></p> <p><i>(The trainer presents module’s objectives on PowerPoint).</i></p> <p>By the end of the module training, the trainee should be able to:</p> <ul style="list-style-type: none"> <li>• Explain climate change and adaptations.</li> <li>• DescribeClimate Smart Agriculture (CSA).</li> <li>• Describe and explain available climate smart crop management practices in Avocado production.</li> <li>• Explain the benefits of selected climate smart crop management practices in Avocado production.</li> </ul>	<ul style="list-style-type: none"> <li>• PowerPoint presentations</li> <li>• Distribute Participants ‘handouts</li> </ul>
1.7.2 Introduction to Climate Change and Climate Variability (1 hour 30 minutes)	Session guide
<p><i>(The trainer proceeds to introduce the module basics).</i></p> <p><b>Plenary presentation (70 minutes)</b></p> <ul style="list-style-type: none"> <li>• Basic terminologies used in the module (weather, climate, variability, adaptation, coping).</li> <li>• Explain climate change and climate variability.</li> <li>• The causes of climate change.</li> <li>• Climate risks impacting agriculture.</li> <li>• Proposed adaptation and mitigation measures</li> </ul> <p><b>Case study videos and discussion (20 minutes)</b></p> <ul style="list-style-type: none"> <li>• The impact of climate change</li> </ul>	<ul style="list-style-type: none"> <li>• PowerPoint presentations</li> <li>• Plenary Discussion</li> <li>• Video Presentation</li> </ul>

<b>1.7.3 Concept of Climate Smart Agriculture (CSA) (1 hour)</b>	<b>Session Guide</b>
<p><i>(The trainer presents to the trainees the principles underpinning CSA and the link to deliverables of project objectives).</i></p> <p><b>Plenary presentation (45 minutes)</b></p> <ul style="list-style-type: none"> <li>• Definition of the CSA approach and their characteristics</li> <li>• The three pillars of CSA (productivity, Adaptation and Mitigation)</li> <li>• Why CSA is needed</li> </ul> <p><b>Plenary discussion (15 minutes)</b></p> <p>Discussions on the CSA concept</p>	<ul style="list-style-type: none"> <li>• PowerPoint presentations</li> <li>• Participants' handouts</li> <li>• Plenary discussion.</li> </ul>
<b>1.7.4 Projected Future Scenarios that will Impact Productivity (40 minutes)</b>	<b>Session Guide</b>
<p><i>(The trainer leads the trainees in discussing future climatic projections focusing on rainfall and temperature, which directly impacts on crop yields)</i></p> <p><b>PowerPoint presentations (20 minutes)</b></p> <ul style="list-style-type: none"> <li>• Projected impacts on food production and needed adaptation measures especially for Avocado.</li> </ul> <p><b>Video presentation and discussion (20 minutes)</b></p> <ul style="list-style-type: none"> <li>• Short Video on showing projections of rainfall and temperature.</li> </ul>	<ul style="list-style-type: none"> <li>• PowerPoint presentations</li> <li>• Video presentation</li> <li>• Plenary discussion</li> </ul>
<b>1.7.5 Module Review (20 minutes)</b>	<b>Session Guide</b>
<p><i>(The trainer leads the trainees in summarizing the key points discussed in the module)</i></p>	<ul style="list-style-type: none"> <li>• Plenary discussion</li> </ul>

## 1.8 Reference materials

### 1.8.1 Participants handouts

- Climate Change and CSA Factsheets
- Climate Change and CSA Leaflets

## 1.8.2 Further reading

KCEP-CRAL Climate Smart Agriculture Extension Manual.



# MODULE 2: FARMER FIELD AND BUSINESS SCHOOL (FFBS) APPROACH IN AVOCADO VALUE CHAIN

## 2.1. Introduction to the module

This module is designed for training and exposing trainees to the Farmer Field and Business Schools (FFBS) approach and concepts. In addition, practitioners of FFBS need to have knowledge of this methodology in order to transfer various Technologies, Innovations and Management Practices (TIMPs) in Avocado value chain to farmers. The trainees will thereafter facilitate farmers in the Common Interest Groups (CIGs) to learn by doing the available Technologies, Innovations and Management Practices (TIMPs) from a common plot of FFBS and then implement what they have learnt in their individual farms. FFBS also empowers the learners with various skills in facilitation, communication and agri-business. Since the methodology is participatory, it improves the learners' observation skills and creates linkages with other value-chain players, thereby making avocado production profitable and sustainable.

## 2.2. Module Learning Outcomes.

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

- Trainees have a clear understanding of Farmer Field and Business School approach in avocado value chain and be able to differentiate between teaching and facilitating.
- Trainees be equipped with practical skills that help them feel informed and confident about their roles and ability to facilitate a participatory learning process.
- Trainees be empowered with knowledge and analytical skills to design simple experiments to test and select the best option to mitigate the constraints in Avocado value chain through applying the climate smart TIMPs.
- Trainees able to lead facilitate a shift from the domestic focus on avocado production to improving productivity towards farming business proposition.
- Trainees able to lead development of a clear road map of dissemination of TIMPs in avocado value chain through an action plan that is Specific, Measurable, Achievable, Realistic and Time bound (SMART).

## 2.3. Module Target Group

This module targets agricultural extension service providers based at sub-county and ward level. It will also be useful for private extension service providers dealing directly with farmer groups at community level and lead farmers.

## 2.4. 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 (training materials)..

## 2.5. Module Duration

The Module is estimated to take 4 hours 30 minutes.

## 2.6 Module Summary

<b>Module 2. 6 Farmer Field and Business School Approach</b>			
<b>Sessions</b>	<b>Training Methods</b>	<b>Training Materials</b>	<b>Time</b>
2.6.1 Introduction, Climate setting, leveling of expectations and objectives.	<ul style="list-style-type: none"> <li>• Setting norms</li> <li>• Group discussions on expectations</li> </ul>	<ul style="list-style-type: none"> <li>• PowerPoint</li> <li>• Projector</li> <li>• Flip charts</li> <li>• Mark pens</li> </ul>	30 minutes
2.6.2 Overview of FFBS key activities	<ul style="list-style-type: none"> <li>• Presentations</li> <li>• Plenary discussions</li> </ul>	<ul style="list-style-type: none"> <li>• PowerPoint</li> <li>• Projector</li> </ul>	30 minutes
2.6.3 Introduction to Communication and communication skills	<ul style="list-style-type: none"> <li>• Presentation</li> <li>• Group discussions</li> <li>• Plenary</li> </ul>	<ul style="list-style-type: none"> <li>• PowerPoint</li> <li>• Projector</li> <li>• Flip charts</li> <li>• Felt pens</li> </ul>	30 minutes
2.6.4 Facilitation and leadership skills	<ul style="list-style-type: none"> <li>• Presentation</li> <li>• Plenary</li> </ul>	<ul style="list-style-type: none"> <li>• PowerPoint</li> <li>• Projector.</li> </ul>	30 minutes
2.6.5 Organization and management in FFBS	<ul style="list-style-type: none"> <li>• Presentation</li> <li>• Plenary</li> </ul>	<ul style="list-style-type: none"> <li>• PowerPoint</li> <li>• Projector.</li> </ul>	1 hour
2.6.6 Developing FFBS Curriculum for the Avocado value chain	<ul style="list-style-type: none"> <li>• Group discussion presentation</li> <li>• Plenary presentation</li> </ul>	<ul style="list-style-type: none"> <li>• PowerPoint</li> <li>• Projector</li> <li>• Flip charts</li> <li>• Felt pens</li> </ul>	1 hour
2.6.7 SMART County action plan development of Avocado value chain on the transfer of TIMPs	<ul style="list-style-type: none"> <li>• Group discussions</li> <li>• Presentations</li> </ul>	<ul style="list-style-type: none"> <li>• PowerPoint</li> <li>• Projector</li> <li>• Flip charts</li> <li>• Felt pens</li> </ul>	20 minutes

2.6.8 Module review	<ul style="list-style-type: none"> <li>• Discussions</li> <li>• Conclusions</li> <li>• Way forward</li> </ul>	<ul style="list-style-type: none"> <li>• Flip charts</li> <li>• PowerPoint</li> <li>• Projector</li> </ul>	10 Minutes
<b>TOTAL</b>			<b>4 hours 30 minutes</b>

## 2.7 Facilitators Guidelines

2.7.1 Introduction, climate setting Leveling Expectations and Objectives (30 minutes)	Session Guide
<p><i>(The trainer welcomes trainees to the module on FFBS and climate change and introduces him/herself stating his profile and experience of working with farmers and leads in climate setting).</i></p> <p><b>Trainee introduction and climate setting</b></p> <p>Introduction of participants, setting training norms, formation of FFBS sub groups (Working groups) and trainees to share their expectations</p> <p><b>Plenary presentation on module Objectives</b></p> <p>The facilitator presents modules objective in PowerPoint</p> <p>By the end of the module the trainee should be able to:</p> <ul style="list-style-type: none"> <li>• Describe the concepts, characteristics, principles and plans of Farmer Field and Business School (FFBS) as a ‘learning by doing approach as it applies in Avocado</li> <li>• Identify main differences between teaching and facilitation</li> <li>• Understand how to conduct Agro Ecosystems Analysis (AESA) on the Avocado value chain enterprise</li> <li>• Know how to successfully lay Participatory Technology Development (PTD) of the Avocado value chain TIMPs</li> <li>• Develop FFBS Curriculum for the Avocado value chain</li> </ul>	<ul style="list-style-type: none"> <li>• Provide checklist for introduction of trainees to help them build confidence in participation</li> <li>• Summarize and display trainees expectations</li> <li>• Assign roles to the sub groups</li> <li>• Set norms and nominate leaders</li> <li>• PowerPoint presentations on the objectives of the FFBS training module</li> </ul>
2.7.2 Overview of FFBS key activities (30 minutes)	Session guide
<p><b>Plenary presentation</b></p> <p>The facilitator takes the trainees through the main concepts and pillars of FFBS which includes:</p> <ul style="list-style-type: none"> <li>• The definition of FFBS</li> <li>• Participatory technology development (PTD) for the Avocado value chain TIMPS</li> <li>• Agro ecosystems Analysis (AESA) of the Avocado value chain</li> <li>• Concept of what is this what is that</li> <li>• FFBS principle of Integrated production and pest management (IPPM)</li> <li>• FFBS Business concept and opportunities intheAvocado value chain stages</li> </ul>	<ul style="list-style-type: none"> <li>• PowerPoint presentations on the overview of Key activities in FFBS</li> </ul>

<b>2.7.3 Introduction to Communication and Communication skills (30 minutes)</b>	<b>Session guide</b>
<p>Group exercise to gauge the understanding of trainees on:</p> <ul style="list-style-type: none"> <li>• what communication is,</li> <li>• communication channels,</li> <li>• Barriers to effective communication and</li> <li>• how to effectively communicate</li> </ul> <p><b>Plenary presentation</b></p> <p>Communication and communication skills</p>	<ul style="list-style-type: none"> <li>• Group exercise and presentations on flip charts and PowerPoint presentations</li> <li>• Handouts</li> </ul>
<b>2.7.4 Facilitation and leadership skills (30 minutes)</b>	<b>Session guide</b>
<p><b>Plenary presentation</b></p> <ul style="list-style-type: none"> <li>• Definition of Facilitation, facilitator and effective facilitation.</li> <li>• Qualities of a good facilitator.</li> <li>• Golden rules of facilitation.</li> <li>• Roles and responsibilities of FFBS facilitators.</li> <li>• Difference between facilitation and teaching</li> <li>• Definition of leadership</li> <li>• Elements of leadership</li> <li>• Types of leadership</li> <li>• Characteristics of a good leader</li> </ul>	<ul style="list-style-type: none"> <li>• PowerPoint presentations on Facilitation and leadership skills</li> <li>• Handouts</li> </ul>
<b>2.7.5 Organization and management in FFBS (1 hour)</b>	<b>Session guide</b>
<p>Plenary presentation on steps to FFBS implementation framework;</p> <ul style="list-style-type: none"> <li>• Ground working.</li> <li>• Training of facilitators.</li> <li>• Establishing PTDs at the FFBS.</li> <li>• Season long FFBS sessions.</li> <li>• Evaluation of PTDs.</li> <li>• Field days.</li> <li>• Graduation.</li> <li>• Establishment of Lead FFBS.</li> <li>• Follow ups.</li> </ul>	<ul style="list-style-type: none"> <li>• PowerPoint presentations</li> <li>• Handouts</li> </ul>

<b>2.7.6 Developing FFBS Curriculum for the Avocado value chain (1hr)</b>	<b>Session guide</b>
<p><b>Plenary presentations</b></p> <p>Steps to PTD on the Avocado value chain production</p> <ul style="list-style-type: none"> <li>• Identify the major constraints to increased yields of Avocado value chain production</li> <li>• Ranking of constraints in order from the highest.</li> <li>• Identify list of TIMPS to address the constraints</li> <li>• Rank the TIMPS in order from the most preferred</li> <li>• Develop PTD on the most preferred TIMP objective</li> <li>• Decide on the parameters for AESA</li> <li>• Develop FFBS curriculum using crop growth stage calendar for the Avocado value chain</li> </ul> <p><b>Group exercises</b></p> <ul style="list-style-type: none"> <li>• Constraint identification and ranking</li> <li>• TIMPS options identification and ranking</li> <li>• Identification of the growth stages of the value chain crop and development of FFBS training curriculum</li> </ul>	<p>Group exercises on</p> <ul style="list-style-type: none"> <li>• pair wise matrix ranking of constraints and TIMPs in Avocado value chain</li> <li>• curriculum development based on the value chain growth stages</li> <li>• Presentations of the group exercises on flip charts</li> <li>• PowerPoint presentation on PTD and curriculum development</li> </ul>
<b>2.7.7 SMART County action plan development on Avocado value chain of transfer of TIMPs (20 Minutes)</b>	<b>Session guide</b>
<p><b>Plenary presentation</b></p> <p>Plenary presentation on the county action plan for Avocado value chain that has</p> <ul style="list-style-type: none"> <li>• Activities to be undertaken in the regular FFBS meetings</li> <li>• Time frame of the activities</li> <li>• Who is responsible for each of the activities</li> <li>• Required resources for the specific activity</li> <li>• Means of verification for the activity</li> </ul> <p><b>Group exercise</b></p> <p>The trainees do a group exercise of the action plan based on Sub counties and wards represented</p>	<ul style="list-style-type: none"> <li>• PowerPoint presentations on the template of county Avocado value chain TIMPs transfer action plan</li> <li>• Group exercise on development of county Avocado action plan for the respective wards and sub counties represented in the training</li> </ul>

2.7.8 Module review ( 10 minutes)	Session guide
<ul style="list-style-type: none"> <li>• Participants Questions and answers</li> <li>• Facilitators Summary</li> </ul>	PowerPoint presentations, projector, flip charts, felt pens

## 2.8 Reference materials

### 2.8.1 Participants handouts

#### 2.8.2: Further reading

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

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

## 3.1. Introduction

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

Good Agricultural Practices (GAPs) manage risk through prevention, risk analysis and sustainable quality agriculture by means of Integrated Pest and Disease Management (IPDM) and Integrated Crop Management (ICM). Declining food safety, reduced food quality, unsustainable farming practices and negative environmental impact from agricultural activities plague the food sector. Worker safety and health along with traceability requirements are a major concern to modern consumers. Good Agricultural Practices 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, providers of logistics and farm equipment. Good Agricultural Practices therefore constitute a certification system for agriculture, specifying procedures that must be implemented to produce and supply food that is safe for consumers and wholesome, using sustainable methods.

Food safety assures food quality based on the absence or occurrence of hazards that are risky to human and animal health, within acceptable limits. Hazards are common along food value chains that lack effective control measures and may be due to 'bad' or poor agronomic practices or are introduced along the supply chain from the farm to fork continuum. Today, 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 through the implementation of an effective Food Safety Management Systems (FSMS) through Hazard Analysis Critical Control Points (HACCP) management. 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.

## 3.2. Module Learning Outcomes

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

1. GAP's on food safety and enhanced quality along the crop value chains discussed and appreciated.
2. 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 crop production system explained
4. Traceability in food safety and quality along the crop value chain and mapping demonstrated.

### 3.3. Module Target Group

This module targets public and private agricultural extension agents, service providers and lead farmers based at sub-county and ward level.

### 3.4. 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 (training materials)..

### 3.5. Module Duration

The Module is estimated to take 6 hours and 30 minutes

### 3.6 Module Summary

<b>Module 3. Good Agricultural Practices (GAPs) and Food Safety Management Systems (FSMS)</b>			
<b>Sessions</b>	<b>Training Methods</b>	<b>Training Materials</b>	<b>Time</b>
3.6.1 Introduction, objectives and leveling of expectations	<ul style="list-style-type: none"><li>• Groups to bring out expectations</li><li>• Plenary presentation</li></ul>	<ul style="list-style-type: none"><li>• Marker pens</li><li>• Flip charts</li><li>• Projector</li><li>• Laptop</li></ul>	30 minutes
3.6.2 Understanding GAP and its application in the Avocado value chain	<ul style="list-style-type: none"><li>• Plenary presentations</li><li>• Plenary discussion</li></ul>	<ul style="list-style-type: none"><li>• Flip charts</li><li>• Marker pens</li><li>• Projector</li><li>• Laptop</li><li>• Pictorials/ video clips</li></ul>	30 minutes
3.6.3 Discussion of factors to consider when selecting a site for agricultural activities through Risk Assessment	<ul style="list-style-type: none"><li>• Plenary presentation</li><li>• Plenary discussion</li></ul>	<ul style="list-style-type: none"><li>• Flip charts</li><li>• Marker pens</li><li>• Projector</li><li>• Laptop</li><li>• Pictorials/ video clips</li><li>• Data sheets</li></ul>	30 minutes
3.6.4 Review of GAPs requirements for audit and types of protocols possible	<ul style="list-style-type: none"><li>• Plenary presentations</li><li>• Plenary discussion</li></ul>	<ul style="list-style-type: none"><li>• Data forms</li><li>• Flip charts</li><li>• Marker pens</li><li>• Projector</li></ul>	30 minutes

		<ul style="list-style-type: none"> <li>• Laptop</li> <li>• Pictorials/ video clips</li> <li>• Data sheets</li> </ul>	
3.6.5 Introduction to Site Selection	<ul style="list-style-type: none"> <li>• Plenary Presentation</li> <li>• Plenary discussion</li> </ul>	<ul style="list-style-type: none"> <li>• Projector</li> <li>• Laptop</li> </ul>	30 minutes
3.6.6 GAP checklists and Audit	<ul style="list-style-type: none"> <li>• Plenary Presentation</li> <li>• Group exercise</li> </ul>	<ul style="list-style-type: none"> <li>• Flip charts</li> <li>• Marker pens</li> <li>• Projector</li> <li>• Laptop</li> </ul>	30 minutes
3.6.7 Safe use of Pesticides and calibration of sprayers and nozzles	<ul style="list-style-type: none"> <li>• Group work on nozzles</li> <li>• Rate of discharge</li> <li>• Safety guidelines</li> </ul>	<ul style="list-style-type: none"> <li>• Pictorials/ video clips</li> <li>• Knapsacks</li> <li>• Measuring cylinders</li> <li>• Tape measure</li> <li>• Nozzles</li> <li>• Clean empty pesticide containers</li> </ul>	1 hour
3.6.8 Understanding food safety management system in Avocado value chains	<ul style="list-style-type: none"> <li>• Plenary presentation</li> <li>• Plenary discussion</li> </ul>	<ul style="list-style-type: none"> <li>• Flip charts</li> <li>• Marker pens</li> <li>• Projector</li> <li>• Laptop,</li> <li>• Pictorials/ video clips</li> </ul>	30 minutes
3.6.9 Determination of food safety risk/ hazards in Avocado value chains (hazard analysis)	<ul style="list-style-type: none"> <li>• Plenary presentation</li> <li>• Group exercise</li> </ul>	<ul style="list-style-type: none"> <li>• Projector</li> <li>• Laptop</li> <li>• Flip charts</li> <li>• Marker pens</li> <li>• Participants' hand outs</li> </ul>	30 minutes
3.6.10 Determination of critical control points (CCPs) and Critical limits (CLs) in Avocado value chain	<ul style="list-style-type: none"> <li>• Plenary Presentation</li> <li>• Group Exercise</li> </ul>	<ul style="list-style-type: none"> <li>• Projector</li> <li>• Laptop</li> <li>• Flip charts</li> <li>• Marker pens</li> </ul>	30 minutes
3.6.11 Prevention and corrective measures for CCPs in Avocado value chain	<ul style="list-style-type: none"> <li>• Plenary Presentation</li> <li>• Group exercise</li> </ul>	<ul style="list-style-type: none"> <li>• Participants' handouts</li> </ul>	30 minutes

3.6.12 Module review	<ul style="list-style-type: none"> <li>• Participants' questions and comments</li> <li>• Facilitator's summary</li> </ul>	<ul style="list-style-type: none"> <li>• Participants' handouts</li> </ul>	30 minutes
<b>TOTAL</b>			<b>6 hours 30 minutes</b>

### 3.7 Facilitator's Guidelines

<b>3.7.1 Introduction, Objectives and Leveling Expectations (30 minutes)</b>	<b>Session Guide</b>
<p><i>The facilitator welcomes trainees to the sub-module on GAPs and introduces him/herself stating profile and experience of working with farmers.</i></p> <p><b>Trainees' introductions and expectations (20minutes)</b></p> <p>The facilitator invites the trainees to state their expectations after brain storming in their respective county groups</p> <p><b>Module objectives (10 minutes)</b></p> <p><i>The facilitator presents module's objectives in PowerPoint.</i></p> <p>By the end of the module, the trainee should be able to:</p> <ul style="list-style-type: none"> <li>• Explain GAPs on matters of food safety and quality along the crop value chain.</li> <li>• Describe optimization and utilization of resources (water, soil, manure, fertilizers, and other inputs), environmental protection and conservation.</li> <li>• Explain worker safety and health within the crop production system.</li> <li>• Demonstrate traceability and mapping in food safety and quality along the crop value chain</li> </ul>	<ul style="list-style-type: none"> <li>• Summarize trainees' Expectations on a flipchart</li> <li>• PowerPoint presentation</li> </ul>
<b>3.7.2 Understanding GAPs and its application in the Avocado value chain (30 minutes)</b>	<b>Session Guide</b>
<p><i>(Facilitator leads discussions on understanding of GAPs and its relevance to actors in the Avocado value chain).</i></p> <p><b>Plenary presentation (10 minutes)</b></p> <ul style="list-style-type: none"> <li>• Understanding GAPs in the context of crop production</li> <li>• Explain the role of GAPs in safe and sustainable food production system for growers and consumers.</li> </ul>	<ul style="list-style-type: none"> <li>• PowerPoint presentation</li> <li>• Participants handouts</li> <li>• Plenary discussion</li> </ul>

<ul style="list-style-type: none"> <li>• Understanding GAPs as the key to high commodity market destinations</li> </ul> <p><b>Plenary discussion</b></p> <p>GAPs application in the Avocado value chain</p>	
<b>3.7.3 Discussion of factors to consider when selecting a site for agricultural activities through Risk Assessment (30 minutes)</b>	
<p><i>(Facilitator guides discussions on the key determinants of site suitability for agricultural activities).</i></p> <p><b>Plenary presentation and discussion (30 minutes)</b></p> <ul style="list-style-type: none"> <li>• 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)</li> <li>• The need for documentation in a farm assurance system</li> <li>• Types of mandatory farm records</li> <li>• General guidelines to conservation agriculture (CA)</li> </ul>	<ul style="list-style-type: none"> <li>• PowerPoint presentation</li> <li>• Participants' handouts</li> <li>• Plenary discussion</li> </ul>
<b>3.7.4 Review of GAPs requirements for audit and types of protocols possible (30 minutes)</b>	
<p><i>(The facilitator leads the trainees in summarizing the key points discussed in the module).</i></p> <p><b>Plenary presentation and discussion (30 minutes)</b></p> <ul style="list-style-type: none"> <li>• Methods and procedures required at on-farm level to obtain GAPs certification in crops production.</li> <li>• Good soil management practices (appropriate crop rotations, manure application)</li> <li>• Careful management of water resources and efficient use of water for rain-fed crop production via irrigation.</li> <li>• Selection of crop types and varieties to meet local consumer needs.</li> <li>• Adoption of IPM practices to minimize the potential impact of pest control actions on workers, food, and environmental and health safety.</li> <li>• Minimizing contamination at harvest, on-farm processing and storage.</li> </ul>	<ul style="list-style-type: none"> <li>• PowerPoint presentation</li> <li>• Participants' handouts</li> <li>• Plenary session</li> </ul>

<b>3.7.5 Introduction to Site Selection (30 minutes)</b>	<b>Session Guide</b>
<p><i>(The facilitator introduces the various factors involved in site selection through Pictorials/video clips PPT's and farm walk).</i></p> <p><b>Plenary presentation and discussions (30 minutes)</b></p> <ul style="list-style-type: none"> <li>• 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)</li> <li>• The need for documentation in a farm assurance system</li> <li>• Types of mandatory farm records</li> <li>• General guidelines to conservation agriculture (CA)</li> </ul>	<ul style="list-style-type: none"> <li>• PowerPoint presentation</li> <li>• Participants' handouts</li> </ul>
<b>3.7.6 GAPs checklists and Audit(30 minutes)</b>	<b>Session Guide</b>
<p><i>(Facilitator guides the trainees on self-assessment (Internal audit and corrective measures for non-compliance)</i></p> <p><b>Plenary presentation (15 minutes)</b></p> <ul style="list-style-type: none"> <li>• Need for mandatory records in GAPs</li> <li>• Internal Audit procedures</li> <li>• Practical on Mock Audits</li> <li>• Interpretation of audit reports</li> <li>• Compliance and corrective actions</li> </ul> <p><b>Group exercise (15 minutes)</b></p> <ul style="list-style-type: none"> <li>• Groups audit a farm or a process within the training site</li> <li>• Present audit results and verdict and corrective actions</li> </ul>	<ul style="list-style-type: none"> <li>• PowerPoint presentation</li> <li>• Global GAP checklists</li> <li>• Participants' handouts</li> <li>• Group exercise</li> </ul>
<b>3.7.7 Safe use of Pesticides and calibration of sprayers and nozzles(1 hour 30 minutes )</b>	<b>Session Guide</b>
<p><i>(The facilitator organizes the groups to identify level of knowledge on pesticide use and safety; Determination of less hazardous pesticides, fungicides and herbicides, quantities to apply and respective PHIs).</i></p> <p><b>Group exercise (30 minutes)</b></p> <p>Practical session on how to handle different types of pesticides, fungicides and herbicides together with their calibrations</p> <p><b>Plenary presentation (1hr minutes)</b></p> <ul style="list-style-type: none"> <li>• Guided knapsack calibration</li> <li>• Different types of nozzles and their uses</li> <li>• Pesticide safety</li> </ul>	<ul style="list-style-type: none"> <li>• PowerPoint presentation</li> <li>• Pesticide containers</li> <li>• Knapsack sprayers</li> <li>• Nozzles</li> <li>• Participants hand outs</li> <li>• Group exercise</li> </ul>

<b>3.7.8 Understanding food safety management system in Avocado value chains (30 minutes)</b>	
<p><i>(The facilitator introduces food safety system by defining it and sharing its benefits with the trainees).</i></p> <p><b>Plenary presentation and discussion(30 minutes)</b></p> <ul style="list-style-type: none"> <li>• Overview of Food Safety Management Systems (FSMS).</li> <li>• Why food safety is important in crops production systems.</li> <li>• Risks to human/animal health due to chemical, biological and physical hazards exposure.</li> <li>• Legal and market requirements for food safety practice.</li> <li>• Food safety practices that reduce risks/hazards.</li> <li>• Use of HACCP tool/system for monitoring crop production</li> </ul>	<ul style="list-style-type: none"> <li>• PowerPoint presentation</li> <li>• Participants' handouts</li> <li>• Plenary discussion</li> </ul>
<b>3.7.9 Determination of food safety risks/hazards in Avocado value chain (Hazard analysis) (30 minutes)</b>	
<p><i>(Facilitator guides discussions on the steps of identification of food safety hazards FSMS).</i></p> <p><b>Plenary presentation (15 minutes)</b></p> <ul style="list-style-type: none"> <li>• Explain the concept of risk identification (Hazard analysis) in crop production chain.</li> <li>• List the types of hazards that cause illness or death.</li> <li>• Determine and identify factors influencing likely occurrence/severity of hazards.</li> <li>• List hazards alongside the possible control measures</li> <li>• Explain the concept in a flow diagram</li> </ul> <p><b>Group exercise (15 minutes)</b></p> <ul style="list-style-type: none"> <li>• Groups to identify major risk/hazards at points of crop production</li> <li>• Produce flow diagrams for the crop</li> </ul>	<ul style="list-style-type: none"> <li>• PowerPoint presentation</li> <li>• Participants hand outs</li> <li>• Group exercise</li> </ul>

<b>3.7.10 Determination of critical control points (CCPs) and Critical limits (CLs) in Avocado value chain (30 minutes)</b>	
<p><i>(The facilitator introduces the topic on determination of critical control points (CCP))</i></p> <p><b>Plenary presentation (15 minutes)</b></p> <ul style="list-style-type: none"> <li>• Why it is important to determine CCP in production chain (preventing, eliminating or reducing risks).</li> <li>• How to monitor and measure the CCP (point, step or procedure).</li> <li>• How to document the CCP.</li> <li>• How to establish critical limits (from standards or guidelines) for each CCP.</li> </ul> <p><b>Group exercise (15 minutes)</b></p> <ul style="list-style-type: none"> <li>• Groups to identify and establish critical control points and critical limits.</li> </ul>	<ul style="list-style-type: none"> <li>• PowerPoint presentation</li> <li>• Participants hand outs</li> <li>• Group exercise</li> </ul>
<b>3.7.11 Prevention and corrective measures for CCP in Avocado value chains (30 minutes)</b>	<b>Session Guide</b>
<p><i>(The facilitator introduces the topic on prevention and control of possible hazards).</i></p> <p><b>Plenary presentation (15 minutes)</b></p> <ul style="list-style-type: none"> <li>• Establishment of corrective actions against CCP</li> <li>• Establish verification procedures for CCP</li> <li>• Establish record-keeping and documentation procedures</li> <li>• How to develop HACCP plan and Food safety tool kit for the crop value chain</li> </ul> <p><b>Group exercise (15 minutes)</b></p> <p>Groups to identify and establish corrective actions and verification procedures for crop value chain.</p>	<ul style="list-style-type: none"> <li>• PowerPoint presentation</li> <li>• Participants hand outs</li> <li>• Group exercises</li> </ul>
<b>3.7.12 Module Review (30 minutes)</b>	<b>Session Guide</b>
<p><i>(The facilitator leads the trainees in summarizing the key points discussed in the module)</i></p>	Plenary discussion

## 3.8 Reference materials

### 3.8.1 Participants handouts

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

### 3.8.2 Further reading

- Hazard Analysis Critical Control Point Principles and Application Guidelines (2018). National Advisory Committee on Hazards Criteria for Foods.
- Food Safety Manual for Farmer Field Schools (2010). A training reference guide on food safety in global FFS Programmes, FAO.
- Global GAP Version V



## **MODULE 4: AVOCADO PRODUCTION NICHEs AND CLIMATIC REQUIREMENTS**

### **4.1 Introduction**

This module exposes service providers, CBFs lead farmers and facilitators to the different types of production ecological conditions (altitudes, soils, AEZs and climate) suitable for Avocado production. In Kenya Avocado is grown in Central, Eastern, Rift Valley and Western regions. Avocado is mainly grown by smallholder farmers under rain-fed conditions. The crop is either grown as a mono crop or intercropped with legume crops at early stages of production. There is need to enhance the knowledge of the farming communities on the production niches and climatic conditions for increased productivity of the crop.

### **4.2 Module Learning Outcomes**

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

- Importance of Avocado in Kenya's economy explained.
- Suitable areas (altitudes and soil types/characteristics) for Avocado production identified and described.
- Climatic conditions (temperatures, rainfall and humidity) required for Avocado production described.
- Specific county AEZs for Avocado production identified.

### **4.3 Module Target Group**

This module is intended for public agricultural extension providers in the Avocado value chain target counties, service providers, CBFs and lead farmers.

### **4.4 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 (training materials)..

### **4.5 Module Duration**

The module is estimated to take 4 hours

## 4.6 Module Summary

<b>Module 4: Avocado production niches and climatic requirements</b>			
<b>Sessions</b>	<b>Training methods</b>	<b>Training materials</b>	<b>Time</b>
4.6.1 Introductions and climate setting	<ul style="list-style-type: none"> <li>• Presenter introduction</li> <li>• Self-introduction of trainees</li> <li>• Plenary discussion</li> </ul>	<ul style="list-style-type: none"> <li>• Flips charts</li> <li>• Felt pens</li> <li>• Laptop</li> </ul>	20 minutes
4.6.2 Objectives and expectations	<ul style="list-style-type: none"> <li>• Presentations</li> <li>• County group exercise</li> <li>• Plenary discussions to share expectations</li> </ul>	<ul style="list-style-type: none"> <li>• Flips charts</li> <li>• Felt pens</li> <li>• Laptop</li> </ul>	30 minutes
4.6.3 Importance of Avocado in Kenya's economy	<ul style="list-style-type: none"> <li>• Presentations</li> <li>• Plenary discussions</li> </ul>	<ul style="list-style-type: none"> <li>• Flips charts</li> <li>• Felt pens</li> <li>• Laptop</li> <li>• Handouts</li> </ul>	1 hour
4.6.4 Avocado production ecological/climatic requirements for optimal yields	<ul style="list-style-type: none"> <li>• Presentations</li> <li>• Plenary discussions</li> </ul>	<ul style="list-style-type: none"> <li>• Flips charts</li> <li>• Felt pens</li> <li>• Laptop</li> <li>• Handouts</li> </ul>	1 hour
4.6.5 Avocado production Agro-ecological zones (AEZs)- average yields, and constraints in the target Counties	<ul style="list-style-type: none"> <li>• Group work to identify avocado production pockets in their sub-Counties/Counties</li> <li>• Presentations</li> <li>• Plenary discussions</li> </ul>	<ul style="list-style-type: none"> <li>• Flips charts</li> <li>• Felt pens</li> <li>• Laptop</li> </ul>	1 hour
4.6.6 Avocado module review	<ul style="list-style-type: none"> <li>▪ Discussions/conclusion and way forward</li> </ul>	<ul style="list-style-type: none"> <li>• Flip charts</li> <li>• Laptop</li> </ul>	20 Minutes
<b>Total</b>			<b>4 hours</b>

## 4.7 Facilitator's Guidelines

<b>Module 4: Avocado production and appropriate climatic requirements</b>	
<b>4.7.1. Introductions and climate setting (30 minutes)</b>	<b>Session Guide</b>
<i>(The facilitator welcomes trainees to the module and invites them to introduce themselves and state their expectations).</i>	<ul style="list-style-type: none"> <li>Summarize the facilitator/trainees involvement in Avocado value chains</li> </ul>
<b>4.7.2. Objectives (30 minutes)</b>	
<p>The facilitator presents module objectives.</p> <p><b>Module objectives</b></p> <p>By the end of the module the trainee should be able to:</p> <ul style="list-style-type: none"> <li>Explain the importance of Avocado in Kenya's economy.</li> <li>Identify and describe suitable areas (altitudes and soil types/characteristics) for Avocado production.</li> <li>Describe climatic conditions (temperatures, rainfall and humidity) required for avocado production.</li> <li>Identify specific county agro-ecological zones for Avocado production.</li> </ul>	<ul style="list-style-type: none"> <li>PowerPoint presentations</li> <li>Group exercise (listing and presenting expectations).</li> <li>Expectations lists kept for later reviewing</li> </ul>
<b>4.7.3 Importance of Avocado in Kenya's economy (1 hour)</b>	
<p><b>Plenary presentation (45 minutes)</b></p> <ul style="list-style-type: none"> <li>Origin of Avocado</li> <li>Why avocado in Kenyan households</li> <li>Key counties producing avocado in Kenya</li> <li>General avocado production in Kenya.</li> </ul> <p><b>Plenary discussion (15 minutes)</b> Questions/answers/comments</p>	<ul style="list-style-type: none"> <li>PowerPoint presentations</li> <li>Distribute to participants' handouts</li> </ul>
<b>4.7.4 Avocado production ecological/climatic requirements (1 hour)</b>	
<p><b>Plenary presentation (45 minutes)</b></p> <ul style="list-style-type: none"> <li>Altitude and Agro-ecological zones</li> <li>Climatic conditions (Rainfall, Temperatures and humidity)</li> <li>Soils (soil types, pH, general fertility for Avocado)</li> </ul> <p><b>Plenary discussion (15 minutes)</b> Questions/answers/comments</p>	<ul style="list-style-type: none"> <li>PowerPoint presentations</li> <li>Distribute to participants handouts'</li> </ul>

<b>4.7.5. Avocado production AEZs (villages), average yields, and constraints in the target Counties (1 hour)</b>	<b>Session Guide</b>
<p><b>Plenary presentation (45 Minutes)</b></p> <p>Facilitator guides in reviewing and discussing suitability map (County by County)</p> <p><b>Group work (15 minutes)</b></p> <p>Trainees to bring out specific county or sub-county AEZs, land size, yields and constraints to Avocado production and present in the plenary:</p> <ul style="list-style-type: none"> <li>• Agro-ecological zones (AEZs) and % area suitable for Avocado</li> <li>• Average land/farm size under avocado</li> <li>• Average avocado yield per farm</li> <li>• Constraints to avocado production</li> </ul> <p><b>Plenary discussions/presentations from the groups (15 minutes)</b></p> <p>Let the trainees/groups share the group exercise outcomes.</p>	<ul style="list-style-type: none"> <li>• PowerPoint presentations</li> <li>• Group work</li> <li>• Facilitator's guided discussions</li> </ul>
<b>4.7.6. Module review (20 minutes)</b>	<b>Session Guide</b>
<p><i>(The facilitator leads the trainees in reviewing the module).</i></p> <p><b>Plenary presentations (20 minutes)</b></p> <p>Facilitator guides on the summary of the module.</p> <ul style="list-style-type: none"> <li>• What new thing(s) did trainees learn from the module?</li> <li>• Are there any unanswered questions the trainees still have?</li> </ul>	<ul style="list-style-type: none"> <li>• The last participants' Handouts/training materials</li> <li>• Summarize the main points of the module on a flip chart and display</li> </ul>

## 4.8 References

### 4.8.1 Participants handouts

- Avocado production Guides (2017)
- Avocado Booklet (2017)

## MODULE 5: AVOCADO VARIETY SELECTION

### 5.1 Introduction

Avocado is native to South Mexico, Central America and Northwestern South America. In Kenya it was mostly introduced by Portuguese in 16<sup>th</sup> and 18<sup>th</sup> centuries. By 1939 improved cultivars such as Puebla, Nabal, Lyon, Lula, Linda and Fuerte had been introduced. They adapted well to the highlands of Kenya particularly Fuerte and Puebla. By 1970, 23 tons of avocado were exported increasing to 1400 tons by 1984. Since 1965 a cultivar introduction program was initiated in order to screen more varieties suitable for lower altitude agro ecological zones. Currently, the most popular and commercial varieties are Hass, Fuerte, Pinkerton, Puebla and Entigger.

### 5.2 Module Learning Outcomes

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

1. Distinguish between the indigenous and hybrid avocado varieties
2. Characteristics and attributes of major exotic avocado varieties appreciated.
3. Recommended varieties for different agro ecological zones identified

### 5.3 Module Target Group

This module targets public and private extension agents, service provider, CBFs and lead farmers

### 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 in the avocado value chain. The facilitators using this module should be well conversant with the participants' handouts.

### 5.5 Module Duration

The facilitation of this module is estimated to last for a period of 3 hours 30 minutes

### 5.6 Module Summary

Module 5. Avocado Variety Selection			
Sessions	Training Methods	Training Materials	Time
5.6.1. Introduction, objectives and levelling expectations	<ul style="list-style-type: none"><li>• Plenary presentation</li><li>• Group discussion and presentation of expectations</li></ul>	<ul style="list-style-type: none"><li>• Flips charts</li><li>• Felt pens</li><li>• Laptop</li><li>• Projector</li></ul>	30 minutes

5.6.2. Introduction to various improved avocado varieties, their ecological areas of cultivation and their attributes	<ul style="list-style-type: none"> <li>• Group Exercises to identify local avocado varieties and the exotic varieties</li> <li>• Plenary Presentations</li> <li>• Plenary discussion</li> </ul>	<ul style="list-style-type: none"> <li>• Flips charts</li> <li>• Felt pens</li> <li>• Laptop</li> <li>• Projector</li> <li>• Manila papers</li> </ul>	1 hour 30 minutes
5.6.3 Recommended varieties for specific regions	<ul style="list-style-type: none"> <li>• Plenary Presentation</li> <li>• Group exercise</li> <li>• Field demonstration</li> </ul>	<ul style="list-style-type: none"> <li>• Flips charts</li> <li>• Felt pens</li> <li>• Laptop</li> <li>• Projector</li> <li>• Manila papers</li> </ul>	1 hour
5.6.4. Module review	<ul style="list-style-type: none"> <li>• Group Exercise</li> <li>• Facilitator's summary</li> </ul>	<ul style="list-style-type: none"> <li>• Participants' handouts</li> <li>• Module review</li> </ul>	30 minutes
<b>TOTAL</b>			<b>3 hours 30 minutes</b>

## 5.7 Facilitator's Guidelines

<b>Module 5: Avocado Variety Selection</b>	
<b>5.7.1 Introduction and levelling of expectations and objectives (30 minutes)</b>	<b>Session Guide</b>
<p><b>Introduction (15 minutes)</b></p> <p><i>(The facilitator welcomes trainees to the module on Avocado varieties and introduces himself/herself by stating his/her profile and experience.)</i></p> <p>The facilitator invites the trainees to introduce themselves and state their expectations.</p> <p><b>Module objectives (15 minutes)</b></p> <p>(The facilitator presents modules objectives)</p> <p>By the end of the module the trainee should be able to:</p> <ol style="list-style-type: none"> <li>1. Describe the avocado crop and its climatic and ecological requirements.</li> <li>2. Identify the various improved Avocado varieties their ecological areas of cultivation and their uses.</li> <li>3. Identify the varieties suited to the counties of interest.</li> </ol>	<ul style="list-style-type: none"> <li>• Summarize trainees' "expectations" and display.</li> <li>• Distribute participants' handouts</li> <li>• Module objectives,</li> </ul>

<b>5.7.2 Introduction to avocado and the various improved avocado varieties and their uses (1 hour 45 minutes)</b>	<b>Session Guide</b>
<p><i>(The facilitator describes the avocado crop and guides the trainees in identifying the various avocado improved varieties and their uses).</i></p> <p><b>Group exercise and discussion (45 minutes)</b></p> <p>Ask trainees highlight and describe some of the Avocado varieties they know.</p> <p><b>Plenary Presentation (1 hour)</b></p> <ul style="list-style-type: none"> <li>• What is avocado?</li> <li>• Improved avocado varieties.</li> <li>• Categories of avocado varieties for grain, forage, dual purpose</li> </ul> <p><i>Show trainees the photographs of each variety and the full description and its uses.</i></p>	<ul style="list-style-type: none"> <li>• Distribute participants' handouts</li> <li>• Group exercise</li> <li>• Plenary discussion</li> </ul>
<b>5.7.3 Recommended avocado varieties for the target counties (1 hour 30 minutes)</b>	<b>Session Guide</b>
<p><b>Plenary Presentation</b></p> <p><b>Varieties for the target counties (30 minutes)</b></p> <ul style="list-style-type: none"> <li>• Avocado growing regions and the new regions which are being targeted for avocado cultivation in Kenya.</li> <li>• Avocado varieties suited for each county</li> <li>• County climate conditions for target county (semi-arid, hot dry low land, cold dry highlands and high potential)</li> </ul> <p><b>Group exercises (30 minutes)</b></p> <p>Trainees discuss and come up with avocado varieties in their county</p> <p><b>Field demonstration (45 minutes)</b></p> <p><i>(Ensure there is an established plot of all the varieties or avocado plant samples).</i></p> <ul style="list-style-type: none"> <li>• Visit the Avocado plots with the trainees and assist them identify and study the various varieties.</li> <li>• After the field visit facilitate them to recall what they learned and discuss on any issue that may arise. (can also use Avocado plant samples for the various varieties)</li> </ul>	<ul style="list-style-type: none"> <li>• Distribute participants' handouts.</li> <li>• Group exercise</li> <li>• Field demonstration</li> </ul>

5.7.4 .Module review (30 minutes)	Session Guide
<p><i>(The facilitator leads the trainees in reviewing the module)</i></p> <p><b>Group exercise</b></p> <p>Summarize the main points of the training</p> <p>Together with the trainees review the main points about improved Avocado varieties</p> <ul style="list-style-type: none"> <li>• What new things did you learn from this Module?</li> <li>• What are some of the problems and issues that you have become more aware of in Avocado varieties?</li> <li>• What questions do you still have about identification of Avocado varieties?</li> </ul>	<ul style="list-style-type: none"> <li>• The last Participants' Handouts</li> <li>•</li> <li>• Summary of the main points from the module.</li> </ul>

## 5.8 References

### 5.8.1 Participants handouts

- Fact sheets on avocado varieties

### 5.8.2 Further reading



# MODULE 6: AVOCADO SEED SYSTEMS

## 6.1 Introduction

In most Avocado growing areas, farmers have established their avocado orchards using their own local seeds, or source seeds from their neighbors which give them minimal yields. Through grafting technology farmers are able to access improved avocado planting materials. Grafting has been identified as one of the most effective means of propagation and it is a skill that almost everybody can practice effectively. It only requires a lot of practicing to gain confidence when doing it.

As agricultural production increasingly becomes commercialized and global food markets become more competitive, farmers need to invest in improved avocado varieties for high yields and sustainable income. This module exposes county extension officers, private service providers, lead farmers and facilitators to the various plant propagation systems and the importance of quality planting materials in avocado production. It also covers community plant seedlings production and gives direction on how to interface public and private seedling production to enable farmers venture into commercial avocado production.

## 6.2 Module learning outcomes

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

1. The main avocado propagation systems in Kenya appreciated and explained.
2. Avocado seedling production in public and private seedling nurseries understood and described.
3. The importance of certified private nurseries, community nurseries and its interface with public nurseries for enhanced production of quality avocadounderstood and explained.

## 6.3 Module Target Group and Categories

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

## 6.4 Module Users

This module is intended for use by Master trainers who are members of the Core Team of Trainers (CTT) and Trained Trainers in the Avocado value chain. 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 4 hours and 30 minutes.

## 6.6 Module Summary

Module 6: Avocado Seed System			
Sessions	Training methods	Training materials	Time
6.6.1 Introduction, objectives and expectations	<ul style="list-style-type: none"> <li>Self-introduction</li> <li>Presentations</li> <li>Plenary discussions</li> </ul>	<ul style="list-style-type: none"> <li>Flip charts</li> <li>Marker pens</li> <li>Projector</li> </ul>	30 minutes
6.6.2 Definition of seed and seed system in Kenya	<ul style="list-style-type: none"> <li>Group work</li> <li>Presentations</li> </ul>	<ul style="list-style-type: none"> <li>Flip charts</li> <li>Marker pens</li> <li>Projector</li> </ul>	30 minutes
6.6.3 Formal seed system in Kenya	<ul style="list-style-type: none"> <li>Presentations</li> <li>Discussions</li> </ul>	<ul style="list-style-type: none"> <li>Projector</li> <li>Flips charts</li> <li>Marker pens</li> </ul>	1 hour 30 minutes
6.6.4 Informal seed system in Kenya	<ul style="list-style-type: none"> <li>Presentations</li> <li>Discussions</li> </ul>	<ul style="list-style-type: none"> <li>Projector</li> <li>Flip charts</li> <li>Marker pens</li> </ul>	1 hours
6.6.5 Module review and discussions	<ul style="list-style-type: none"> <li>Group work</li> <li>Discussions</li> <li>Presentation</li> </ul>	<ul style="list-style-type: none"> <li>Flips charts</li> </ul>	30minutes
<b>Total</b>			<b>4 hours</b>

## 6.7 Facilitator's Guidelines

Module 6: Avocado Seed System	
6.7.1. Introduction and levelling of expectations and objectives (1 hour)	Session Guide
<p><b>Introduction (30 minutes)</b></p> <p><i>(The facilitator welcomes trainees to the module on the main avocado seed systems before inviting trainees to introduce themselves and state their expectations).</i></p> <p><b>6.7.1. Module Objectives (30 minutes)</b></p> <p><i>(The facilitator presents module's objectives)</i></p> <p>By the end of the module the trainee should be able to:</p> <ol style="list-style-type: none"> <li>Describe and explain Avocado propagation technologies in Kenya.</li> <li>Describe Avocado seedling production systems in public and private seedling nurseries</li> </ol>	<ul style="list-style-type: none"> <li>Summarize trainees' "expectations" and display.</li> <li>PowerPoint presentations</li> <li>Distribute Participants' Handouts</li> </ul>

<p>3. Explain the role of private nurseries, community and public nurseries in the production of quality avocado</p>	
<p><b>6.7.2. Definition of Seed and Seed System in Kenya (30 Minutes)</b></p>	
<p><b>Group work and presentation (15 Minutes)</b></p> <ul style="list-style-type: none"> <li>• What is quality seed?</li> </ul> <p><b>Plenary presentation (15 Minutes)</b></p> <ul style="list-style-type: none"> <li>• Definition of a seed system and characteristics of main seed systems (formal and informal seed system)</li> <li>• Commodity corridors</li> </ul>	<ul style="list-style-type: none"> <li>• Group work</li> <li>• PowerPoint presentations</li> <li>• Distribute participants' handouts</li> <li>• Brochures, leaflets,</li> </ul>
<p><b>6.7.3 Formal Seed Systems in Kenya (1 hour 30 Minutes)</b></p>	
<p><b>Plenary presentation and discussion (1 hour 30 Minutes)</b></p> <ul style="list-style-type: none"> <li>• Legal requirements for seed certification</li> <li>• Seed certification process</li> <li>• Post certification activities for enforcing the seed act cap 326</li> <li>• Post certification activities for seed quality assurance</li> <li>• Seed importation and exportation requirements.</li> </ul>	<ul style="list-style-type: none"> <li>• PowerPoint presentations</li> <li>• Distribute Participants' Handouts</li> <li>• Brochures, leaflets</li> </ul>
<p><b>6.7.4 Informal Seed System in Kenya (1 hour)</b></p>	
<p><b>Plenary presentations: (30 minutes)</b></p> <ul style="list-style-type: none"> <li>• Seed multiplication</li> <li>• Avocado seed standards and commercial production</li> <li>• Informal seed system</li> <li>• Synergies for formal and informal seed systems</li> </ul> <p><b>Group work and Discussion (30 Minutes)</b></p> <p>Calculate seedling requirements for the county/ward/farmer group and present.</p>	<ul style="list-style-type: none"> <li>• Group work</li> <li>• PowerPoint presentations</li> <li>• Distribute participants handouts</li> <li>• Brochures, leaflets,</li> </ul>
<p><b>6.7.5 Module review (30 minutes)</b></p>	
<p><i>(The facilitator leads the trainees in reviewing the module)</i></p> <p><b>Plenary discussion and presentation</b></p> <p>Summarize the module together with the trainees and have a recap of the main components in:</p> <ul style="list-style-type: none"> <li>• Avocado seed systems and their characteristics</li> <li>• Importance of using certified seedlings</li> <li>• Informal seed</li> </ul>	<ul style="list-style-type: none"> <li>• The last Participants' Handouts</li> <li>• Summarize the main points from the module on a flip chart and display</li> </ul>

<i>(Discuss the knowledge acquired and skills learnt from this module with the trainees. What are the observations made by trainees from this module?)</i>	
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## 6.8 References

### 6.8.1 Participants handouts

- Avocado production Guides [2019]
- Avocado Booklet [2006]



# MODULE 7: CLIMATE SMART AGRONOMIC PRACTICES FOR AVOCADO PRODUCTION

## 7.1 Introduction

Avocado production has been an important income generating activity in Kenya. Due to poor crop management practices and unfavorable market structure, the production has declined drastically, thus reducing its economic importance. The avocado tree produces fruits during the rainy period of the year when food is in short supply in most parts of the avocado growing areas. The avocado tree has the potential of protecting the environment from the adverse effects of climate change and contributes to agricultural climate resilience. In addition, the avocado plant is evergreen and has the ability of utilizing the carbon dioxide from the atmosphere thereby increasing the carbon sequestration and consequently reducing global warming.

Avocado remains a potential crop for income generation. Various avocado production technologies have been developed over the years for use by farmers.

This module covers various aspects of climate smart agronomic practices. These includes; the importance of proper plant spacing in which the avocado plants are established in the farm. Closer spacing will lead to overcrowding of the plants and hence lead to competition for nutrients as well as inadequate air and light penetration. As a result, the plants will harbor pests and diseases thereby leading to reduced yields. Pruning is also one of the major important agronomic practices that must be carried out on avocados for the realization of high yields of quality fruits. The purpose of pruning is to remove dead and entangled branches as well as diseased branches. The canopy is also opened up during the process of pruning to allow more light and air penetration to the plant.

Coppicing and top working are other form of agronomic practices that are undertaken in avocado orchards with the aim of rejuvenating the trees in order to ensure higher yields. The practice involves the cutting down of the upper portion of a tall avocado tree and allowing it to sprout. The sprouted shoots are either grafted with scions of other avocado varieties or left to grow in a well-managed manner to enable proper spraying and harvesting of fruits. In most cases, coppicing is done on old and tall avocado trees that are difficult to manage as they are. Other forms of good agronomic practices include weeding of the avocado fields to ensure that they are weed free at all times as well as correct fertilizer and manure application. The overall goal is to increase average yields and quality of avocados per tree in order to fetch better prices in the market.

This module covers various aspects of climate smart agronomic practices. These includes; the importance of proper plant spacing, pruning, coppicing and top working. The overall purpose is to reduce the number of farmers obtaining low Avocado yields and to increase average yields of the Avocado per tree.

## 7.2 Module Learning Outcomes

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

1. The agronomic practices recommended for avocado production identified.
2. Inputs and their right application rates for avocado production described and explained.
3. Region-specific advice on agronomic practices for avocado production explained.
4. The right timing for operations or inputs application in avocado production described.

## 7.3 Module Target Group and Categories

This module is intended for county public agricultural extension staff, private service providers, CBFs and lead farmers in the avocado value chain across the target counties.

## 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 in the Avocado value chain. The facilitators using this module should thoroughly familiarize themselves with the participants' handouts (training materials).

## 7.5. Module Duration

The module is estimated to take 4 hours 30 minutes

## 7.6 Module Summary

<b>Module 7: Avocado Agronomic Practices</b>			
<b>Sessions</b>	<b>Training methods</b>	<b>Training materials</b>	<b>Time</b>
<b>7.6.1 Introductions and climate setting</b>	<ul style="list-style-type: none"><li>• Presenter introductions</li><li>• Self-introduction of trainees</li><li>• Plenary discussions</li></ul>	<ul style="list-style-type: none"><li>• Flip charts</li><li>• Marker pens</li><li>• Laptop</li><li>• Projector</li></ul>	30 minutes
<b>7.6.2 Objectives and expectations</b>	<ul style="list-style-type: none"><li>• Presentations</li><li>• Group work</li><li>• Plenary discussions to share expectations</li></ul>	<ul style="list-style-type: none"><li>• Flip charts</li><li>• Marker pens</li><li>• Laptop</li><li>• Projector</li></ul>	1 hour
<b>7.6.3 Agronomic practices for Avocado production</b>	<ul style="list-style-type: none"><li>• Presentations</li><li>• Practical work</li><li>• Plenary discussions resulting from the farm visit</li></ul>	<ul style="list-style-type: none"><li>• Flip charts</li><li>• Marker pens</li><li>• Laptop</li><li>• Projector</li></ul>	1hour 30 minutes

<b>7.6.4 Appropriate inputs and their application rates for optimum yields of Avocado</b>	<ul style="list-style-type: none"> <li>• Presentations</li> <li>• Group work</li> <li>• Plenary discussions to share group work results</li> </ul>	<ul style="list-style-type: none"> <li>• Flips charts</li> <li>• Marker pens</li> <li>• Laptop</li> <li>• Projector</li> </ul>	1 hour
<b>7.6.5 Module review and discussion</b>	<ul style="list-style-type: none"> <li>• Discussions/conclusion and way forward</li> </ul>	<ul style="list-style-type: none"> <li>• Flip charts</li> <li>• Marker pens</li> <li>• Laptop</li> <li>• Projector</li> </ul>	30 minutes
<b>Total</b>			<b>4 hours 30 Minutes</b>

## 7.7 Facilitator's Guidelines

<b>Module 7: Climate Smart Agronomic Practices for Avocado</b>	
<b>7.7.1. Introduction, climate setting (30 minutes)</b>	<b>Session Guide</b>
<i>(The facilitator welcomes trainees to the module and invites them to introduce themselves and state their expectations).</i>	<ul style="list-style-type: none"> <li>• Summarize the facilitator/trainees involvement in Avocado value chains</li> </ul>
<b>7.7.2 Objectives and expectations (1 hour)</b>	
<p><b>Objectives (30 minutes)</b></p> <p>The facilitator presents the module objectives.</p> <p>By the end of the module training, the trainees should be able to:</p> <ul style="list-style-type: none"> <li>• Identify the agronomic practices recommended for avocado production.</li> <li>• Describe and explain inputs and their right application rates for avocado production.</li> <li>• Explain region-specific advice on agronomic practices for avocado production.</li> <li>• Describe the right timing for operations or inputs application in avocado production.</li> </ul> <p><b>Expectations (30 minutes)</b></p> <p>The trainees to form discussion groups and list their expectations from the module.</p>	<ul style="list-style-type: none"> <li>• PowerPoint presentations</li> <li>• Group exercise (listing and presenting expectations).</li> <li>• Expectations lists kept for later reviewing compliancy</li> </ul>

<b>7.7.3. Agronomic practices for Avocado production (1 hour 30 minutes)</b>	
<p><b>Plenary Presentation (1 hour)</b></p> <p>The facilitator presents critical factors on:</p> <ul style="list-style-type: none"> <li>• Climate smart land preparation</li> <li>• Fertilizer recommendations</li> <li>• Climate smart optimal planting (seed rates, plant density)</li> <li>• Physiological maturity indices and harvesting</li> <li>• Innovative avocado intercropping system</li> <li>• Avocado orchard rehabilitation techniques</li> </ul> <p><b>Discussions (30 minutes)</b></p> <p>Questions/answers and comments</p>	<ul style="list-style-type: none"> <li>• PowerPoint presentations</li> <li>• Groups discussions</li> <li>• Distribute participants' handouts/training materials</li> </ul>
<b>7.7.4. Appropriate inputs and their application rates for optimum yield of Avocado (1 hour)</b>	<b>Session Guide</b>
<p><b>Group Work (30 minutes)</b></p> <ul style="list-style-type: none"> <li>• The facilitator guides trainees to list and/or present the required inputs for use in Avocado production.</li> <li>• The trainees form county groups to provide lists of Avocado inputs and the application rates used by farmers.</li> <li>• The groups present their results in the plenary - opening up for some questions, answers and discussions.</li> </ul> <p><b>Plenary presentation (30minutes)</b></p> <p>The facilitator presents on:</p> <ul style="list-style-type: none"> <li>• Recommended Avocado inputs (seeds, fertilizers, manures, etc.)</li> <li>• Input application rates</li> <li>• Input timing of their application for optimal yields of Avocadoes</li> </ul>	<ul style="list-style-type: none"> <li>• PowerPoint presentations</li> <li>• Distribute participants' handouts/training materials</li> <li>• Groups discussions</li> </ul>

7.7.5. Module review (30 minutes)	Session Guide
<p><i>(The facilitator leads the trainees in reviewing the module)</i></p> <p>Summary for the main points from the training</p> <ul style="list-style-type: none"> <li>• Objectives and expectations (review done on the basis of objectives and expectations listed earlier).</li> <li>• Trainees to randomly indicate new sets of skills and knowledge acquired from the module.</li> <li>• Trainees to randomly highlight future undertakings (average of 10 cases) in reference to the module.</li> </ul>	<ul style="list-style-type: none"> <li>• The last Participants' Handouts/training materials</li> <li>• Summarize the main points of the module on a flip chart and display</li> </ul>

## 7.8 References

### 7.8.1 Participants handouts

1. Avocado production guides [2019]
2. Avocado booklet [2006]
3. Brochures on soil and water management

# MODULE 8: INTEGRATED SOIL AND WATER MANAGEMENT PRACTICES FOR AVOCADO PRODUCTION

## 8.1 Introduction

Poor soil conditions and unreliable availability of moisture in most smallholder avocado farming systems have been the main causes of low yields. Generally, avocado yields have continued to decline over the years due to increased soil acidity, mining of nutrients not supplied in the applied 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 identified as deficient in Kenyan soils. Additionally, climate change has accelerated the decline of the agricultural sector performance through limited and unpredictable water availability for the Avocado 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. Avocado as any other crop requires nutrient inputs for potential yield. If the nutrient is not balanced by application of manures and fertilizers, the yield and quality will decline apart from deterioration of soil health. Integrated use of organic manure and inorganic fertilizers provides sustainable yields while maintaining soil health.

Avocado are mostly cultivated by smallholder farmers with minimal inputs. However, farmers have not realized the full benefits due to limited integration of the developed Integrated Natural Resource Management (INRM) and sustainable intensification practices in their Avocado production systems.

This module introduces the avocado value chain service providers, lead farmers, agriculture extension staff and facilitators to the importance of integrated soil and water management practices for enhanced avocadoproduction.

## 8.2 Module Learning Outcomes

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

1. Soil composition, the various physical, chemical and biological properties, and what constitutes a healthy soil, including soil classification identified and explained
2. Soil and plant tissue sampling for laboratory analysis, interpretation and utilization of results from accredited laboratories in Kenya discussed and appreciated.
3. Soil fertility and plant nutrition for increased crop productivity (4R Stewardship that includes nutrient source and application rates, timing and placement) appreciated.
4. Soil health and Integrated Soil Fertility Management (ISFM) for climate resilient cropping explained
5. Water harvesting technologies, water quality for avocadoproduction together with soil and water management identified

6. Knowledge and skills for identifying temporary or permanent decline in the productive capacity of land and how to solve soil degradation challenges identified
7. Occurrence of problematic soils and their management explained.

### 8.3 Module Target Group and Categories

This module is intended for avocado value chain service providers, County extension agents, CBFs and lead farmers in the avocadoproducing regions.

### 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 in the Avocado value chain. The facilitators using this module should thoroughly familiarize themselves with the participants' handouts (training materials).

### 8.5 Module Duration

The Module is estimated to take **7 hours**

### 8.6 Module Summary

<b>Module 8: Integrated soil and water management practices for Avocado production</b>			
<b>Sessions</b>	<b>Training methods</b>	<b>Training materials</b>	<b>Duration</b>
8.6.1 Introduction, objectives and expectations	<ul style="list-style-type: none"> <li>• Personal introduction</li> <li>• Presentations</li> <li>• Plenary discussions</li> </ul>	<ul style="list-style-type: none"> <li>• Flip charts</li> <li>• Marker pens</li> <li>• PowerPoint presentations</li> </ul>	30 minutes
8.6.2 Soil composition, properties and health,	<ul style="list-style-type: none"> <li>• Presentations</li> <li>• Practicals on soil sampling and analysis</li> </ul>	<ul style="list-style-type: none"> <li>• Flip charts</li> <li>• Marker pens</li> <li>• PowerPoint presentations</li> <li>• Participants' handouts</li> </ul>	30 minutes
8.6.3 Soil and plant tissue sampling and analysis	<ul style="list-style-type: none"> <li>• Presentations</li> <li>• Field demonstrations (Conduct soil and plant tissue sampling and analysis)</li> </ul>	<ul style="list-style-type: none"> <li>• Flip charts</li> <li>• Marker pens</li> <li>• PowerPoint presentations</li> <li>• Participants' handouts</li> </ul>	1 hour 30 minutes

8.6.4. Soil fertility and plant nutrition	<ul style="list-style-type: none"> <li>• Presentations</li> <li>• Field demonstrations</li> </ul>	<ul style="list-style-type: none"> <li>• Flip charts</li> <li>• Marker pens</li> <li>• PowerPoint presentations</li> <li>• Participants' handouts</li> </ul>	1 hour
8.6.5 Soil health and ISFM for climate resilient cropping systems	<ul style="list-style-type: none"> <li>• Presentations</li> <li>• Field demonstrations</li> </ul>	<ul style="list-style-type: none"> <li>• Flip charts</li> <li>• Marker pens</li> <li>• PowerPoint presentations</li> <li>• Participants' handouts</li> </ul>	1 hour
8.6.6 Soil and water management and water harvesting technologies	<ul style="list-style-type: none"> <li>• Presentations</li> <li>• Field demonstrations</li> </ul>	<ul style="list-style-type: none"> <li>• Flip charts</li> <li>• Marker pens</li> <li>• PowerPoint presentations</li> <li>• Participants' handouts</li> </ul>	1 hour
8.6.7 Soil degradation and reclamation	<ul style="list-style-type: none"> <li>• Presentations</li> <li>• Field demonstrations</li> </ul>	<ul style="list-style-type: none"> <li>• Flip charts</li> <li>• Marker pens</li> <li>• PowerPoint presentations</li> <li>• Participants' handouts</li> </ul>	30 minutes
8.6.8 Problematic soils and their management	<ul style="list-style-type: none"> <li>• Presentations</li> <li>• Field demonstrations</li> </ul>	<ul style="list-style-type: none"> <li>• Flip charts</li> <li>• Marker pens</li> <li>• PowerPoint presentations</li> <li>• Participants' handouts</li> </ul>	30 minutes
8.6.9 Module review and discussion	<ul style="list-style-type: none"> <li>• Discussions</li> </ul>	<ul style="list-style-type: none"> <li>• Flip charts</li> <li>• Marker pens</li> </ul>	30 minutes
<b>Total</b>			<b>7 hours</b>

## 8.7 Facilitator's Guidelines

<b>Module 8: Integrated Soil and Water Management Practices for Avocado Production</b>	
<b>8.7.1. Introduction, objectives and expectations (45minutes)</b>	<b>Session Guide</b>
<p><i>(The facilitator welcomes trainees to the module and invites them to introduce themselves and state their expectations)</i></p> <p><b>Module Objectives (30 minutes)</b></p> <p><i>(The facilitator presents modules objectives)</i></p>	<ul style="list-style-type: none"> <li>• Summarize trainees' "Expectations" and display.</li> <li>• PowerPoint presentations</li> </ul>

<p>By the end of the module the trainee should be able to:</p> <ul style="list-style-type: none"> <li>• Explain soil composition and what constitutes a healthy soil, including soil classification.</li> <li>• Describe soil and plant tissue sampling for laboratory test analysis, interpretation and utilization of results from accredited laboratories in Kenya.</li> <li>• Explain soil fertility and plant nutrition for increased crop productivity (4R Stewardship that includes Right source, Right application rates, Right timing and Right placement).</li> <li>• Describe soil health and ISFM for climate resilient cropping systems.</li> <li>• Explain water harvesting technologies, soil and water management</li> <li>• Describe temporary or permanent decline of land productive capacity and provide various solutions to soil degradation.</li> <li>• Identify and describe the occurrence of problematic soils and their management.</li> </ul>	<ul style="list-style-type: none"> <li>• Distribute participants' handouts on Module</li> <li>• Objectives and Training Program</li> </ul>
<p><b>8.7.2. Soil composition, properties and health (1 hour)</b></p>	<p><b>Session Guide</b></p>
<p><i>(The facilitator presents on soil composition, properties and health)</i></p> <p><b>Plenary Presentation (30 minutes)</b></p> <p>Soil composition, properties and health</p> <ul style="list-style-type: none"> <li>• Description of soil composition</li> <li>• Description of soil properties</li> <li>• Describe what soil health is all about</li> </ul> <p><b>Plenary Discussion (30 Minutes)</b></p> <p>Let the trainees recall what they learnt and discuss any issues that may arise.</p>	<ul style="list-style-type: none"> <li>• PowerPoint presentations</li> <li>• Distribute participants' handouts</li> <li>• Brochures, leaflets and manual</li> </ul>

<b>8.7.3. Soil and plant tissue sampling and analysis (1 hour)</b>	<b>Session Guide</b>
<p><b>Plenary Presentation (30 minutes)</b></p> <ul style="list-style-type: none"> <li>• Overview of the soil sampling methods</li> <li>• Soil analysis results and interpretation</li> <li>• Overview of soil analysis results using available examples</li> <li>• Soil sampling guidelines</li> </ul> <p><b>Practical exercise on soil sampling (30 minutes)</b></p> <p>Demonstration on soil sampling method</p>	<ul style="list-style-type: none"> <li>• PowerPoint presentations</li> <li>• Distribute participants' handouts</li> <li>• Brochures, leaflets and manuals</li> <li>• Practical Demonstration</li> </ul>
<b>8.7.4. Soil fertility and plant nutrition (1 hour 15 minutes)</b>	<b>Session Guide</b>
<p><b>Plenary Presentation (1 hour)</b></p> <ul style="list-style-type: none"> <li>• Potential role of different soil management techniques in addressing soil fertility challenges in Avocado smallholder farming systems</li> <li>• Integrated Soil Fertility Management techniques</li> <li>• Soil management guidelines</li> </ul> <p><b>Plenary Discussion (15 Minutes)</b></p> <p>Let the trainees recall what they learnt and discuss any issues that may arise.</p>	<ul style="list-style-type: none"> <li>• PowerPoint presentations</li> <li>• Distribute participants' handouts</li> <li>• Brochures, leaflets and manual</li> </ul>
<b>8.7.5 Soil health and (ISFM) for climate resilient cropping systems (30 minutes)</b>	<b>Session Guide</b>
<p><b>Plenary Presentation (20 Minutes)</b></p> <ul style="list-style-type: none"> <li>• Soil health</li> <li>• Introduce ISFM</li> <li>• Soil health and ISFM for a climate resilient cropping system</li> <li>• Manure management, mulching, organic amendments and composting for increased use of organic manure for improving agricultural production</li> <li>• Conservation agriculture as a climate smart agriculture practice</li> </ul>	<ul style="list-style-type: none"> <li>• PowerPoint presentations</li> <li>• Distribute participants' handouts</li> <li>• Brochures, leaflets and manual</li> </ul>

<ul style="list-style-type: none"> <li>• Avocado intercrop and crop rotation as climate resilient cropping systems such as (<i>Mucuna pruriens</i>, Dolichos Lab, <i>Clitoria ternatea</i>, cowpeas etc.).</li> </ul> <p><b>Plenary Discussion (10 Minutes)</b></p> <p>Let the trainees recall what they learnt and discuss any issues that may arise.</p>	
<p><b>8.7.6 Soil and water management and water harvesting technologies (1 hour)</b></p>	<p><b>Session Guide</b></p>
<p><b>Plenary Presentation (45 Minutes)</b></p> <ul style="list-style-type: none"> <li>• Principles of soil management for increased Avocado productivity</li> <li>• Methods of tillage systems that conserve water for avocado use</li> <li>• Principles of soil fertility management for increased avocado productivity</li> <li>• Methods of soil fertility management for increased avocado productivity</li> </ul> <p><b>Plenary Discussion (15 Minutes)</b></p> <p>Let the trainees recall what they learnt and discuss any issues that may arise.</p>	<p><b>Session Guide</b></p> <ul style="list-style-type: none"> <li>• PowerPoint presentations</li> <li>• Distribute participants' handouts</li> <li>• Brochures, leaflets and manual</li> </ul>
<p><b>8.7.7 Soil degradation and reclamation (30 minutes)</b></p>	<p><b>Session Guide</b></p>
<p><b>Plenary Presentation (20 minutes)</b></p> <ul style="list-style-type: none"> <li>• Overview of soil degradation and reclamation.</li> <li>• Reclamation measures of degraded soil</li> <li>• Identification of the causes of soil degradation</li> <li>• Identification of reclamation measures of degraded soil</li> </ul> <p><b>Plenary Discussion (10 Minutes)</b></p> <p>Let the trainees recall what they learnt and discuss any issues that may arise.</p>	<ul style="list-style-type: none"> <li>• PowerPoint presentations</li> <li>• Distribute participants handouts</li> <li>• Brochures, leaflets and manual</li> </ul>

8.7.8 Problematic soils and their management (30 minutes)	Session Guide
<p><b>Plenary Presentation (20 minutes)</b></p> <ul style="list-style-type: none"> <li>• Problematic soils and their management</li> <li>• Soils with unsuitable biological properties</li> <li>• Soils with unsuitable chemical properties</li> <li>• Soils with unsuitable physical properties</li> </ul> <p><b>Plenary Discussion (10 Minutes)</b></p> <p>Let the trainees recall what they learnt and discuss any issues that may arise.</p>	<ul style="list-style-type: none"> <li>• PowerPoint presentations</li> <li>• Distribute participants' Handouts</li> <li>• Brochures, leaflets and manual</li> </ul>
8.7.9. Module review (30 minutes)	Session Guide
<p><i>The facilitator leads the trainees in reviewing the module)</i></p> <p>Summarize the main points of the training review the main points together with the trainees.</p> <p>Discuss with trainees the new things learnt from this Module. Let them identify some of the problems and any other issues arising from the module.</p>	<ul style="list-style-type: none"> <li>• The last participants' handouts</li> <li>• Summary of the main points from the module on a flip chart and display</li> </ul>

## 8.8 Reference Materials

### 8.8.1 Participants' Handouts

- Soil Management Extension Manual [KCEP-CRAL Manual 2019]
- Soil Management Leaflets [KCEP-CRAL PAMPHLETS 2019]
- OFRA Technical Training Manual

### 8.8.2 Further Reading

# MODULE 9: AVOCADO CROP HEALTH

## 9.1 Introduction

The avocado crop reliably yields highly in Central and Eastern regions of Kenya. However, the cumulative effects of climate change, emergence of persistent evolution of pests and diseases, invasive weeds, cost of production and quality of avocado fruits cannot be underestimated. Further, acute shortage of knowledge and good agricultural practices among the avocado farmers on the recommended crop health management options lead to perennial frustration that may render to the abandonment of this high value crop if timely interventions are not prioritized. Synthetic agro-chemicals that offer spot on solution are predominantly used as a control measure for most pests, disease pathogens and weeds. However, this practice poses a long term hazardous impacts on soil biology, human health including terrestrial and aquatic ecosystems due to build resistance and high cumulative build up. Consequently, a proper integrated insect pest, disease and weed management program is very crucial in minimizing losses and ensuring that both environmental and food safety concerns are adequately addressed. Available options for the control of these biotic impediments to high yields of avocado fruit can cushion farmers. There is need to employ human and environmentally safe approaches to pest, disease and weed management so as to increase productivity and enhance food safety. A comprehensive package including cultural, mechanical, use of resistant or tolerant varieties and chemical control are readily practical to farmers.

The standard operating process in crop health begins from selection of tolerant and clean planting seedlings, suitable site selection and tests for presence of pest and diseases on the planting soils, correct land preparation that aims at reducing pest emergence, inoculum and seed bank. Knowledge on scouting for pest, diseases and weeds for identification and diagnosis and to determine action thresholds for management is important. During vegetative growth the avocado seedling/ tree need plenty of water moisture and fertile soil base. However, weed, pests and diseases increase the competition and attack the young tree, therefore, crop health management technologies/ techniques are required to achieve the high potential yield of the avocado.

## 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 practices in Avocado described.
3. Safe use of agro-chemicals (insecticides, fungicides and herbicides) appreciated and explained.

## 9.3 Module Target Group

This module targets public and private extension agents, service providers and lead farmers

## 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 in the Avocado value chain. The facilitators using this module should thoroughly familiarize themselves with the participants' handouts (training materials).

## 9.5 Module Duration

This module is estimated to take 6 hours

## 9.6 Module Summary

<b>Module 9: Avocado Crop Health</b>			
<b>Sessions</b>	<b>Training methods</b>	<b>Training materials</b>	<b>Time</b>
9.6.1 Introduction, objectives and expectations	<ul style="list-style-type: none"> <li>• Self-introductions</li> <li>• Group exercise</li> <li>• Plenary presentation</li> <li>• Plenary discussion</li> </ul>	<ul style="list-style-type: none"> <li>• Flip charts</li> <li>• Marker pens</li> <li>• PowerPoint presentations</li> </ul>	30 minutes
9.6.2 Major pests that cause economic losses and their control methods	<ul style="list-style-type: none"> <li>• Group work</li> <li>• Plenary presentation</li> <li>• Plenary discussion</li> <li>• Practical exercise</li> </ul>	<ul style="list-style-type: none"> <li>• Flip charts</li> <li>• Marker pens</li> <li>• Laptop/projector</li> <li>• Participants' handouts</li> </ul>	1 hour
9.6.3 Sustainable Integrated Pests Management (IPM) practices: scouting and threshold determination	<ul style="list-style-type: none"> <li>• Plenary presentation</li> <li>• Plenary discussion</li> </ul>	<ul style="list-style-type: none"> <li>• Flip charts</li> <li>• Marker pens</li> <li>• Laptop/ projector</li> <li>• Participants/ handouts</li> </ul>	30 minutes
9.6.4 Major Avocado diseases that cause economic losses, conditions that favor their development including their control methods	<ul style="list-style-type: none"> <li>• Group work</li> <li>• Plenary Presentation</li> <li>• Plenary discussion</li> <li>• Practical exercise</li> </ul>	<ul style="list-style-type: none"> <li>• Flip charts</li> <li>• Marker pens</li> <li>• Laptop/Projector</li> <li>• Participants' handouts</li> </ul>	1 hours
9.6.5 Sustainable Integrated Management of Avocado diseases and scouting for threshold determination	<ul style="list-style-type: none"> <li>• Presentations</li> <li>• Plenary discussion</li> <li>• Field demonstration</li> </ul>	<ul style="list-style-type: none"> <li>• Flip charts</li> <li>• Marker pens</li> <li>• Laptop/ projector</li> <li>• Participants' handouts</li> </ul>	1 hour

9.6.6 Integrated weed management (Major weeds of avocado)	<ul style="list-style-type: none"> <li>• Plenary presentation</li> <li>• Plenary discussion</li> <li>• Field demonstration</li> </ul>	<ul style="list-style-type: none"> <li>• Flip charts</li> <li>• Marker pens</li> <li>• Projector</li> <li>• Laptop</li> <li>• Participants' handouts</li> </ul>	1 hour
9.6.7 Safe use of agro-chemicals and update source for registered agro-chemicals (PCPB registered products)	<ul style="list-style-type: none"> <li>• Presentations</li> <li>• Practical</li> <li>• Plenary discussion</li> </ul>	<ul style="list-style-type: none"> <li>• Laptop/projector</li> <li>• Flip charts</li> <li>• Marker pens</li> <li>• Participants' handouts</li> </ul>	30 minutes
9.6.8 Module review	<ul style="list-style-type: none"> <li>• Plenary discussions</li> <li>• Take away messages</li> </ul>	<ul style="list-style-type: none"> <li>• Flip charts</li> <li>• Marker pens</li> <li>• Participants' handouts</li> </ul>	30 minutes
<b>Total</b>			<b>6 hours</b>

## 9.7 Facilitator's Guidelines

<b>Module 9: Avocado Crop Health</b>	
<b>9.7.1. Introduction and levelling of expectations and objectives (30 minutes)</b>	<b>Session Guide</b>
<p><b>Introduction (15 minutes)</b></p> <p><i>(The facilitator welcomes trainees to the module on avocado crop health. They are then invited to introduce themselves and state their expectations through group work)</i></p> <p><b>Module objectives (15 minutes)</b></p> <p><i>(The facilitator presents modules objectives)</i></p> <p>By the end of the module, the trainees should be able to:</p> <ul style="list-style-type: none"> <li>• Identify major pests, diseases and weeds.</li> <li>• Describe and explain integrated pest, disease and weed management in Avocado.</li> <li>• Explain safe use of agro-chemicals (pesticides, fungicides and herbicides).</li> </ul>	<ul style="list-style-type: none"> <li>• Summarize trainees' "expectations"</li> <li>• PowerPoint presentations</li> <li>• Participants' handouts</li> </ul>

9.7.2. Major Avocado pests that cause economic losses and their control methods; emerging/migratory pests (1 hour)	Session Guide
<p><i>(The facilitator makes a presentation on the common Avocado pests that are of economic importance)</i></p> <p><b>Group work (15 minutes)</b></p> <ul style="list-style-type: none"> <li>• Trainees to share avocado pest information from their respective Counties</li> </ul> <p><b>Plenary presentation (20 minutes)</b></p> <ul style="list-style-type: none"> <li>• Names of pests and their descriptions</li> <li>• Symptoms of their infestation/type of damage</li> <li>• Data on economic significance of the common avocado pests</li> </ul> <p><b>Practical exercise (15 minutes)</b></p> <ul style="list-style-type: none"> <li>• Identification of avocado pests from provided specimens</li> </ul> <p><b>Discussion (10 minutes)</b></p> <ul style="list-style-type: none"> <li>• Let the trainees recall what they learned and discuss any issue that may arise</li> </ul>	<ul style="list-style-type: none"> <li>• PowerPoint presentations</li> <li>• Group exercise</li> <li>• Practical exercise</li> <li>• Participants' handouts</li> </ul>
9.7.3. Sustainable Integrated Pest Management (IPM) practices in Avocado: scouting and threshold determination(30 minutes)	Session Guide
<p><b>Plenary Presentation (20 minutes)</b></p> <ul style="list-style-type: none"> <li>• IPM principles; how to implement them with a focus on cultural, physical, biological and chemical pest management options.</li> <li>• Critical considerations for proper scouting</li> <li>• Threshold determination and when to implement control measures</li> <li>• An overview on the safe use of agro-chemicals (demonstration on how to select most suitable pesticides for the management of pests in avocado orchards).</li> </ul> <p><b>Discussion (10 minutes)</b></p> <p>Let the trainees recall what they learned and seek clarification on the principles of sustainable IPM options</p>	<ul style="list-style-type: none"> <li>• PowerPoint presentations on scouting for pests</li> <li>• Participants' handouts (brochures,</li> <li>• Leaflets and manuals on pest species on avocado</li> </ul>

<b>9.7.4. Major Avocado diseases that cause economic losses, conditions that favour their development and their control methods (1 hour)</b>	<b>Session Guide</b>
<p><b>Group work (15 minutes)</b></p> <ul style="list-style-type: none"> <li>• Determination of Avocado diseases in specific counties</li> </ul> <p><b>Plenary presentation (15 Minutes)</b></p> <ul style="list-style-type: none"> <li>• Presentations on Avocado diseases and conditions that favor their development</li> </ul> <p><b>Practical exercise (30 Minutes)</b></p> <ul style="list-style-type: none"> <li>• Identification of major disease species causing economic damage based on samples presented</li> </ul>	<ul style="list-style-type: none"> <li>• PowerPoint presentations</li> <li>• Participants' handouts</li> <li>• Disease identification guidelines</li> <li>• Practical exercise</li> </ul>
<b>9.7.5. Sustainable Integrated Diseases Management (IDM); scouting and threshold determination (1 hour)</b>	<b>Session Guide</b>
<p><b>Plenary presentation (30 minutes)</b></p> <ul style="list-style-type: none"> <li>• Critical considerations for scouting and when to implement Avocado disease control measures</li> <li>• Presentation on Integrated Disease Management (IDM) in Avocado</li> <li>• An overview on the safe use of recommended agrochemicals (demonstration on how to select most suitable fungicides for the management of major Avocado diseases).</li> </ul> <p><b>Field visit (30 minutes)</b></p> <ul style="list-style-type: none"> <li>• Visit to a nearby Avocado field for collection and identification of diseased avocado plant samples</li> </ul>	<ul style="list-style-type: none"> <li>• PowerPoint presentations</li> <li>• Participants' handouts</li> <li>• Disease management guidelines</li> <li>• Field demonstration</li> </ul>
<b>9.7.6 Integrated weed management of major weeds of Avocado (1 hour)</b>	<b>Session Guide</b>
<p><b>Plenary presentation (45 minutes)</b></p> <ul style="list-style-type: none"> <li>• Identification of weeds</li> <li>• Major types of weed in the avocado field</li> <li>• Integrated weed management</li> </ul> <p><b>Plenary discussion (15 minutes)</b></p> <p>Integrated weed management</p>	<ul style="list-style-type: none"> <li>• PowerPoint presentations</li> <li>• Participants' handouts</li> <li>• Plenary discussion</li> </ul>

9.7.7. Module review (1 hour)	Session Guide
<p><i>(The facilitator leads the trainees in reviewing the module)</i></p> <p>Summarize the main points of the training: The facilitator should review the following main points about climatic conditions suitable for Avocado production:</p> <ul style="list-style-type: none"> <li>• Major pests of Avocado and their economic impacts in production.</li> <li>• IPM options for avocado crop</li> <li>• Major diseases of avocado and their economic impact in production.</li> <li>• IDM options for avocado</li> <li>• Major weeds of avocado and their economic impacts in production.</li> <li>• Integrated weed management options for avocado</li> </ul> <p><i>(Discuss with trainees the new things learnt from this Module. What are some of the issues that need clarification)?</i></p>	<ul style="list-style-type: none"> <li>• The last participants' handouts</li> <li>• Summarize the main points from the module on a flip chart and display</li> </ul>

## 9.8 References

### 9.8.1 Participants handouts

1. Fact sheets on avocado pest identification and control
2. Factsheets on avocado disease identification and their control
3. Factsheets on avocado weeds identification and their management
4. Weed Management manual. Mwangi, H.W. KALRO-Kabete

### 9.8.2 Further Reading

# MODULE 10: AVOCADO HARVESTING AND POSTHARVEST MANAGEMENT

## 10.1. Introduction

This module is designed for training facilitators of FFBS in knowledge and skills that are useful in postharvest handling of avocado. Avocado destined for markets should be harvested using appropriate harvesting techniques and at the right time. This ensures good quality of produce with long shelf-life. Many avocado value chain actors are not familiar with the appropriate harvesting and postharvest handling of avocado. Avocados are delicate and highly perishable and if not handled properly after harvesting losses between 30-50% occur.

Careful handling of avocado from harvesting up to market ensures maintenance of good quality. Farmers and other actors at these value chain levels do not always follow recommended practices. This leads to high postharvest losses. There is need to sensitize farmers and other avocado value chain actors on importance of proper harvesting and postharvest handling of avocado and capacity build them on best practices that include determination of maturity indices, harvesting technique, appropriate harvesting and holding containers, sorting and grading, pre cooling at farm level, packaging and transportation.

## 10.2 Module Learning Outcomes

By the end of the module the participants should be able to:

- Identify the maturity indices for avocado destined for markets
- Identify quality attributes of avocado that need to be preserved during postharvest handling
- Explain/demonstrate the appropriate harvesting technique and harvesting containers for avocado
- Explain the whole range of postharvest practices for avocado from harvesting to marketing
- Explain use of the low cost cooling units at farm level namely charcoal cooler and Zero energy cooler

## 10.3 Module Target Group

This module targets public and private agricultural extension agents, lead farmers and service providers, 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 in the Avocado value chain. The facilitators using this module should thoroughly familiarize themselves with the participants' handouts (training materials).

## 10.5 Module Duration

The Module is estimated to take 3 hours

## 10.6 Module Summary

<b>Module 10. Avocado Harvesting and Postharvest Management</b>			
<b>Sessions</b>	<b>Training Methods</b>	<b>Training Materials</b>	<b>Time</b>
10.6. 1. Introduction, expectations and objectives	<ul style="list-style-type: none"><li>• Personal introduction</li><li>• Group exercise</li><li>• Plenary presentation</li></ul>	<ul style="list-style-type: none"><li>• Flip charts</li><li>• Felt pens</li><li>• Projector</li><li>• Laptop</li></ul>	30 minutes
10.6.2. Constraints and opportunities in postharvest handling of avocado	<ul style="list-style-type: none"><li>• Group exercise</li><li>• Plenary presentations</li></ul>	<ul style="list-style-type: none"><li>• Flip charts</li><li>• Felt pens</li><li>• Participants' handouts</li><li>• Videos</li></ul>	1 hour
10.6.3. Avocado postharvest value chain TIMPs	<ul style="list-style-type: none"><li>• Group exercise</li><li>• Plenary presentation</li><li>• Practical demonstration</li><li>• Video presentation</li></ul>	<ul style="list-style-type: none"><li>• PowerPoint</li><li>• Participants' handouts</li><li>• Materials for demos</li></ul>	1 hours 10 minutes
10.6.4. Module review	<ul style="list-style-type: none"><li>• Facilitator's summary</li><li>• Group exercise</li></ul>	<ul style="list-style-type: none"><li>• Flip charts</li><li>• Projector</li><li>• Module evaluation forms</li></ul>	20 minutes
<b>TOTAL</b>			<b>3 hours</b>

## 10.7 Facilitator's Guidelines

<b>Module 10: Avocado Harvesting and Postharvest Management</b>	
<b>10.7.1 Introduction and levelling of expectations and objectives (30 minutes)</b>	<b>Session Guide</b>
<p><b>Introduction and expectations</b></p> <p><i>(The facilitator welcomes trainees to the module and thereafter trainees are invited to introduce themselves and state their expectations)</i></p> <p><b>Module objectives (20 minutes)</b></p> <p>(The facilitator presents module's objectives)</p> <p>By the end of the module trainees should be able to:</p> <ul style="list-style-type: none"> <li>• Describe the whole range of postharvest handling practices for Avocado,</li> <li>• Explain the constraints and opportunities in Avocado postharvest value chain</li> <li>• Appreciate climate smart and gender-friendly postharvest TIMPs for minimizing the losses and enhancing quality of avocado</li> </ul>	<ul style="list-style-type: none"> <li>• Participants handouts</li> <li>• PowerPoint presentations</li> <li>• Summarize trainees' expectations and display on flip chart/board.</li> </ul>
<b>10.7.2 Constraints and opportunities in postharvest handling of Avocado (1 hour)</b>	<b>Session Guide</b>
<p><i>(Highlight the Avocado postharvest value chain – harvesting, and postharvest handling among others)</i></p> <p><b>Group exercise (20 minutes)</b></p> <ul style="list-style-type: none"> <li>• Trainees discuss constraints in the postharvest handling of Avocado, and suggest solutions</li> </ul> <p><b>Plenary presentation (40 minutes)</b></p> <p>Trainees present results of group work in plenary</p>	<ul style="list-style-type: none"> <li>• PowerPoint presentations</li> <li>• Participants' handouts</li> </ul>

<b>10.7.3 Avocado postharvest handling practices TIMPs (1 hour 10 minutes)</b>	<b>Session Guide</b>
<p><i>(Facilitator uses slides to train)</i></p> <p><b>PowerPoint presentations (40 minutes)</b></p> <p>PowerPoint presentations on the operations in avocado harvesting and postharvest handling practices</p> <ul style="list-style-type: none"> <li>• Maturity indices and harvesting of avocado (importance of harvesting at the right maturity index, advantages and disadvantages of harvesting too early or too late)</li> <li>• Preparations farmers need to make prior to harvesting</li> <li>• Avocado harvesting methods</li> <li>• Harvesting containers</li> <li>• Avocado cooling</li> <li>• Packaging and transportation</li> </ul> <p>Practical demonstrations (30 minutes)</p> <ul style="list-style-type: none"> <li>• Sorting and grading (a sample of avocado purchased from the market and grading into various grades with reference to any existing standards)</li> </ul>	<ul style="list-style-type: none"> <li>• PowerPoint presentations</li> <li>• Participants' handouts</li> </ul>
<b>10.7.4 Training review (20 minutes)</b>	<b>Session Guide</b>
<p><i>(The facilitator should be able to lead the trainees in reviewing the module)</i></p> <p><b>Plenary presentation (15 min)</b></p> <p>Together with the trainees, summarize the main points of the training.</p> <p><b>Group Exercise (5 min)</b></p> <p>Together with the trainees review the main points about avocado post-harvest handling practices</p> <ul style="list-style-type: none"> <li>• What new things did you learn from this module?</li> <li>• What are some of the problems and issues that you have become more aware of in harvesting and postharvest handling practices of avocado?</li> <li>• What questions do you still have about post-harvest handling in avocado?</li> </ul>	<ul style="list-style-type: none"> <li>• PowerPoint presentations</li> <li>• Participants' handouts</li> <li>• Summary of the main points from the Module</li> </ul>

## **10.8 References**

### **10.8.1 Participants handouts**

- Avocado post-harvest handling Factsheets

### **10.8.2 Further reading**

# MODULE 11: AVOCADO VALUE ADDITION

## 11.1. Introduction

This module is designed for training facilitators to acquire skills that are useful in adding value to avocado. The Avocado fruit is highly perishable resulting in high postharvest losses and short shelf-life. Processing of avocado into various products enhances shelf life thus ensuring availability during off season. Agro-processing enhances value to avocado, increasing their economic value thus giving better returns to various value chain actors. Value addition also diversifies markets and utilization of avocado. Knowledge and skills in avocado value addition is limited or lacking at grass-root levels. There is need for capacity building to address these challenges and promote avocado value addition at cottage industry level as viable commercial enterprises.

## 11.2 Module Learning Outcomes

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

- The role of avocado as a food and nutrition security crop explained and appreciated.
- Nutritional composition of avocado and its health benefits, food security and income described.
- Constraints in value addition and consumption of avocado, and suggest solutions identified
- Avocado-based value added products identified and explained.

## 11.3 Module Target Group

This module targets public and private extension agents, service providers, SMEs/entrepreneurs and lead farmers

## 11.4 Module Users

This module is intended for use by Master trainers who are members of the Core Team of Trainers (CTT) and Trained Trainers in the Avocado value chain. The facilitators using this module should thoroughly familiarize themselves with the participants' handouts (training materials).

## 11.5. Module Duration

The Module is estimated to take 6 hours.

## 11.6. Module Summary

Module 11. Avocado value addition			
Sessions	Training Methods	Training Materials	Time
11.6.1. Introduction, Objectives and Expectations	<ul style="list-style-type: none"> <li>• Personal introduction</li> <li>• Group work</li> <li>• Plenary presentation</li> </ul>	<ul style="list-style-type: none"> <li>• Flip charts</li> <li>• Projector</li> <li>• Laptops</li> </ul>	30 minutes
11.6.2 Role of Avocado as a food and nutrition security crop	<ul style="list-style-type: none"> <li>• PowerPoint presentations</li> <li>• Group exercise</li> <li>• Plenary presentation</li> </ul>	<ul style="list-style-type: none"> <li>• Flip charts</li> <li>• Felt pens</li> <li>• Projector</li> <li>• Laptop</li> <li>• Participants' handouts</li> </ul>	50 minutes
11.6.3. Nutritional composition of Avocado and its role in human health	<ul style="list-style-type: none"> <li>• PowerPoint</li> <li>• Plenary presentation</li> <li>• Group exercise</li> </ul>	<ul style="list-style-type: none"> <li>• PowerPoint presentations</li> <li>• Flip charts</li> <li>• Felt pens</li> <li>• Participant handouts</li> </ul>	50 minutes
11.6.4. Constraints in value addition and consumption of Avocado	<ul style="list-style-type: none"> <li>• Group exercise</li> <li>• Plenary presentation</li> </ul>	<ul style="list-style-type: none"> <li>• Flip charts</li> <li>• Felt pens</li> <li>• Participants' handouts</li> <li>• Projector</li> <li>• Laptop</li> </ul>	1 hour 10 minutes
11.6.5 Avocado based value added products:	<ul style="list-style-type: none"> <li>• Plenary presentations</li> <li>• Plenary discussion</li> <li>• Sensory evaluation of value added Avocado products</li> </ul>	<ul style="list-style-type: none"> <li>• Projector</li> <li>• Laptop</li> <li>• Participant handouts</li> <li>• Assorted value addition equipment and ingredients (Avocado pulp, Avocado flours, among others.)</li> </ul>	2 hours

		<ul style="list-style-type: none"> <li>• List of value added products</li> <li>• Checklist for prioritization</li> <li>• Pair wise ranking tool</li> </ul>	
11.6.6. Module review	<ul style="list-style-type: none"> <li>• Plenary discussion</li> <li>• Presentations</li> </ul>	<ul style="list-style-type: none"> <li>• Flip charts</li> <li>• PowerPoint presentations</li> <li>• Module evaluation forms</li> </ul>	40 minutes
<b>TOTAL</b>			<b>6 hours</b>

## 11.7. Facilitator's Guidelines

<b>Module 11. Avocado value addition</b>	
<b>11.7.1 Introduction, expectations and objectives (30 minutes)</b>	<b>Session Guide</b>
<p><b>Introduction and expectations (25 minutes)</b></p> <p><i>(The facilitator welcomes trainees to the module on value addition of avocado. They are then invited to introduce themselves and state their expectations)</i></p> <p><b>Module Objectives (5 minutes)</b></p> <p><i>(The facilitator presents modules objectives.)</i></p> <p>By the end of the module, the trainee should be able to</p> <ul style="list-style-type: none"> <li>• Appreciate the role of avocado as a food and nutrition security crop.</li> <li>• Describe nutritional composition of avocado, health benefits, food security and income.</li> <li>• Identify constraints in value addition and consumption of avocado, and suggest solutions.</li> <li>• Explain how to make avocado-based value added products.</li> <li>• Explain the use of avocado straw as a nutritive livestock feed (hay, feed block, pellets and silage, among others).</li> </ul>	<ul style="list-style-type: none"> <li>• Participants' handouts</li> <li>• PowerPoint presentations</li> <li>• Summarize trainees' expectations and display on flip chart/board.</li> </ul>

<b>11.7.2 Role of Avocado as a food and nutrition security crop (50 minutes)</b>	<b>Session Guide</b>
<p><i>(The facilitator presents on malnutrition cases in Kenya and the importance of Avocado in addressing food security and malnutrition challenges)</i></p> <p><b>Plenary presentation (15 minutes)</b></p> <p>PowerPoint presentations highlighting the critical elements:</p> <ul style="list-style-type: none"> <li>• Micronutrient malnutrition cases in Kenya</li> <li>• Dietary nutrient requirements (focusing on VMGs)</li> </ul> <p><b>Group Exercises (35 minutes)</b></p> <p>Trainees discuss in groups, the main malnutrition challenges in their respective counties / regions</p>	<ul style="list-style-type: none"> <li>• PowerPoint presentations</li> <li>• Participants' handouts</li> <li>• Recipe books</li> <li>• Sample Avocado and other processing ingredients</li> <li>• Group exercise</li> </ul>
<b>11.7.3 Avocado nutritional composition and impact of consumption on human health (50 minutes)</b>	
<p><b>Plenary presentation (50 minutes)</b></p> <ul style="list-style-type: none"> <li>• Overview of the documented avocado nutritional composition and their role in human health and nutrition</li> </ul>	<ul style="list-style-type: none"> <li>• PowerPoint</li> <li>• Participant handouts</li> <li>• Brochures, leaflets, manual, factsheets, posters</li> </ul>
<b>11.7.4. Constraints in value addition and consumption of Avocado, and suggested solutions (1hour 10minutes)</b>	<b>Session Guide</b>
<p><b>Group exercise(40min)</b></p> <p>Groups discuss the constraints in avocado value addition and consumption</p> <p><b>Plenary presentation (30 min)</b></p> <p>Overview of constraints in value addition and consumption of Avocado.</p>	<ul style="list-style-type: none"> <li>• PowerPoint presentations</li> <li>• Group Exercise</li> </ul>
<b>11.7.5 Avocado based value added products (2 hours)</b>	<b>Session Guide</b>
<p><b>Plenary presentation (1 hour 30 minutes)</b></p> <ul style="list-style-type: none"> <li>• Overview of avocado based value added products</li> <li>• Meaning of value addition</li> <li>• Requirements for value addition of avocado</li> <li>• Avocado based value added products</li> </ul>	<ul style="list-style-type: none"> <li>• Leaflets</li> <li>• Sensory evaluation forms</li> <li>• Assorted value addition equipment and ingredients</li> </ul>

<p><b>Practical exercise (30 minutes)</b></p> <ul style="list-style-type: none"> <li>• Demonstration on formulation of avocado based products</li> </ul>	
<p><b>11.7.6 Training review (40 minutes)</b> <span style="float: right;"><b>Session Guide</b></span></p>	
<p><i>(The facilitator leads the trainees in reviewing the module)</i></p> <p>Review the main points about avocado value addition together with the trainees.</p> <ul style="list-style-type: none"> <li>• What new things did you learn from this Module?</li> <li>• What are some of the problems and issues that you have become more aware of in Avocado value addition?</li> <li>• What questions do you still have about Avocado value addition?</li> </ul>	<p>Summary of the main points from the Module.</p>

## 11.8. References

### 11.8.1 Participants handouts

- Avocado Manual
- Pamphlets, leaflets.
- Recipe books

### 11.8.2 Further Reading

# MODULE 12: MECHANIZATION OF AVOCADO PRODUCTION

## 12.1 Introduction to the Module

Agricultural mechanization supports avocado value chain through enhancing production, productivity and profitability in agriculture. 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 Avocado 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:

- Climate smart tillage options identified and explained
- Bush clearing machines demonstrated
- Tractor mounted hole auger described and explained
- Portable hand operated hole auger described and explained
- Semi-automatic seedling grafting robot equipment demonstrated
- Use of pest control implements and tools demonstrated
- Use of tree crop power pruner explained
- Harvesting machine equipment demonstrated

## 12.3. Module Target Group and Categories

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

## 12.4. 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 (training materials)..

## 12.5. Module Duration

The Module is estimated to take 4 hours

## 12. 6. Module Summary

Module 12. Mechanization of Avocado production activities			
Sessions	Training methods	Training materials	Duration
12.6.1 Introduction, objectives and expectations	<ul style="list-style-type: none"> <li>• Personal introductions/ know your audience</li> <li>• Presentations</li> <li>• Plenary discussions</li> </ul>	<ul style="list-style-type: none"> <li>• Flip charts</li> <li>• PowerPoint presentations</li> </ul>	20 minutes
12.6.2 Bush clearing machines	<ul style="list-style-type: none"> <li>• Presentations</li> <li>• Plenary discussions</li> </ul>	<ul style="list-style-type: none"> <li>• Flip chart</li> <li>• PowerPoint presentations</li> <li>• Participants' handouts</li> </ul>	10 minutes
12.6.3 Climate smart tillage options	<ul style="list-style-type: none"> <li>• Presentations</li> <li>• Plenary discussions</li> </ul>	<ul style="list-style-type: none"> <li>• Flip chart</li> <li>• PowerPoint presentations</li> <li>• Participants' handouts</li> </ul>	30 minutes
12.6.4 Tractor mounted hole digger	<ul style="list-style-type: none"> <li>• Presentations</li> <li>• Plenary discussions</li> </ul>	<ul style="list-style-type: none"> <li>• Flip chart</li> <li>• PowerPoint presentations</li> <li>• Participants' handouts</li> <li>• Practicals</li> </ul>	15 minutes
12.6.5 Portable hand operated hole digger	<ul style="list-style-type: none"> <li>• Presentations</li> <li>• Plenary discussions</li> </ul>	<ul style="list-style-type: none"> <li>• Flip chart</li> <li>• PowerPoint presentations</li> <li>• Participants' handouts</li> <li>• Practicals</li> </ul>	30 minutes
12.6.6 Semi-automatic seedling grafting robot	<ul style="list-style-type: none"> <li>• Presentations</li> <li>• Plenary discussions</li> </ul>	<ul style="list-style-type: none"> <li>• Flip chart</li> <li>• PowerPoint presentations</li> <li>• Participants' handouts</li> <li>• Practical</li> </ul>	15 minutes

12.6.7 Pest control equipments and tools	<ul style="list-style-type: none"> <li>• Presentations</li> <li>• Plenary discussions</li> </ul>	<ul style="list-style-type: none"> <li>• Flip chart</li> <li>• PowerPoint presentations</li> <li>• Participants' handouts</li> <li>• Practical</li> </ul>	1 hour
12.6.8 Tree crop power pruner equipment	<ul style="list-style-type: none"> <li>• Presentations</li> <li>• Plenary discussions</li> </ul>	<ul style="list-style-type: none"> <li>• Flip chart</li> <li>• PowerPoint presentations</li> <li>• Participants' handouts</li> <li>• Practicals</li> </ul>	30 minutes
12.6.9 Avocado harvesting machine	<ul style="list-style-type: none"> <li>• Presentations</li> <li>• Plenary discussions</li> <li>• Demonstrations</li> </ul>	<ul style="list-style-type: none"> <li>• Flip chart</li> <li>• PowerPoint presentations</li> <li>• Participants. handouts</li> <li>• Practicals</li> </ul>	15 minutes
12.6.10 Module review	<ul style="list-style-type: none"> <li>• Presentations</li> </ul>	<ul style="list-style-type: none"> <li>• PowerPoint presentations</li> </ul>	15 minutes
<b>Total</b>			<b>4 hours</b>

## 12.7 Facilitator's Guidelines

<b>Module 12: Mechanization of Avocado production activities</b>	
<b>12.7.1 Introduction, Objectives and Expectations (20 minutes)</b>	<b>Session Guide</b>
<p><i>(The facilitator welcomes trainees to the module on Avocado harvesting and post-harvest management that help reduce the post-harvest losses. They are then invited to introduce themselves and state their expectations)</i></p> <p><b>Module Objectives (20 minutes)</b> The facilitator presents modules objectives</p> <p>By the end of the module the trainee should be able to:</p> <ul style="list-style-type: none"> <li>• Identify and explain various climate smart tillage operations</li> <li>• Describe and explain tractor mounted hole digging operations</li> </ul>	<ul style="list-style-type: none"> <li>• Summarize trainees' "expectations" and display.</li> <li>• PowerPoint presentations</li> <li>• Distribute participants' handouts on module objectives and training program</li> </ul>

<ul style="list-style-type: none"> <li>• Describe and explain tractor mounted bush clearing operations</li> <li>• Describe a tractor mounted hole digger</li> <li>• Demonstrate semi-automatic seedling grafting robot equipment</li> <li>• Demonstrate planting seedling machine</li> <li>• Demonstrate pest control equipment, tools, and usage</li> <li>• Demonstrate tree crop power pruner equipment</li> <li>• Demonstrate harvesting machine</li> </ul> <p>*In each case stating approximate prices and availability of machines</p>	
<b>12.7.2. Avocado climate smart land preparation tools (30 minutes)</b>	<b>Session Guide</b>
<p><b>Plenary presentation (20 minutes)</b></p> <p>PowerPoint presentations highlighting:</p> <ul style="list-style-type: none"> <li>• Overview of the Avocado mechanization activities</li> <li>• Climate smart tillage options</li> </ul> <p><b>Discussion (10 minutes)</b></p> <p>Let the trainees recall what they learned and discuss any issue that may arise</p>	<ul style="list-style-type: none"> <li>• PowerPoint presentations</li> <li>• Distribute participants' handouts</li> <li>• Brochures, leaflets and manual</li> <li>• All participants</li> </ul>
<b>12.7.3. Bush clearing machines (10 minutes)</b>	<b>Session Guide</b>
<p><b>Plenary presentation (5 minutes)</b></p> <p>PowerPoint presentations highlighting on:</p> <ul style="list-style-type: none"> <li>• Description and explanation of bush clearing machines</li> </ul> <p><b>Discussion (5 Minutes)</b></p> <p>Let the trainees recall what they learned and discuss any issue that may arise.</p>	<ul style="list-style-type: none"> <li>• PowerPoint presentations</li> <li>• Distribute participants' handouts</li> <li>• Brochures, leaflets and manual</li> </ul>
<b>12.7.4. Tractor mounted hole digger(15 minutes)</b>	<b>Session Guide</b>
<p><b>Plenary Presentation (20 minutes)</b></p> <p>PowerPoint presentations highlighting on:</p> <ul style="list-style-type: none"> <li>• Description and explanation of tractor mounted hole digging operations</li> </ul>	<ul style="list-style-type: none"> <li>• PowerPoint presentations</li> <li>• Distribute participants' handouts</li> </ul>

<p><b>Discussion (5 Minutes)</b></p> <p>Let the trainees recall what they learned and discuss any issue that may arise.</p>	<ul style="list-style-type: none"> <li>• Brochures, leaflets and manual</li> </ul>
<p><b>12.7.5. Demonstration of semi-automatic seedling grafting robot (30 minutes)</b></p>	
<p><b>Plenary Presentation (20 minutes)</b></p> <p>PowerPoint presentations highlighting on:</p> <ul style="list-style-type: none"> <li>• Description and explanation of semi-automatic seedling grafting robot</li> </ul> <p><b>Discussion (10 Minutes)</b></p> <p>Let the trainees recall what they learned and discuss any issue that may arise.</p>	<ul style="list-style-type: none"> <li>• PowerPoint presentations</li> <li>• Distribute participants' handouts</li> <li>• Brochures, leaflets and manual</li> </ul>
<p><b>12.7.6. Demonstration seedling planting machine (30 minutes)</b></p>	
<p><b>Plenary Presentation (20 minutes)</b></p> <p>PowerPoint presentations highlighting on:</p> <ul style="list-style-type: none"> <li>• Description and explanation of seedling planting machine</li> </ul> <p><b>Discussion (10 Minutes)</b></p> <p>Let the trainees recall what they learned and discuss any issue that may arise.</p>	<ul style="list-style-type: none"> <li>• PowerPoint presentations</li> <li>• Distribute participants' handouts</li> <li>• Brochures, leaflets and manual</li> </ul>
<p><b>12.7.7. Demonstration of pest control implements and tools</b></p>	
<p><b>Plenary Presentation (40minutes)</b></p> <p>PowerPoint presentations Highlighting on:</p> <ul style="list-style-type: none"> <li>• Description and explanation of pest control implements and tools usage</li> </ul> <p><b>Discussion (20 Minutes)</b></p> <p>Let the trainees recall what they learned and discuss any issue that may arise.</p>	<ul style="list-style-type: none"> <li>• PowerPoint presentations</li> <li>• Distribute participants' handouts</li> <li>• Brochures, leaflets and manual</li> </ul>
<p><b>12.7.8. Demonstration of tree crop power pruner</b></p>	
<p><b>Plenary Presentation (20 minutes)</b></p> <p>PowerPoint presentations highlighting on:</p> <ul style="list-style-type: none"> <li>• Description and explanation of tree crop power pruner</li> </ul>	<ul style="list-style-type: none"> <li>• PowerPoint presentations</li> <li>• Distribute participants' handouts</li> </ul>

<p><b>Discussion (10 Minutes)</b></p> <p>Let the trainees recall what they learned and discuss any issue that may arise.</p>	<ul style="list-style-type: none"> <li>• Brochures, leaflets and manual</li> </ul>
<p><b>12.7.9. Avocado harvesting machine operating principles (15 minutes)</b></p>	<p><b>Session Guide</b></p>
<p><b>Plenary Presentation (10 minutes)</b></p> <p>PowerPoint presentations highlighting on:</p> <ul style="list-style-type: none"> <li>• Techniques and methods of harvesting machine operating</li> </ul> <p><b>Discussion (5Minutes)</b></p> <p>Let the trainees recall what they learnt and discuss any issues that may arise</p>	<ul style="list-style-type: none"> <li>• PowerPoint presentations</li> <li>• Distribute participants' handouts</li> <li>• Brochures, leaflets and manual</li> </ul>
<p><b>12.7.10 Module review (15 minutes)</b></p>	<p><b>Session Guide</b></p>
<p><i>The facilitator leads the trainees in reviewing the module)</i></p> <p>Summarize the main points of the training and together with the participants review the main points: Demonstrate;</p> <ul style="list-style-type: none"> <li>• Various climate smart tillage operations</li> <li>• Various tractor mounted hole auger</li> <li>• Operations of a semi-automatic seedling grafting robot equipment</li> <li>• Describe and demonstrate seedling planting machine</li> <li>• Demonstrate and describe chemical implements and tools operations</li> <li>• Demonstrate and describe a tree crop power pruner equipment</li> <li>• Demonstrate and describe a harvesting machine equipment</li> </ul> <p><i>(Discuss with trainees about new things learnt from this Module. What are some of the problems and issues that they have become more aware of in the module?)</i></p>	<ul style="list-style-type: none"> <li>• The last participants' handouts</li> <li>• Summarize the main points from the module on a flip chart and display</li> </ul>

## **12.8 References**

### **12.8.1 Participants handouts**

- Avocado Manual
- Avocado Pamphlets.
- Recipe books

### **12.8.2 Further Reading**

# MODULE 13: AVOCADO BUSINESS AND MARKETING

## 13.1 Introduction

Avocado are produced mainly in Muranga, Kiambu, Embu, Nyeri, and Meru areas in Central Kenya. The other avocado growing areas outside Central Kenya are: Kisii, Eldoret, Bomet, Nyamira, Busia among others. According to the HCD 2020 validated report the production volume of avocado in 2019 increased, mainly due to the increased harvest area for avocado and improved prices in the international markets. As the global demand for avocados is increasing and the profitability of avocado is much higher than other tropical fruits, more farmers are starting to plant the fruit. In addition, the Kenyan government is also actively supporting avocado production by providing free avocado seedlings to farmers and subsidizing small scale avocado farmers. Kenyan farmers, especially smallholder farmers who account to over 70 percent of the total production, have increasingly adopted avocado farming in recent years. The area under production increased from 16,501Ha in 2018 to 20,240Ha in 2019, a 43 percent change that was attributed to planting of new orchards in non-traditional areas of the Rift valley and Western (HCD, 2020). The volume increased from 317,087 tons in 2018 to 420,430 tons in 2019 representing a 33 percent increase.

The key driver of variance in productivity per unit is the level of farm management practices. Therefore, there is need to improve production of avocados through market-orientation. This module is designed to train Trainer of Trainers (ToTs) in skills that are useful in Avocado farming business and marketing in Kenya.

## 13.2 Module Learning Outcomes

By the end of this module, participants are expected to:

1. Explain and appreciate the business concept, transitioning from subsistence to commercialization, risk management, and emerging farming business models.
2. Plan a farm business using SWOT Analysis, farm budgeting and business plan.
3. Explain and describe tools for managing and implementing a farm business, record keeping, performance (break-even, gross-margin, benefit-cost ratios) and entrepreneurship skills.
4. Develop and share details of a Small Farm Business Plan and financing.
5. Map and identify marketing approaches and strategies of Avocado.

## 13.3 Module Target Group

This module targets agricultural extension staff, service providers and lead farmers.

### 13.4 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 (training materials)..

### 13.5 Module Duration

The Module is estimated to take **2 hours**

### 13.6. Module Summary

<b>Module 13. Avocado Business and Marketing</b>			
<b>Sessions</b>	<b>Training Methods</b>	<b>Training Materials</b>	<b>Time</b>
13.6.1. Levelling of participants' expectations about the module	<ul style="list-style-type: none"> <li>• Personal introduction</li> <li>• Discussion</li> </ul>	<ul style="list-style-type: none"> <li>• PowerPoint</li> <li>• Flip charts</li> </ul>	15 minutes
13.6.2. Module Introduction, objectives and expectations	<ul style="list-style-type: none"> <li>• Personal introduction Presentation</li> <li>• Plenary presentations</li> </ul>	<ul style="list-style-type: none"> <li>• Flip charts</li> <li>• PowerPoint</li> </ul>	10 minutes
13.6.3. Business concept and emerging farming business models	<ul style="list-style-type: none"> <li>• Plenary presentations</li> <li>• Plenary discussion</li> </ul>	<ul style="list-style-type: none"> <li>• PowerPoint</li> <li>• Flip charts,</li> <li>• Marker pens</li> </ul>	10 minutes
13.6.4. Building a business plan	<ul style="list-style-type: none"> <li>• Plenary presentations</li> </ul>	<ul style="list-style-type: none"> <li>• PowerPoint</li> </ul>	20 minutes
13.6.5 Marketing as a group - collective marketing	<ul style="list-style-type: none"> <li>• Plenary presentations</li> <li>• Plenary discussion</li> </ul>	<ul style="list-style-type: none"> <li>• PowerPoint</li> </ul>	10 minutes
13.6.6 Profitability analysis - Reviewing Avocadoagro enterprise performance	<ul style="list-style-type: none"> <li>• Plenary presentations</li> </ul>	<ul style="list-style-type: none"> <li>• PowerPoint</li> </ul>	10 minutes
13.6.7 Scaling up plan	<ul style="list-style-type: none"> <li>• Plenary presentations</li> </ul>	<ul style="list-style-type: none"> <li>• PowerPoint</li> </ul>	10 minutes
13.6.8 Contracted production model	<ul style="list-style-type: none"> <li>• Plenary presentations</li> </ul>	<ul style="list-style-type: none"> <li>• PowerPoint</li> </ul>	10 minutes
13.6.9 Avocado marketing entrepreneurship model	<ul style="list-style-type: none"> <li>• Plenary presentations</li> </ul>	<ul style="list-style-type: none"> <li>• PowerPoint</li> </ul>	10 minutes
13.6.10 Internet/mobile marketing	<ul style="list-style-type: none"> <li>• Plenary presentations</li> </ul>	<ul style="list-style-type: none"> <li>• PowerPoint</li> </ul>	10 minutes

13.6.11. Training review	<ul style="list-style-type: none"> <li>Facilitator’s summary: Takeaways</li> </ul>	<ul style="list-style-type: none"> <li>Module review</li> <li>Participants handouts</li> </ul>	5 minutes
<b>TOTAL</b>			<b>2 hours</b>

### 13.7 Facilitators Guidelines

<b>Module 13. Avocado Business and Marketing</b>	
<b>13.7.1 Levelling participants’ expectations about the module (15 minutes)</b>	<b>Session Guide</b>
<b>13.7.1.1 Module Title</b> <i>(The facilitator welcomes trainees to the module on Avocado farming as a business and marketing strategies and introduces him/herself by stating his/her profile and experience.)</i>	<ul style="list-style-type: none"> <li>Handouts</li> <li>Program</li> <li>Note books</li> <li>pens</li> <li>PowerPoint slides</li> </ul>
<b>13.7.1.2 Participants expectations (15 minutes)</b>	
<i>(The facilitator asks the trainees to state their expectations by listing on a flip chart)</i> <b>Plenary Discussion .</b>	<ul style="list-style-type: none"> <li>Summarize trainees’ “Expectations” and display on flip chart/board.</li> </ul>
<b>13.7.2 Module introduction, objectives and expectations (10 minutes)</b>	
<i>(The facilitator introduces the module and states the objectives and expectations)</i> By the end of this module, participants are expected to: <ul style="list-style-type: none"> <li>Understand business concept and appreciate emerging farming business models for organizing farmer groups</li> <li>Acquire skills for building a business plan</li> <li>Be able to facilitate marketing as a group - collective marketing</li> <li>Acquire skills for profitability analysis - Reviewing Avocado agro-enterprise performance</li> <li>Be able to facilitate scaling up plan avocado production</li> <li>Understand the benefits and challenges in implementation of contracts.</li> <li>Understand the farmer as an entrepreneur</li> <li>Acquire skills for Internet/mobile marketing</li> </ul>	<ul style="list-style-type: none"> <li>PowerPoint slides</li> <li>Factsheets</li> </ul>

<b>13.7.3 Business concept and emerging farming business models (10 minutes)</b>	<b>Session Guide</b>
<p><i>(The facilitator to highlight elements of business concept and emerging farming business models)</i></p> <p><b>Plenary Presentation (5 minutes)</b></p> <p>Make presentation on the business concept and emerging farming business models</p> <p><b>Group Exercise (5 minutes)</b></p> <p>Discuss areas of improvement in the models</p>	<ul style="list-style-type: none"> <li>• PowerPoint slides</li> <li>• Handouts</li> <li>• Flipcharts</li> </ul>
<b>13.7.4 building a business plan (20 minutes)</b>	<b>Session Guide</b>
<p><i>(The facilitator highlights the components of a business plan and how to build it)</i></p> <p><b>Plenary Presentation (15 minutes)</b></p> <p><b>Plenary Discussion (5 minutes)</b></p>	<ul style="list-style-type: none"> <li>• Handouts</li> <li>• Flip charts,</li> <li>• Manila papers,</li> <li>• Pelt pens</li> </ul>
<b>13.7.5 Marketing as a group - collective marketing (10 minutes)</b>	<b>Session Guide</b>
<p><b>Plenary Presentation (5 minutes)</b></p> <p><i>(The facilitator describes how the farmers should organize themselves to market Avocado)</i></p> <ul style="list-style-type: none"> <li>• Advantages of collective marketing</li> <li>• Problems with collective marketing</li> <li>• Organizing collective marketing</li> </ul> <p><b>Plenary Discussion (5 minutes)</b></p>	<ul style="list-style-type: none"> <li>• Use PowerPoint</li> <li>• Handouts</li> </ul>
<b>13.7.6 Profitability analysis - Reviewing Avocado agro-enterprise performance (10 minutes)</b>	<b>Session Guide</b>
<p><b>Plenary Presentation (5 minutes)</b></p> <p><i>(The facilitator highlights the usefulness of the profitability analysis)</i></p> <ul style="list-style-type: none"> <li>• Reworking the profitability analysis using actual amounts of produce that were sold, actual material and labour costs and actual sales prices</li> <li>• Reworking sales amounts with the farmers in the group to determine their levels of profit</li> <li>• Calculating costs, income and profits</li> </ul> <p><b>Plenary Discussion (5 minutes)</b></p>	<ul style="list-style-type: none"> <li>• Use PowerPoint</li> <li>• Handouts</li> </ul>

<b>13.7.7 Scaling up plan (10 minutes)</b>	<b>Session Guide</b>
<p><b>Plenary Presentation (10 minutes)</b></p> <p><i>(The facilitator highlights how farmers begin to organize a new plan with higher targets, or more lucrative markets and more farmers involved in production and sales, to target buyers)</i></p> <ul style="list-style-type: none"> <li>• Reviewing market strategy</li> <li>• Fixing the new target</li> <li>• Identifying the appropriate scaling method</li> </ul>	<ul style="list-style-type: none"> <li>• Use PowerPoint</li> <li>• Handouts</li> </ul>
<b>13.7.8 Contracted production model ( 10 minutes)</b>	<b>Session Guide</b>
<p><b>Plenary Presentation (5 minutes)</b></p> <p><i>(The facilitator highlights the details of contracted avocado production)</i></p> <ul style="list-style-type: none"> <li>• Essence and objectives of contract farming</li> <li>• Key components of a contract</li> <li>• Benefits and challenges in implementation of contracts</li> <li>• Critical issues to look at before signing a contract</li> <li>• The role of government and its arms in contract management</li> </ul> <p><b>Plenary Discussion (5 minutes)</b></p>	<ul style="list-style-type: none"> <li>• Use PowerPoint</li> <li>• Handouts</li> </ul>
<b>13.7.9 Avocado marketing entrepreneurship model(10 minutes)</b>	<b>Session Guide</b>
<p><b>Plenary Presentation (5 minutes)</b></p> <p><i>(The facilitator highlights the characteristics of farmers as entrepreneurs)</i></p> <ul style="list-style-type: none"> <li>• The role of entrepreneurship in avocado marketing</li> <li>• The characteristics of farmers as entrepreneurs</li> </ul> <p><b>Plenary Discussion (5 minutes)</b></p>	<ul style="list-style-type: none"> <li>• Use PowerPoint</li> <li>• Handouts</li> </ul>
<b>13.7.10 Internet/mobile marketing ( 10 minutes)</b>	<b>Session Guide</b>
<p><b>Plenary Presentation (5 minutes)</b></p> <p><i>(The facilitator highlights the usefulness of Internet/mobile marketing)</i></p> <ul style="list-style-type: none"> <li>• Advantages of internet/mobile marketing</li> <li>• How to interact with buyers through the use of internet</li> </ul> <p><b>Plenary Discussion (5 minutes)</b></p>	<ul style="list-style-type: none"> <li>• Use PowerPoint</li> <li>• Handouts</li> </ul>

13.7.11 Training review (5 minutes)	Session Guide
<p><i>(The facilitator leads the trainees in reviewing the module. Conclude by thanking the trainees)</i></p> <p><b>Plenary Discussion (5 minutes)</b></p> <p>Summarize the main points of the training</p>	<ul style="list-style-type: none"> <li>• Summary of the main points from the Module.</li> </ul>

## 13.8 References

### 13.8.1 Participants handouts

#### 13.8.2 Further Reading

Financial Sector Deepening Kenya (FSD Kenya) (2015). Financing the avocado value chain: A case study of Lower Eastern Kenya

Kenya Horticultural Development Program (KHDP) (2010). Market Opportunities for Avocado Growers

HCD 2020, Horticulture validated report 2018-2019 AFA, Kenya

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

## **14.1 Introduction**

This module is on Cross-cutting issues that influence the uptake and up-scaling of TIMPS within the avocado value chain. These issues include Agricultural Innovation Platforms, Gender and social-environmental concerns and climate smart agricultural policy.

Agricultural Innovation Platforms provide a forum for stakeholders to interact and develop technical, institutional and organizational innovations to solve value chain challenges. While Gender and social-environmental concerns are aimed at providing appropriate solutions to value chain challenges with due regard to graduated gender considerations. Finally, Climate smart agricultural policy creates awareness on policy formulation and the various regulations that are put in place to facilitate the development of value chains. The methodology of delivery for each of these sub modules are presented here.

## **SUB-MODULE 14.1: AGRICULTURAL INNOVATION PLATFORMS**

### **14.1.1. Introduction**

This sub module exposes the avocado TOT participants to an agricultural innovation systems based configuration of stakeholders called the Agricultural Innovation Platform (AIP). It is an organizational model for stimulating innovation and development and brings value chain stakeholders together in a way that pools together skills, knowledge and capacities to address challenges and utilize opportunities in the value chain. 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 avocado 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

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

### 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 the trained trainers. The trainers using this module should thoroughly familiarize themselves with the participants' handouts (training materials)..

### 14.1.5 Sub-Module Duration

The Module is estimated to take 2 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	<ul style="list-style-type: none"> <li>• Personal introduction</li> <li>• Plenary Presentations</li> <li>• Plenary discussion</li> </ul>	<ul style="list-style-type: none"> <li>• Flips charts</li> <li>• Felt pens</li> <li>• Projector</li> </ul>	20 minutes
14.1.6.2 Definition of Agricultural Innovation Systems and different types of innovations (technical, institutional and organizational)	<ul style="list-style-type: none"> <li>• PowerPoint presentationss</li> <li>• Plenary discussion</li> <li>• Group exercise</li> </ul>	<ul style="list-style-type: none"> <li>• Flips charts</li> <li>• Felt pens</li> <li>• Projector</li> </ul>	30 minutes
14.1.6.3 Characteristics of an Agricultural Innovation Platform	<ul style="list-style-type: none"> <li>• PowerPoint presentations</li> <li>• Plenary discussion</li> </ul>	<ul style="list-style-type: none"> <li>• Flip charts</li> <li>• Felt pens</li> <li>• Projector</li> <li>• Participants Handouts</li> </ul>	20 minutes
14.1.6.4 Phases of an innovation platform (Initiation, Establishment, Management and Sustainability)	<ul style="list-style-type: none"> <li>• PowerPoint presentationss</li> <li>• Plenary discussion</li> <li>• Group Exercise</li> </ul>	<ul style="list-style-type: none"> <li>• Flips charts</li> <li>• Felt pens</li> <li>• Projector</li> <li>• Handouts</li> </ul>	20 minutes

14.1.6.5 Case studies of successful Agricultural Innovation Platforms	<ul style="list-style-type: none"> <li>• PowerPoint presentations</li> <li>• Plenary discussion</li> <li>• Role plays</li> </ul>	<ul style="list-style-type: none"> <li>• Flips charts</li> <li>• Felt pens</li> <li>• Projector</li> <li>• Participants' handouts</li> </ul>	10 minutes
14.1.6.6 Benefits and challenges of Agricultural Innovation Platforms	<ul style="list-style-type: none"> <li>• PowerPoint presentations</li> <li>• Plenary discussion Role plays</li> </ul>	<ul style="list-style-type: none"> <li>• Flips charts</li> <li>• Felt pens</li> <li>• Projector</li> <li>• Participants' handouts</li> </ul>	10 minutes
14.1.6.7 Module review	<ul style="list-style-type: none"> <li>• Discussion</li> </ul>	<ul style="list-style-type: none"> <li>• Flip Charts</li> <li>• Felt pens</li> <li>• Fact Sheets</li> </ul>	10 minutes
<b>Total</b>			<b>2 hours</b>

#### 14.1.7 Facilitator's Guidelines

<b>Sub Module 14.1 Agricultural Innovation Platform (AIP)</b>	
<b>14.1.7.1. Introduction, levelling of expectations and objectives (20 Minutes)</b>	<b>Session Guide</b>
<p><b>Introduction</b></p> <p><i>The facilitator welcomes trainees to the module on Agricultural Innovation Platforms. They are then invited to introduce themselves and state their expectations)</i></p> <p><b>Module Objectives</b></p> <p><i>(The facilitator presents modules objectives and levels out expectations)</i></p> <p>By the end of the module, the trainee should be able to:</p> <ul style="list-style-type: none"> <li>• Define agricultural innovation systems, innovation process and innovations</li> <li>• Describe characteristics of an innovation platform</li> <li>• Describe how to initiate, establish, manage and sustain an agricultural Innovation Platform</li> <li>• Describe the benefits and challenges of Agricultural innovation platforms</li> </ul>	<ul style="list-style-type: none"> <li>• Summarize Trainees' "Expectations" and display.</li> <li>• PowerPoint presentations</li> </ul>

<b>14.1.7.2 A definition of Agricultural Innovation Systems and different types of innovations (technical, institutional and organizational) (30 minutes)</b>	<b>Session Guide</b>
<ul style="list-style-type: none"> <li>• Past progression of research and extension models and their shortcomings</li> <li>• Agricultural Innovation Systems model and actualization through Agricultural Innovation Platforms</li> <li>• Definition of innovation process</li> <li>• Types of innovations (products of innovation process)</li> </ul>	<ul style="list-style-type: none"> <li>• PowerPoint presentations</li> <li>• Plenary discussion</li> </ul>
<b>14.1.7.3.Characteristics of an Agricultural Innovation Platform (20 minutes)</b>	<b>Session Guide</b>
<p><i>(The facilitator should present an overview of innovation platforms and their main characteristics).</i></p> <p><b>Plenary Presentation (10 minutes)</b></p> <ul style="list-style-type: none"> <li>• Characteristics of Agricultural Innovation Platforms</li> <li>• Why Agricultural innovation platforms are used</li> <li>• Where to form Agricultural Innovation Platforms</li> <li>• Establishment of linkages between value chain actors in agricultural innovation platforms</li> </ul> <p><b>Plenary discussion (10 minutes)</b></p> <p>Let the trainees recall what they learned and discuss any issue that may arise.</p>	<ul style="list-style-type: none"> <li>• PowerPoint presentations</li> <li>• Participants' handouts</li> <li>• Plenary discussion</li> </ul>
<b>14.1.7.4 Phases of an innovation platform (Initiation, Establishment, Management and Sustenance (20minutes)</b>	<b>Session Guide</b>
<p><b>Plenary presentation (15 minutes)</b></p> <p><b>Initiation phase</b></p> <ul style="list-style-type: none"> <li>• Mobilization of stakeholders in the Avocado value chain for challenge identification</li> <li>• General description of the value chain within a specific area</li> </ul> <p><b>Establishment Phase</b></p> <ul style="list-style-type: none"> <li>• Clear prioritization of the key value Chain challenge or compelling agenda in the (weakness in the chain)</li> <li>• Vision of the AIP formulated with clear goals</li> </ul>	<ul style="list-style-type: none"> <li>• PowerPoint presentations</li> <li>• Participants Handouts</li> <li>• Plenary discussion</li> </ul>

<ul style="list-style-type: none"> <li>• Development of a business plan with clear milestones to guide operations of the AIP</li> <li>• Formation of a main committee to coordinate platform activities.</li> <li>• Formation of diverse sub-committees with clear roles</li> </ul> <p><b>Management phase</b></p> <ul style="list-style-type: none"> <li>• Keeping stakeholders focused on the business plan to ensure an inclusive and transparent process.</li> <li>• Neutral facilitation to ensure joint strategy building and action and the coordination of support activities.</li> <li>• Managing emerging experts taking up leading roles and issues as champions.</li> </ul> <p><b>Sustainability and scaling phase</b></p> <ul style="list-style-type: none"> <li>• Changing roles of initiator, local stakeholders and Private sector</li> <li>• Local stakeholders lead and own AIP while Initiator backstops and private sector supports and seize opportunity</li> <li>• Embarking on fresh issues or challenges</li> <li>• Maintaining capacity acquired to address new issues or challenges in subsequent cycles.</li> </ul> <p><b>Plenary discussion (10 minutes)</b></p> <p>Let the trainees recall what they learned and discuss any issue that may arise.</p>	
<p><b>14.1.7. 5 Case studies of successful AIPS (10 minutes)</b></p>	<p><b>Session Guide</b></p>
<p><b>Plenary presentation and discussion</b></p> <ul style="list-style-type: none"> <li>• successful innovation platforms and their achievements</li> </ul>	<ul style="list-style-type: none"> <li>• PowerPoint presentations</li> <li>• Plenary discussion</li> </ul>
<p><b>14.1.7. 6 Benefits and challenges of AIPS (10 minutes)</b></p>	<p><b>Session Guide</b></p>
<p><b>Plenary presentation</b></p> <ul style="list-style-type: none"> <li>• Benefits of Agricultural innovation platforms</li> <li>• Challenges of Agricultural Innovation platforms</li> </ul>	<ul style="list-style-type: none"> <li>• PowerPoint presentations</li> <li>• Plenary discussion</li> </ul>

14.1.7.5. Module review (30 minutes)	Session Guide
<p><i>(The facilitator leads the trainees in reviewing the module)</i></p> <p>Summarize the main points of the training and together with the trainees review the main points on:</p> <ul style="list-style-type: none"> <li>• Agricultural Innovation Systems, Innovation process and different Innovations</li> <li>• AIP characteristics, why and where to form them</li> <li>• The four Phases of Innovation Platforms</li> <li>• The benefits and challenges of innovation Platforms</li> </ul> <p><i>(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?)</i></p>	<ul style="list-style-type: none"> <li>• Participants' Handouts</li> <li>• Summarize the main points from the module on a flip chart and display</li> </ul>

## 14.8.1References

### 14.8.1.1Participants handouts

Kamau G. (2020) Agricultural Innovation Platform Factsheet

Kamau G. (2020) Agricultural Innovation Platform Phases Fact sheets

### 14.8.1.2Further Reading

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

# **SUB-MODULE 14.2 AVOCADO GENDER, VULNERABLE AND MARGINALIZED GROUPS (VMGs), SOCIO, ENVIRONMENTAL CONCERNS AND COHESION**

## **14.2.1 Introduction**

Avocado is a major agro-enterprise involving all the gender categories (men, women, youth vulnerable marginalized groups (VMGs) are involved in its value chain from production, marketing and consumption. In production activities of the crop, women perform weeding while the youth harvest and the men do most of the marketing. Despite the women's contribution, gender inequalities exist in all areas of the value chains. Some of these gender inequalities include: division of labour, access to and control of resources and decision making within and beyond the household. These inequalities limit women, youth and VMGs access to and benefits from the various Technologies Innovations and Management Practices (TIMPs) at different nodes of the value chain. At the macro-level, effective participation of women and youth in groups and market activities is constrained by their low decision-making power, lack of voice and lack of access to financial resources. Gender analysis examines the productive, 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.

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

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

## **14.2.2 Sub-Module learning outcomes**

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

The concept of gender mainstreaming and social inclusion in Avocado value chain understood and appreciated.

1. Youth empowerment in avocado value chain explained and understood.
2. Women empowerment in avocado value chain explained and understood.
3. Strategies for inclusion of vulnerable and marginalized groups in avocado value chain understood and applied.
4. Knowledge on environmental and social management framework (ESMF) tool enhanced.

### 14.2.3 Sub-Module Target Group

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

### 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 the trained trainers. The trainers using this module should thoroughly familiarize themselves with the participants’ handouts (training materials).

### 14.2.5 Sub-Module Duration

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

### 14.2.6 Sub-Module Summary

<b>Sub-Module 14.2 Gender main streaming and social inclusion in the Avocado value chain</b>			
<b>Sessions</b>	<b>Training methods</b>	<b>Training materials</b>	<b>Duration</b>
14.2.6.1 Introduction, expectations and objectives	<ul style="list-style-type: none"> <li>• Personal introductions</li> <li>• Presentations</li> <li>• Plenary discussion</li> </ul>	<ul style="list-style-type: none"> <li>• Flips charts</li> <li>• Felt pens</li> <li>• Laptop</li> <li>• Participants’ handouts</li> </ul>	30 minutes
14.2.6.2 Gender mainstreaming in Avocado value chain	<ul style="list-style-type: none"> <li>• PowerPoint presentationss</li> <li>• Group Exercise</li> <li>• Plenary discussion</li> </ul>	<ul style="list-style-type: none"> <li>• Flips charts</li> <li>• Felt pens</li> <li>• Participants handouts</li> </ul>	30 minutes
14.2.6.3 Youth empowerment in Avocado value chain	<ul style="list-style-type: none"> <li>• PowerPoint presentationss</li> <li>• Group exercise</li> <li>• Plenary discussion</li> </ul>	<ul style="list-style-type: none"> <li>• Flips charts</li> <li>• Felt pens</li> <li>• Participants handouts</li> </ul>	30 minutes
14.2.6.4 Women empowerment in Avocado value chain	<ul style="list-style-type: none"> <li>• PowerPoint presentationss</li> <li>• Plenary discussion</li> </ul>	<ul style="list-style-type: none"> <li>• Flips charts</li> <li>• Felt pens</li> <li>• PowerPoint presentations</li> <li>• Participants handouts</li> </ul>	30 minutes

14.2.6.5 Strategies for inclusion of vulnerable and marginalized groups	<ul style="list-style-type: none"> <li>• PowerPoint presentations</li> <li>• Plenary discussion</li> </ul>	<ul style="list-style-type: none"> <li>• Flips charts</li> <li>• Felt pens</li> <li>• Participants handouts</li> </ul>	30 minutes
14.2.6.6 Environmental and Social Management Framework	<ul style="list-style-type: none"> <li>• PowerPoint presentations</li> <li>• Plenary discussion</li> </ul>	<ul style="list-style-type: none"> <li>• Flips charts</li> <li>• Felt pens</li> <li>• Participants handouts</li> </ul>	30 minutes
14.2.6.7 Module Review	<ul style="list-style-type: none"> <li>• Plenary discussion</li> </ul>	<ul style="list-style-type: none"> <li>• Flips charts</li> <li>• Felt pens</li> </ul>	30 minutes
<b>Total</b>			<b>3 hours 30 minutes</b>

### 14.2.7 Facilitator's Guidelines

<b>Sub Module 14.2: Gender mainstreaming and social inclusion in Avocado value</b>	
<b>14.2.7.1 Introduction, Objectives and Expectations (30 Minutes)</b>	<b>Session Guide</b>
<p><i>(The facilitator welcomes trainees to the module and thereafter invites them to state their expectations)</i></p> <p><b>Module Objectives (30 Minutes)</b></p> <p><i>The facilitator presents modules objectives</i></p> <p>By the end of the module training, the trainee must be able to: -</p> <ul style="list-style-type: none"> <li>• Explain gender mainstreaming and social inclusion, in Avocado value chain</li> <li>• Describe youth empowerment in Avocado value chain</li> <li>• Explain women empowerment in Avocado value chain</li> <li>• Identify strategies for inclusion of vulnerable and marginalized groups in Avocado value chain</li> <li>• Describe the environmental and social management framework (ESMF) tool</li> </ul>	<ul style="list-style-type: none"> <li>• Summarize Trainees "Expectations" and display.</li> <li>• PowerPoint presentations</li> <li>• Group exercise</li> <li>• Objectives and Training Program</li> </ul>

<b>14.2.7.2 Gender mainstreaming and social inclusion in Avocado value chain (30 Minutes)</b>	<b>Session Guide</b>
<p><i>(The facilitator presents and explains what is gender mainstreaming, who does what activity, who has access to what resources among others. and why gender mainstreaming is important in avocado value chain.,</i></p> <p><b>Plenary Presentation (20 minutes)</b></p> <ul style="list-style-type: none"> <li>• Definition of gender</li> <li>• What is gender mainstreaming and why it is important?</li> <li>• Who does what? (gender division of roles in Avocado value chain)</li> <li>• Who owns what? (access and control of resources and benefits)</li> <li>• Who makes which decisions?</li> <li>• Existing policies in support of gender mainstreaming</li> </ul> <p><b>Group exercise and discussion (10 Minutes)</b></p> <p>Let the trainees recall what they learned and discuss any issue that may arise</p>	<ul style="list-style-type: none"> <li>• PowerPoint presentations, Group exercise</li> <li>• Plenary discussion</li> <li>• Participants' handouts</li> <li>• Group exercise</li> <li>• Plenary discussion</li> </ul>
<b>14.2.7.3 Youth empowerment in Avocado value chains (30 minutes)</b>	<b>Session Guide</b>
<p><b>Plenary Presentation (20 minutes)</b></p> <ul style="list-style-type: none"> <li>• Why agriculture is not attractive to youth</li> <li>• Youth's role in the value chain</li> <li>• Strategies to empower youth in Avocado value chain</li> </ul> <p><b>Group exercise and discussion (10 Minute)</b></p> <p>Let the trainees recall what they learned and discuss any issue that may arise.</p>	<ul style="list-style-type: none"> <li>• PowerPoint presentations</li> <li>• Group exercise</li> <li>• Plenary discussion</li> <li>• Participants' handouts</li> </ul>
<b>14.2.7.4 Women empowerment in Avocado value chain (30 minutes)</b>	<b>Session Guide</b>
<p><b>Plenary Presentation (20 minutes)</b></p> <ul style="list-style-type: none"> <li>• Women's role in the value chain</li> <li>• Challenges facing women in the value chain</li> <li>• Strategies for empowering women in the value chain</li> </ul> <p><b>Plenary discussion (10 minutes)</b></p> <p>Let the trainees recall what they learned and discuss any issue that may arise</p>	<ul style="list-style-type: none"> <li>• PowerPoint presentations</li> <li>• Distribute participants' handouts</li> <li>• Plenary discussion</li> <li>• Participants' handouts</li> </ul>

<b>14.2.7.5. Strategies for inclusion of vulnerable and marginalized groups in Avocado value chain (30 minutes)</b>	<b>Session Guide</b>
<p><b>Plenary presentation (20 minutes)</b></p> <ul style="list-style-type: none"> <li>• Who are vulnerable and marginalized groups (VMGs)</li> <li>• Why gender inequality exists</li> <li>• Social inclusion and why</li> <li>• Strategies of inclusion of VMG</li> </ul> <p><b>Plenary discussion (10 minutes)</b></p> <p>Let the trainees recall what they learned and discuss any issue that may arise</p>	<ul style="list-style-type: none"> <li>• PowerPoint presentations</li> <li>• Plenary discussion</li> <li>• Participants' handouts</li> </ul>
<b>14.2.7.6. Environmental and social management framework (ESMF) (30 minutes)</b>	<b>Session Guide</b>
<p><b>Plenary presentation (20 minutes)</b></p> <ul style="list-style-type: none"> <li>• Objective of ESMF in Avocado value chain</li> <li>• Environmental and social safeguards of Avocado</li> <li>• Safeguard policies triggered by the project</li> </ul> <p><b>Plenary discussion (10 minutes)</b></p> <p>Let the trainees recall what they learned and discuss any issue that may arise</p>	<ul style="list-style-type: none"> <li>• PowerPoint presentations</li> <li>• Plenary discussion</li> </ul>
<b>14.2.7.7. Module review (30 Minutes)</b>	<b>Session Guide</b>
<p><i>(The facilitator leads the participants in reviewing the module).</i></p> <p>Summarize the main points of the training and together with the trainees review the main points:</p> <ul style="list-style-type: none"> <li>• What is gender mainstreaming and why it is important?</li> <li>• Youth empowerment in Avocado value chain</li> <li>• Women empowerment in Avocado value chain</li> <li>• Strategies for inclusion of vulnerable and marginalized groups in Avocado value chain</li> <li>• Environmental and Social Management Framework of Avocado activities</li> </ul> <p>Let the trainees recall what they learned and discuss any issue that may arise.</p>	<ul style="list-style-type: none"> <li>• Summary of the main points on from the module on a flip chart and display</li> </ul>

## **14.8.2 References**

### **14.8.2.1 Participants handouts**

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

### **14.8.2.2 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: AGRICULTURAL POLICY OPTIONS FOR SUPPORTING SMALLHOLDER FARMERS' AVOCADO PRODUCTION AND MARKETING**

## **14.3.1 Introduction**

This module is designed to train Trainer of Trainers (ToTs) on skills that are useful in making smallholder farmers' agency central in avocado policy making in Kenya. This is through identifying policy options, classifying policy objectives and instruments, using policy cycle to develop new policies and using policy validation cycle to update policies related to avocado production and marketing. Avocados are produced commercially in different Counties of Kenya. About 70% of the avocados are grown by smallholder farmers who have 5-20 trees per homestead, 20% by medium scale farmers who have over 100 trees and 10% from commercial plantations, which have 10 hectares or more in production. However, there is scope for small farmers to increase their incomes if they can increase productivity and yields and reduce post-harvest losses while creating better market linkages. Smallholder avocado farmers in Kenya face several challenges to participating in export markets. These include capital and liquidity constraints, limited access to production technologies and institutional support and poor infrastructure. Programs and policy makers need to reduce the barriers that smallholders face when they want to participate in local and export markets

## **14.3.2 Module Learning Outcomes**

By the end of this module, participants are expected to:

1. Identify the gaps of the existing National agricultural policies with smallholder farmers' agency
2. Identify relevant areas in the agricultural policy options with the avocado smallholder central agency
3. Classify the policy instruments for achieving policy objectives
4. Understand the use of policy cycle in the development of new agricultural policies
5. Understand the use of policy validation cycle to update agricultural policies

## **14.3.3 Module Target Group**

This module targets agricultural extension, service providers and lead farmers.

## **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 the Trained Trainers. The trainers using this module should thoroughly familiarize themselves with the participants' handouts (training materials).

### 14.3.5 Module Duration

The Module is estimated to take **2 hours**

### 14.3.6. Module Summary

<b>Module 14.3 Agricultural policy options for influencing avocado production and marketing</b>			
<b>Sessions</b>	<b>Training Methods</b>	<b>Training Materials</b>	<b>Time</b>
14.6.1. Levelling of participants' expectations about the module	<ul style="list-style-type: none"> <li>• Personal introduction</li> <li>• Discussion</li> </ul>	<ul style="list-style-type: none"> <li>• Projector</li> <li>• Flip charts</li> </ul>	15 minutes
14.6.2. Module introduction, objectives, expectations	<ul style="list-style-type: none"> <li>• Personal introduction</li> <li>• Presentation</li> </ul>	<ul style="list-style-type: none"> <li>• Projector</li> </ul>	10 minutes
14.6.3 National agricultural policies with smallholder farmers agency	<ul style="list-style-type: none"> <li>• Personal introduction</li> <li>• Presentation</li> </ul>	<ul style="list-style-type: none"> <li>• Projector</li> </ul>	15 minutes
14.6.4. Policy options and their objectives	<ul style="list-style-type: none"> <li>• Plenary presentation</li> </ul>	<ul style="list-style-type: none"> <li>• Projector</li> </ul>	10 minutes
14.6.5. Policy instruments	<ul style="list-style-type: none"> <li>• Plenary presentation</li> <li>• Plenary Discussion</li> </ul>	<ul style="list-style-type: none"> <li>• Projector</li> </ul>	20 minutes
14.6.6. Policy development cycle	<ul style="list-style-type: none"> <li>• Plenary presentation</li> <li>• Plenary Discussion</li> </ul>	<ul style="list-style-type: none"> <li>• Projector</li> </ul>	20 minutes
14.6.7. Policy validation cycle	<ul style="list-style-type: none"> <li>• Plenary presentation</li> <li>• Plenary Discussion</li> </ul>	<ul style="list-style-type: none"> <li>• Projector</li> </ul>	20 minutes
14.6.8. Training review	<ul style="list-style-type: none"> <li>• Facilitator's summary:</li> <li>• Takeaways</li> </ul>	<ul style="list-style-type: none"> <li>• Module review</li> <li>• Participants Handouts</li> </ul>	10 minutes
<b>TOTAL</b>			<b>2 hours</b>

### 14.3.7 Facilitators Guidelines

<b>Module 14.3 Agricultural policy options to support avocado production and marketing</b>	
<b>14.3.7.1 Levelling participants' expectations about the module (15 minutes)</b>	<b>Session Guide</b>
<p><b>14.3.7.1.1 Module title</b></p> <p><i>(The facilitator welcomes trainees to the module on Agricultural policy options and introduces him/herself by stating his/her profile and experience.)</i></p>	<ul style="list-style-type: none"> <li>• Handouts</li> <li>• Program</li> <li>• Note books</li> <li>• Felt pens</li> <li>• PowerPoint slides</li> </ul>
<b>14.3.7.1.2 Participants expectations (15 minutes)</b>	
<p><i>(The facilitator asks the trainees to state their expectations by listing on a flip chart)</i></p> <p><b>Plenary Discussion .</b></p>	<ul style="list-style-type: none"> <li>• Summarize trainees' "expectations" and display on flip chart/board.</li> </ul>
<b>14.3.7.2 Module introduction, objectives and expectations (10 minutes)</b>	
<p><i>(The facilitator introduces the module and states the objectives and expectations)</i></p> <p>By the end of this module, participants are expected to:</p> <ul style="list-style-type: none"> <li>• Identify crucial areas in the policy options that you feel have the most impact on farmers</li> <li>• Be able to classify the policy instruments for achieving policy objectives</li> <li>• Understand the use of policy development cycle in the development of new agricultural policies</li> <li>• Understand the use of policy validation cycle to update agricultural policies</li> </ul>	<ul style="list-style-type: none"> <li>• PowerPoint slides</li> <li>• Factsheets</li> </ul>
<b>14.3.7.3 National agricultural policies with smallholder farmers agency (15 minutes)</b>	<b>Session Guide</b>
<p><i>(The facilitator to highlight the types of the National agricultural policies)</i></p> <p><b>Plenary Presentation (10 minutes)</b></p> <p>Make presentation on the available agricultural policies</p> <p>Discuss how the National agricultural policies fail to make smallholder farmers' agency central (<b>5 minutes</b>)</p>	<ul style="list-style-type: none"> <li>• PowerPoint slides</li> <li>• Handouts</li> <li>• Flipcharts</li> </ul>

<p><b>14.3.7.4 Policy options and their objectives (10 minutes)</b></p> <p><i>(The facilitator to highlight the types of policy options and their objectives relevant to avocado production and marketing)</i></p> <p><b>Plenary Presentation (5 minutes)</b></p> <p>Make presentation on the available policy options and their objectives</p> <p>Discuss which policy options are applicable to avocado production and marketing <b>(5 minutes)</b></p>	<p><b>Session Guide</b></p> <ul style="list-style-type: none"> <li>• PowerPoint slides</li> <li>• Handouts</li> <li>• Flipcharts</li> </ul>
<p><b>14.3.7.5 Policy instruments (20 minutes)</b></p> <p><i>(The facilitator describes the policy instruments )</i></p> <p><b>Plenary Presentation (10 minutes)</b></p> <p><b>Group Exercise (10 minutes)</b></p> <p>Discuss successes and failures of policy instruments in influencing production and marketing of avocado</p>	<p><b>Session Guide</b></p> <ul style="list-style-type: none"> <li>• Handouts</li> <li>• Flip charts,</li> <li>• Manila papers,</li> <li>• Pelt pens</li> </ul>
<p><b>14.7.6 Policy development cycle(20 minutes)</b></p> <p><b>Plenary Presentation (10 minutes)</b></p> <p><i>(The facilitator discusses the components of policy cycle and their relationship to the production and marketing of avocado)</i></p> <p><i>Plenary Discussion (10 minutes)</i></p>	<p><b>Session Guide</b></p> <ul style="list-style-type: none"> <li>• Use PowerPoint</li> <li>• Handouts</li> </ul>
<p><b>14.3.7.7 Policy validation cycle (20 minutes)</b></p> <p><b>Plenary Presentation (10 minutes)</b></p> <p><i>(The facilitator highlights the components of policy validation cycle. The facilitator also discusses the relevance of policy validation in the production and marketing of avocado)</i></p> <p><b>Plenary Discussion (10 minutes)</b></p>	<p><b>Session Guide</b></p> <ul style="list-style-type: none"> <li>• Use PowerPoint</li> <li>• Handouts</li> </ul>
<p><b>14.3.7.8 Training review (10 minutes)</b></p> <p><i>(The facilitator leads the trainees in reviewing the module. Conclude by thanking the trainees )</i></p> <p><b>Plenary Presentation (10 minutes)</b></p> <p>Summarize the main points of the training</p>	<p><b>Session Guide</b></p> <p>Summary of the main points from the Module.</p>

## 14.8.3 References

### 14.8.3.1 Participants handouts

### 14.8.3.2 Further Reading

Financial Sector Deepening Kenya (FSD Kenya) (2015). Financing the avocado value chain: A case study of Lower Eastern Kenya

Kenya Horticultural Development Program (KHDP) (2010). Market Opportunities for Avocado Growers

Government of Kenya (GoK) (2012). National horticulture policy.



# ANNEXES

## ANNEX 1: TRAINING PROGRAMME

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

**NATIONAL AGRICULTURAL AND RURAL INCLUSIVE GROWTH PROJECT  
TRAINING OF TRAINERS FOR AVOCADO VALUE CHAIN FOR  
NANDI, KIRINYAGA, MERU AND MURANG'A COUNTIES  
VENUE: XXXX 2021**

Time	Day 0 (Sunday) Travel to Venue	Duration	Remarks / Facilitator
Late Evening	<ul style="list-style-type: none"> <li>▪ Arrival of participants and registration – Host</li> <li>▪ Setting up and prepare training venue and materials – CTT</li> </ul>	2 Hours	The training venue and materials are ready for use
<b>Close of Day 0</b>			
Time	Day 1 (Monday)	Duration	Remarks / Facilitator
8.00am-9.30am	<b>Session 1: Introduction, objectives &amp; expectations</b> <ul style="list-style-type: none"> <li>▪ Welcome by host and Prayers</li> <li>▪ Self-introductions –(CTT)</li> <li>▪ Introduction to KCSAP project</li> <li>▪ Official opening Ceremony (CEC)</li> <li>▪ Introduction to the training program (CTT)</li> </ul>	10 minutes 20 minutes 20 minutes 20 minutes 20 minutes	The trainees relax and climate set for the ten-day training
9.30 - 10.30 am	<b>Module 1: Climate Change and Climate Smart Agriculture in Avocado value chain</b>  <b>1.1. Introductions and objectives</b>	1 Hour	
10.30 - 11.00 am	<b>Tea Break</b>	<b>30 minutes</b>	
11.00-12.00 pm	<ul style="list-style-type: none"> <li>• <b>1.2. Introduction to Climate Change and Climate Variability</b></li> </ul>	1 Hour	

12.00-01.00 pm	<b>1.3. Concept of Climate Smart Agriculture (CSA)</b>	1 Hour	
<b>1.00 -2.00 pm</b>	<b>Lunch Break</b>	<b>1 Hour</b>	
<b>2.00 -2.40 pm</b>	<b>1.4. Selected Future Scenarios that will Impact Productivity.</b>	40 minutes	
<b>2.40 -3.00 pm</b>	<b>1.5. Module Review</b>	20 minutes	
	<b>End of Module 1</b>		
<b>3.0 -4.00 pm</b>	<b>Module 2: Farmer Field and Business School Approach</b> <b>2.1. Introductions and objectives</b>	1 Hour	
<b>4.00 -5.00 pm</b>	<b>2.2 Overview of FFBS key activities</b>	30 minutes	
<b>5.00 -6.00 pm</b>	Tea Break	1 Hour	
<b>Close of Day 1</b>			
<b>Time</b>	<b>Day 2 (Tuesday)</b>	<b>Duration</b>	<b>Remarks / Facilitator</b>
8.00-9.00am	Registration for second day participation Recap of day 1 activities	30 minutes 30 minutes	CTT
8.00-9.00am	<b>Continuation of Module 2</b> <b>2.3 Designing an FFBS program</b>	1 Hour	
9.00-10.00am	<b>2.4 Communication skills</b>	30 minutes	
<b>10.00 - 10.30 am</b>	<b>Tea break</b>	<b>30 minutes</b>	
10.30 - 11.00 am	<b>2.5 Facilitation skills</b>	30 minutes	
11.00 - 11.30 am	<b>2.6 Organization, management and Leadership of FFBS</b>	30 minutes	
11.30 - 12.00 pm	<b>2.7. Module Review</b>	30 minutes	
	<b>End of Module 2</b>		
12.00 -01.00 pm	<b>Module 3. Good Agricultural Practices (GAPs) and Food Safety Management Systems (FSMS)</b>		
12.00-12.30pm	3.6.1 Introduction, objectives and levelling of expectations	30 Minutes	
12.30-1.00pm	3.6.2 Understanding what is GAPs and its application in the crop value chains	30 Minutes	
<b>1.00 -2.00 pm</b>	<b>Lunch Break</b>	<b>1 Hour</b>	
2.00-2.30 pm	3.6.3 Discussion of what factors to consider when selecting a site for agricultural activities through Risk Assessment	30 Minutes	

2.30-3.30 pm	3.6.4 Review of GAPs requirements for audit and types of protocols possible	1 hour	
3.30-4.00 pm	3.6.5 Introduction to Site Selection (1 hour)	30 minutes	
4.00-4.30 pm	3.6.6 GAP checklists and Audit (1 hour)	30 Minutes	
4.30-5.30 pm	3.6.7 Safe use of Pesticides and calibration of sprayers and nozzles	1 hour	
5.30 -6.00 pm	Tea Break	1 Hour	
<b>Time</b>	<b>Day 3 (Wednesday)</b>	<b>Duration</b>	<b>Remarks / Facilitator</b>
8.00-9.00am	Registration for second day participation Recap of day 1 activities	30 minutes 30 minutes	CTT
9.00-9.30 am	<b>Continuation of Module 3</b> 3.6.8 Understanding of food safety management system in crop value chains	30 minutes	
9.30-10.00 am	3.6.9 Determination of food safety risk/ hazards in crop value chains (hazard analysis)	30 minutes	
10.00-10.30 am	<b>Tea break</b>	<b>30 minutes</b>	
10.30-11.30 am	3.6.10 Determination of critical control points (CCPs) and Critical limits (CLs) in crop value chain	1 hour	
11.30-12.30 pm	3.6.11 Prevention and corrective measures for CCPs in Avocado value chain	1 hour	
12.30-1.00 pm	3.6.12 Module review	30 Minutes	
1.00- 2.00 pm	Lunch break	1 hour	All
2.00 -3.00 pm	<b>Module 4: Avocado production and appropriate climatic requirements</b> <b>4.1. Introductions and objectives</b>	1 hour	
3.00 -4.00 pm	<b>4.2 Importance of Avocado in Kenya's economy</b> <b>Presentation</b>	1 hour	Facilitator
4.00 -5.00 pm	<b>4.3 Avocado production ecological/ climatic requirements</b>	1 hour	
5.00 -6.00 pm	Tea Break	1 Hour	All
Close of day 3			

Time	Day 4 (Thursday )	Duration	Remarks / Facilitator
8.00-9.00am	Registration for third day participation Recap of day 3 activities	30 minutes 30 minutes	CTT
9.00-9.45 am	<b>4.4. Avocado production AEZs , average yields, and constraints in the target Counties</b>	45Minutes	
9.45-10.00 am	<b>4.5. Module review</b>	15 Minutes	
	<b>End of Module 4</b>		
10.00-10.30 am	<b>Tea break</b>	<b>30 minutes</b>	
10.30 – 11.30 am	<b>Module 5: Avocado Variety Selection</b> <b>5.1. Introduction and levelling of expectations and objectives</b>	1 hour	Facilitator
11.30 - 12.00 pm	<b>5.2 Introduction to Avocado and the various improved Avocado varieties and their uses</b>	30 minutes	Facilitator
12.00 – 1.00 pm	<b>5.3 Recommended Avocado varieties for the target counties</b>	1 hour15 minutes	
<b>1.00- 2.00 pm</b>	<b>Lunch break</b>	<b>1 hour</b>	<b>All</b>
2.00 - 2.30 pm	<b>5.4 .Module review</b>	30 minutes	Facilitator
	<b>End of Module 5</b>		
2.30 – 3.30 pm	<b>Module 6. Avocado Seed System</b> <b>6.1. Introduction and levelling of expectations and objectives</b>	1 hour	Facilitator
3.30 - 4.30 pm	<b>6.2. Definition of seed and seed system in Kenya</b>	1 hour	Facilitator
4.30 – 5.30 pm	<b>6. 3 Formal seed system in Kenya</b>	30 minutes	Facilitator
5.30 – 6.00 pm	<b>Tea Break</b>	30 minutes	All
Close of day 4			
Time	Day 5 (Friday)	Duration	Remarks / Facilitator
8.00-9.00am	Registration for fourth day participation Recap of day 3 activities	30 minutes 30 minutes	CTT
9.00-10.00am	<b>Continuation of Module 6.....</b> <b>6.4 Informal seed system in Kenya</b>	1 hior	Facilitator
10.00 -10.30 am	Tea Break	30 minutes	
10.30 – 11.00 am	<b>6.5. Module review</b>	30 minutes	
	<b>End of Module 6</b>		

11.30 – 12.00 pm	<b>Module 7: Avocado climate smart agronomic practices</b> <b>7.1. Introductions, climate setting</b>	30 minutes	Facilitator
12.00 – 1.00 pm	<b>Objectives and expectations</b>	1 hour	
1.00 -2.00 pm	Lunch Break	1 hour	
2.00 -3.00 pm	<b>7.3. Agronomic practices for Avocado production</b>	1 hour	
3.00 -4.00 pm	<b>7.4. Appropriate inputs for Avocado optimal production and their correct doses</b>	1 hour	
4.00 -5.00 pm	<b>7. 5. Module review</b>	30 minutes	
5.00 – 5.30 pm	Tea Break	30 minutes	
	<b>End of Module 7</b>		
Close of day 5			
<b>Time</b>	<b>Day 6 (Saturday)</b>	<b>Duration</b>	<b>Remarks / Facilitator</b>
8.00-9.00 am	Registration day five participation	30 minutes	CTT
	Recap of day 4 activities	30 minutes	
9.00-10.00 am	<b>Module 8: Integrated soil and water management practices for Avocado production</b> <b>8.1. Introduction, Objectives and Expectations</b>	30 minutes	
<b>10.00 -10.30 am</b>	<b>Tea Break</b>	<b>30 minutes</b>	
10.30 – 11.00 am	<b>8.2. Soil composition, properties and health</b>	30 minutes	
11.00 – 12.00 pm	<b>8.3. Soil and plant tissue sampling</b>	1 hour	
12.00-1.00 pm	Lunch Break	1 hour	
1.00 – 1.30 pm	<b>8.4. Soil fertility and plant nutrition</b>	30 minutes	
1.30 – 2.00 pm	<b>8.5 Soil health and (ISFM) for climate resilient</b>	30 minutes	
2.00 – 2.30 pm	<b>8.6 Soil and water management and water harvesting technologies</b>	30 minutes	
2.30 – 3.00 pm	<b>8.7. Soil degradation and reclamation</b>	30 minutes	
3.00 – 3.30 pm	<b>8.8 Problematic soils and their management</b>	40 minutes	
3.30 – 4.00 pm	<b>8.9. Module review</b>	30 minutes	
	<b>End of Module 8</b>		

4.30 – 5.00 pm	<b>Module 9: Crop Health</b> <b>9.1. Introduction, Objectives and Expectations</b>	30 minutes	
5.00 - 5.30 pm	Tea Break	30 minutes	
Close of day 5			
<b>Time</b>	<b>Day 7 (Sunday)</b>	<b>Duration</b>	<b>Remarks / Facilitator</b>
8.00 - 9.00 am	Registration day six participation	30 minutes	CTT
	Recap of day 5 activities	30 minutes	
9.00 - 10.00 am	<b>Module 9 continued.....</b> <b>9.2. Major Avocado pests that cause economic losses and their control</b>	1 hour	
10.30 -10.30 am	Tea Break	30 minutes	
10.30 – 11.00am	<b>9.3. Sustainable Integrated Avocado pests management practices; scouting, and threshold determination</b>	30 minutes	
11.00 – 12.00pm	<b>9.4. Major Avocado diseases that cause economic losses, conditions that favour their development and their control methods</b>	45 minutes	
12.00 – 1.00pm	<b>9.5. Sustainable Integrated Diseases Management (IDM) ; scouting and threshold determination</b>	1 hour	
1.00 - 2.00 pm	Lunch Break	1 hour	
2.00 - 2.30 pm	<b>9.6. Safe use of pesticides and update source for registered pesticides</b>	30 minutes	
2.30 - 3.30 pm	<b>9.7. Module review</b>	30 minutes	
	<b>End of Module 9</b>		
4.00 – 4.30 pm	<b>Module 10. Avocado harvesting and post-harvest management</b> <b>10. 1</b> Introduction and levelling of expectations and objectives	30 minutes	
4.30 – 5.00 pm	<b>Module 10 continued...</b> <b>10. 2 Avocado harvesting to maintain quality(1 hour)</b> <b>Presentation</b>	30 minutes	
5.00 – 5.30 pm	Tea Break	30 minutes	
Close of day 7			

Time	Day 8 (Monday)	Duration	Remarks / Facilitator
8.00 – 9.00 am	Registration day seven participation	30 minutes	CTT
	Recap of day 7 activities	30 minutes	
9.00 – 9.30 am	<b>10.3 Proper Avocado sorting and grading</b> <b>Presentation</b>	30 minutes	
9.30 – 10.30 am	<b>10.4 Avocado cooling/storage techniques</b> <b>Field Trip:</b> Travel to KALRO Matuga Avocado Variety trial field	1 hour	
<b>10.30 -11.00 am</b>	<b>Tea Break</b>	<b>30 minutes</b>	
11.00 -11.30 am	<b>10.5 Training review</b>	30 minutes	
	<b>End of Module 10</b>		
12.00 -1.00 pm	<b>Module 11. Avocado value addition</b> <b>11.1 Introduction and levelling of expectations and objective</b>	30 minutes	
1.30 - 2.00 pm	Lunch Break	1 hour	
2.00 – 3.00 pm	<b>11. 2 Introduction to recipes for Avocado value added products</b>	1 hour	Facilitator
3.00- 5.00 pm	<b>11. 3. Making of different Avocado value added products</b> <b>Practicals</b>	2 hours	
5.00 – 5.30 pm	Tea Break	30 minutes	
Close of day 8			
Time	Day 9 (Tuesday)	Duration	Remarks / Facilitator
8.00 - 9.00 am	Registration day 9 participation	30 minutes	CTT
	Recap of day 8 activities	30 minutes	
9.00 - 10.00 am	<b>11.4 Prioritizing opportunities in Avocado value addition</b>	1 hour	
10.00 -10.30 am	Tea Break	30 minutes	
10.30 -12.00 pm	<b>11.5 Value addition strategy development</b>	1 hour30 minutes	
12.00 -12.30 pm	<b>11.6 Training review</b>	30 minutes	
	<b>End of Module 11</b>		
1.00 - 2.00 pm	Lunch break	1 hour	All

2.00 – 2.30 pm	<b>Module 12: Mechanization of Avocado production activities</b> <b>12.1 Introduction, Objectives and Expectations</b> <b>Module Objectives</b>	30 minutes	
2.30 – 3.00 pm	<b>12.2. Avocado climate smart land preparation tools</b> <b>Presentation</b>	20 minutes 10 minutes	
3.00 – 3.30 pm	<b>12.3. Avocado calibration of fertilizer and seed rate for planters</b>	30 minutes	
3.30 – 4.00 pm	<b>12. 4. Avocado Chemical implements and tools operations</b>	1 hour	
4.00 – 5.00 pm	<b>12.5. Avocado harvesting machine operating principles</b>	1 hour	
5.00 – 5.30 pm	Tea Break	30 minutes	
Close of Day 9			
<b>Time</b>	<b>Day 10 (Wednesday)</b>	<b>Duration</b>	<b>Remarks / Facilitator</b>
8.00 - 9.00 am	Registration day 9 participation	30 minutes	CTT
	Recap of day 8 activities	30 minutes	
9.00 – 9.30 am	<b>Module 12 continued.....</b> <b>12.6 Machine and procedure for Avocado grading</b>	30minutes	
9.30 -10.00 am	<b>12.7 Module review</b> Review the main points about Avocado mechanization	30 minutes	
End of Module 12			
10.00 -10.30 am	Tea Break	30 minutes	
10.30 -11.30 am	<b>Module 13. Avocado Business and Marketing</b> <b>13.1 Introduction and levelling of expectations and objectives</b>	1 hour	
11.30 -12.00 pm	<b>13.2 Introduction to marketing channels and strategies</b>	30 minutes	
12.00 -1.30 pm	<b>13.3 Identification and prioritization of market opportunities in Avocado value chain</b>	40 minutes 20 minutes	
1.30 - 2.30 pm	Lunch break	1 hour	All

2.30 – 3.30 pm	<b>13.4 Avocado Community production, aggregation and marketing models (COPMAS)</b>	1 hour	
3.30 – 4.30 pm	<b>13.5 Training review</b>	30 minutes	
4.30 – 5.00 pm	<b>Tea Break</b>	30 minutes	All
	End of module 13		
Close of day 10			
<b>Time</b>	<b>Day 11 (Thursday)</b>	<b>Duration</b>	<b>Remarks / Facilitator</b>
8.00 - 9.00 am	Registration day 11 participation Recap of day 9 activities	30 minutes 30 minutes	CTT
9.00 - 9.30 am	<b>Sub-Module 13.1 Agricultural Innovation Platforms (AIP)</b>  <b>13.1.1 Introduction, Objectives and Expectations</b>  <b>Module Objectives</b>	30 minutes	
9.30 - 10.30 am	<b>13.1.2. The characteristics of an innovation platform</b>	1 hour	
10.30 - 11.00 am	Tea break	30 minutes	All
11.00 - 12.00 pm	<b>13.1.3 Preformation and formation phases of the Avocado AIP</b>	1 hour	
12.00 - 12.30 pm	<b>13.1.4. Module review</b>  Summary of main points	30 minutes	
	<b>End of sub module 13.1</b>		
1.00 - 2.00 pm	Lunch break	1 hour	All
1.00 - 1.30 pm	<b>Sub Module 13.2 Gender mainstreaming and social inclusions in the Avocado value chain</b>  <b>13.2.1 Introduction, Objectives and Expectations</b>	30 minutes	
1.30 - 2.00 pm	<b>13.2.2 Gender mainstreaming and social inclusion in Avocado value chain</b>	30 minutes	
2.00 - 2.30 pm	<b>13.2.3 youth empowerment in Avocado value chains</b>	30 minutes	
2.30 - 3.00 pm	<b>13.2.4 Women empowerment in Avocado value chain</b>	30 minutes	
3.00 - 3.30 pm	<b>13.2.5. Strategies for inclusion of vulnerable and marginalized groups in Avocado value chain</b>	30 minutes	

3.30 - 4.00 pm	<b>13.2.7.6. Environmental and social management framework (ESMF)</b>	30 minutes	
4.00 - 4.30 pm	<b>13.2.7. Module review (30 Minutes)</b> Plenary summary of the module	30 minutes	
4.30 – 5.00 pm	<b>Tea Break</b>	30 minutes	All
	<b>End of sub-module 13.2</b>		
Close of day 10			
<b>Time</b>	<b>Day 12 (Friday)</b>	<b>Duration</b>	<b>Remarks / Facilitator</b>
8.00 - 9.00 am	Registration day 12 participation	30 minutes	CTT
	Recap of day 11 activities	30 minutes	
9.00 - 9.30 am	<b>Sub-Module 13.3: Climate-Smart Agricultural Policy Options</b> <b>13.3.1 Introduction, Objectives and Expectations</b> <b>Module Objectives</b>	30 minutes	
9.30 - 10.00 am	<b>13.3.2 Agricultural Policy Frameworks in Kenya</b>	30 minutes	
10.00 - 10.30 am	Tea break	30 minutes	All
10.30 - 11.30 am	<b>13.3.3 Climate-smart agriculture practices, policy options and approaches</b>	1 hour	
11.30 - 11.50 am	<b>13.3.7.4 Climate-smart-sensitive policy cycle</b>	20 minutes	
11.50 - 12.40 pm	<b>13.3.7.5 Implementation of the climate-smart-sensitive policy at the county level</b>	50 minutes 30 minutes	
12.40 - 2.00 pm	Lunch break	1 hour	All
2.00 - 3.00 pm	<b>13.3.6 Policy financing and investments for Climate-smart Agriculture</b>	1 hour	
3.00 - 3.20 pm	<b>13.3.7 Need for Technology Policy</b>	20 minutes	
3.20 - 3.40 pm	<b>13.3.8 Module review</b>	20 minutes	
	End of module 13.3		
3.40 - 4.00 pm	• Course Evaluation	20 minutes	All
4.00 - 4.30 pm	Announcements Way Forward Closing remarks	30 minutes	CCT

4.30 - 5.00 pm	Tea Break	30 minutes	
Close of day 12			
<b>Time</b>	<b>Day 13 (Saturday)</b>	<b>Duration</b>	<b>Remarks / Facilitator</b>
	<ul style="list-style-type: none"> <li>• Departure to various destinations</li> </ul>		All

## ANNEX 2: GENERAL REFERENCE MATERIALS

Category / Modules	Publication title	Reference types	No Pages	Farmer Category A= New entrant/ Avocado Elite farmer B=Elite Avocado Farmer
<b>General Avocado production</b>	Avocado production Guide in Kenya	Manual	25	<b>A/B</b>
	A Manual for Avocado	Training Manual	26	<b>A/B</b>
<b>Avocado Varietal Selection</b>		Leaflet	2	<b>A/B</b>
		Leaflet	2	<b>A/B</b>
		Leaflet	2	<b>A/B</b>
	Variety Characteristics and Production Guidelines of Traditional Crops	Training Manual	38	<b>A/B</b>
<b>Avocado Crop Health</b>	Crop Management Guidelines			
	Integrated Pest Management (Cost saving Techniques for Smallholder Farmers)	Manual	34	<b>B/A</b>
<b>Avocado Business Management</b>	Avocado Production Guide	Manual	30	<b>B/A</b>
		Booklet	89	<b>B</b>
Gender Mainstreaming	Gender Mainstreaming in Agriculture and Rural Development: A Reference Manual for Governments and Other Stakeholders. Marlborough house, London.	Manual	100	<b>B</b>

### ANNEX 3: PARTICIPATORY TECHNOLOGY DEVELOPMENT (PTD) FOR AVOCADO SOIL FERTILITY MANAGEMENT

<b>Value Chain</b>	Avocado
<b>Learning Enterprise</b>	Avocado
<b>Funded Enterprise</b>	Avocado VC at production level
<b>Background Problem</b>	Low Avocado production due to low soil fertility
<b>Objective</b>	To increase production through improved soil fertility management strategies

#### Factors to consider:

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

#### Setting the P.T.D blocks:

- 6 trees are selected randomly in 4 equal blocks of the orchard to be the plots.
- Preferred Avocado variety
- Different soil fertility management treatment
- Collect the data from 6 plants in each block.
- Other TIMPS should be applied equally in each block.
- Weeding and spraying should also be done the same time for each plot

#### Parameters Measurement

- No of leaves per crop
- Leaf width and length
- Crop height
- No of Avocadoes per plant
- Average weight of avocado fruit
- Yield /unit area

**Setting of Blocks**

Plot 1 Inorganic fertilizer P Source	Plot 2 Inorganic compound fertilizer	Plot 3 Inorganic compound and organic manure	Plot 4 Farmers practice
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**AGRO ECOSYSTEMS ANALYSIS (AESAs) AVOCADO.**

**AESA NO .....**

**General information Agronomic data**

Variety ..... Average Leaf length.....  
 Planting date..... Average plant height.....  
 Average Leaf width.....  
 No of Avocadoes per plant.....  
 Average weight of avocado.....  
 Yield in tons per acre.....

Weather: .....

Time of observation: .....

Diagram of crop of enemies and insects observed

**Natural Enemies Insects observed**

- |    |    |
|----|----|
| 1. | 1. |
| 2. | 2. |

**Observation Recommendation**

- |                        |                                     |
|------------------------|-------------------------------------|
| 1. Weeds               | Weeding after 2 weeks               |
| 2. Holes on the leaves | Keep monitoring and control pests   |
| 3. Yellow leaves       | Add foliar feeds or control disease |





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

