



MINISTRY OF  
FOREIGN AFFAIRS  
OF DENMARK  
*Danida*

# Avocado Value Chain Manual





# **Avocado Value Chain Manual**



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## **Disclaimer**

This manual is for advisory use only. Users of this manual should verify details that relate to their agro-climatic zones from their area agricultural extension officers. It is also advised that this training manual should be used in conjunction with the respective value chain handbook and other relevant resource materials.

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# Foreword

The Micro Enterprises Support Programme Trust (MESPT) is a local development organization founded in 2002 through a partnership between the Government of Kenya (GoK), the European Union (EU), and later, the Royal Danish Government. MESPT's main goal is to eradicate poverty by supporting the growth of micro-enterprises, including agricultural production, agribusiness, and afro-processing. This support aims to foster social, economic, and environmentally sustainable growth by increasing access to financial and business development services, creating jobs, and promoting sustainable micro-enterprises. Our vision is to build a more prosperous society, and our mission is to provide sustainable business development and financial services to smallholder farmers and agri-MSMEs in Kenya.

For over two decades, our team of professionals has been at the forefront of developing cost-effective and scalable solutions that promote financial inclusion and support the growth of sustainable agribusinesses. We accomplish this by providing tailored financial solutions that meet the specific needs of various agricultural value chains, delivered through a wholesale lending model to financial service providers such as SACCOs, MFIs, and Farmer Cooperatives. These providers, in turn, extend loans to smallholder farmers and micro agricultural enterprises.

Our approach emphasizes delivering integrated financial and business development services to smallholder farmers and MSMEs in Kenya, helping them access finance, boost agricultural productivity, improve afro-processing and connect to markets. Over the years, we have worked closely with county governments, development agencies, donors, and investors to strengthen business development capacities in the agricultural sector, using a unique tripartite model that connects farmers, SMEs, and financial institutions.

Avocado is among key value chains that have been supported by MESPT over the years through various interventions in order to enhance commercialization. MESPT appreciates the importance of documenting best practices for the value chain in facilitating effective delivery of training for farmers and Agripreneurs. Therefore, MESPT has facilitated the development of this manual alongside the value chain trainers' guide and other resource materials through Green Employment in Agriculture Programme (GEAP) with support from DANIDA.

This manual is expected to enhance effectiveness in delivery of trainings on Good Agricultural Practices and commercialization of the value chain. I am optimistic that this manual will be helpful to partners in the the value chain including county governments. I am grateful to DANIDA for the continued support to MESPT programmes. I am also thankful to the value chain experts who spear-headed compilation of this manual.

**Rebecca Amukhoye,**

**Chief Executive Officer, Micro-Enterprises Support Programme Trust**

# Preface

The Green Employment in Agriculture Programme is a 5 years' programme (2021 to 2025) funded by DANIDA and implemented by Micro-Enterprises Support Programme Trust (MESPT). GEAP seeks to contribute directly to Kenya's Vision 2030 and to one of Denmark-Kenya Strategic Framework on accelerated decent employment creation in MSMEs and improved competitiveness of targeted value chains in agriculture which will contribute to transforming the economy towards a greener and more inclusive growth.

GEAP programme targets 40,000 smallholder farmers and has been implemented in 12 counties namely, Kilifi, Kwale, Nakuru, Nyandarua, Siaya, Kisii, Kakamega, Bungoma, Trans Nzoia, Uasin Gishu, Makueni and Machakos. The programme facilitates increased commercialization, decent employment, and green transformation through targeted interventions in selected agriculture value chains that include, Cassava, Coconut, Dairy, Export Vegetables, Pineapple, Indigenous Poultry, Moringa, Pineapple, Aquaculture, Avocado and Banana

MESPT through GEAP tasked multidisciplinary teams to develop resource materials tailored for extension service providers and farmers. This Avocado value chain manual is one of the series of the materials that were developed. MESPT further tasked value chain experts to develop a value chain trainers' guide for avocado. This manual is to be used as a reference material for training on implementation of good agricultural practices, value addition and marketing for the value chain. Relevance of the content is based on needs identified among value chain players, actors and aligned to GEAP project objectives.

MESPT is grateful to the value chain experts who spearheaded the development and production of this manual. It is my hope that counties and other users will adopt and optimally use this resource so as to increase productivity and profitability while ensuring a greener and more inclusive growth.

**Doreen Kinoti**

**Programme Manager, Green Employment in Agriculture Programme**

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The Green Employment in Agriculture Programme (GEAP) participating counties (Kilifi, Kwale, Nakuru, Nyandarua, Siaya, Kisii, Kakamega, Bungoma, Trans Nzoia, Uasin Gishu, Makueni and Machakos) are acknowledged for providing resource persons in compilation of the document. The technical support and expertise provided by Kenya Agricultural and Livestock Research Organisation in development of the document is appreciated. Thanks to the Royal Danish Government's Danish International Development Agency (DANIDA) for facilitating the development of this re-source material. Micro Enterprises Support Programme Trust (MESPT) is appreciated for co-ordinating the process of development and production of this document.

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# **Avocado Value Chain Manual**



## Acronyms and Abbreviations

AEZ	Agro Ecological Zonation
DAP	Diammonium Phosphate
FPEAK	Fresh Produce Exporters Association of Kenya
FSMS	Food Safety Management System
GAP	Good Agricultural Practices
GHP	Good Hygiene Practices
GMP	Good Manufacturing Practices
GSP	Good Storage Practices
HCD	Horticultural Crops Directorate
IPM	Integrated Pest Management
ISO	International Organization for Standardization
IQF	Individual Quick Freezing
MoALF	Ministry of Agriculture, Livestock and Fisheries
NGOs	Non-Governmental Organizations
PCPB	Pest Control Products Board
PRPs	Pre-requisite Programs
QA	Quality Assurance
SOPs	Standard Operating Procedures

# Chapter I: Introduction

## 1.1. The avocado plant

Kenya is the world's third largest producer of avocados (*Persea americana*). It is also Kenya's leading fruit export, accounting for nearly one-fifth of its total horticultural exports. But Kenya only exports 10% of its total avocado production. By comparison, Chile exports 55% and South Africa exports 60%. Avocado is grown in several parts of Kenya and about 70% of avocado production is by small-scale growers. They grow it for subsistence, local markets, and export purposes. Some of the key challenges include lack of food safety practices in production, adequate processing of avocados, proper storage and transportation facilities.

The main commercial varieties of Avocados grown in Kenya are Hass, Fuerte, and Pinkerton, with Fuerte and Puebla also recommended as rootstocks. Additionally, the country also has other varieties including Choquette (jumbo type) Entenger, G755, Simmond, Tonnage and Zutano.

## 1.2 Agro-Climatic requirements

### 1.2.1 Temperature

Globally, avocados are grown across a wide range of temperatures.

Hass avocado requires an optimum temperature of 25–28°C. For most avocado varieties, the maximum temperature should be less than 30°C. Temperature above 35°C is tolerated but with a negative effect on fruit yield and size.

### 1.2.2 Rainfall

Rain fed avocados need >1000 mm rainfall a year, spread out through out the year, with a two-month drier season pre-flowering. Our Avocado Farming Guide shows that most avocados need irrigating. Plants require about 25 mm water per week. Farmers should ensure that they have access to enough water year-round as droughted avocado trees die fast. You should test your Irrigation water quality. High pH and bicarbonates create a free lime build up in the soil. High salts, sodium and chloride have a very negative affect on the plants.

### Altitude

In Kenya, avocados can be grown at an altitude of about 1,500 to 2,100 metres above sea level. However, the crop is generally grown in highland areas between 1,000 and 2,100m.

### 1.2.3 Soil

#### 12.3.1 Soil structure, texture and depth

Avocado grows successfully in many types of soils provided the soil is deep, permeable and well drained. Good soil aeration is needed and a depth of at least one metre of topsoil is recommended. One soil condition to be avoided is waterlogging because root rots, such as Phytophthora can be a serious problem for avocado trees.

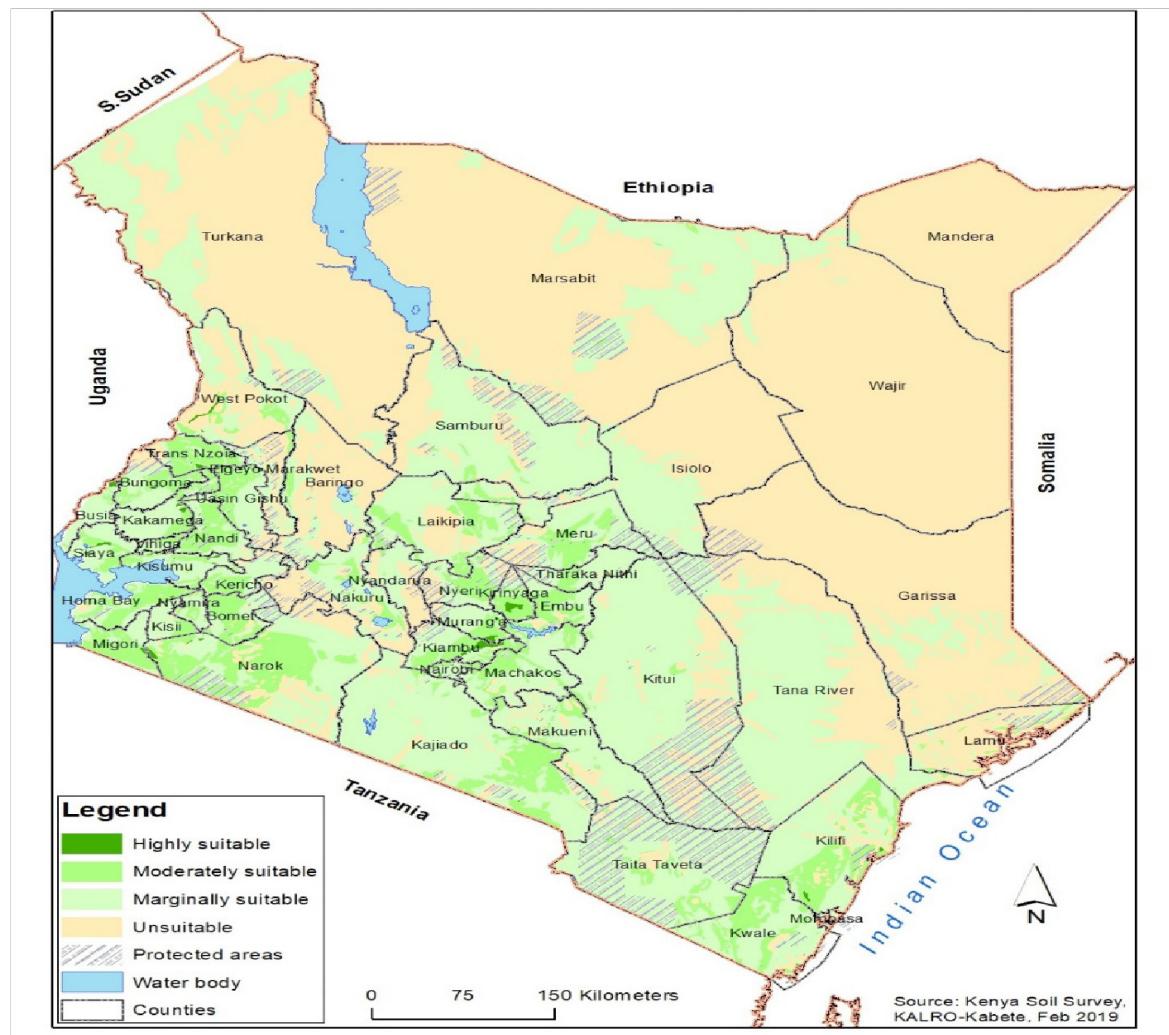
### 1.2.4 Spacing

It is recommended to plant trees in a straight line to facilitate proper husbandry measures and harvesting. Spacing depends on the cultivar; it varies from 6m x 7m to 14m x 14m. Ensure you acquire certified and true-to-type seedlings from reputable suppliers.

Tree spacing depends on several factors such as soil fertility and climatic conditions. Spacing may range from 6m x 7m to 8m x 10m. Generally, plants are spaced 20-25 ft apart (6-7.5m) giving approximately 70 - 100 trees/acre (175 - 250 trees/ha). Also keep in mind that avocados have an extensive root system and can disturb the roots of other plants if planted too close.

### 1.2.5 Land suitability for avocado growing in Kenya

Fig. I: Avocado suitability map



In terms of geographical distribution, the avocado suitability map shows the main avocado growing areas in Kenya. There are two types of avocado that flower at different times of the year (type A and B). Farmers are advised to mix both types in an orchard so that type A pollinates type B and vice versa.

PROVINCE	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
CENTRAL												
R/VALLEY												
NAIROBI												
EASTERN												
NYANZA												
WESTERN												
COAST												

Table.1: Production Seasons in Different Regions of Kenya

Source KALRO/NAVCDP/PAMPHLET No..129/2024

	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
FUERTE												
HASS												

Table.2: Production seasons of major commercial varieties

Source KALRO/NAVCDP/PAMPHLET No..129/2024

# Chapter 2: Food Safety

## 2.1 Introduction

The aim of implementing a food safety management system is to deliver a safe and wholesome final product to the consumer. Food safety management should be ongoing processes that incorporate activities from the selection and preparation of the soil in agricultural operations through the final preparation and consumption of the food. Food safety focuses on the prevention of problems, once safety has been compromised it is difficult or impossible to restore.

### 2.1.1 Meaning of food safety

Food safety is a scientific discipline describing handling, preparation, and storage of food in ways that prevent food-borne illness. It relates to activities to protect food supply chain from microbial, chemical, allergenic and physical hazards that may occur during all stages of food production and handling.

### 2.1.2 Importance of food safety

Globalization and increasing demand by consumers for variety of foods, increases local and trans-boundary movement and trade of food within and across countries. With this continuously increasing global food supply chain the potential for spread of contaminants is high which has resulted in the need for stricter controls.

### 2.1.3 Principles of food safety

The general issues and key principles of food safety remain the same whatever the value chain being considered. The driving principles of food safety are hygiene, prevention and risk reduction, time and temperature control, reliability, consistency, traceability, transparency, accountability, customer and consumer relevance. These are operationalized through management systems such as HACCP. Food safety hazards can arise at various stages of the food value chain and need to be prevented or eliminated at each stage.

### 2.1.4 Prerequisite programmes (PRPs)

Prerequisite programs (PRPs) are practices that are put in place to maintain a sanitary environment and minimize the risk of introducing hazards in the food chain. Prerequisites programmes are often referred to as “Good practices”, since they form the basis of food safety management. They Include: GAPs, GMPs, GHPs among others.

### 2.1.5 Good Agricultural Practices (GAPs)

Good Agricultural Practices are a collection of principles to apply for on farm production and post-production processes resulting in safe and healthy food and non-food agricultural production while considering economic, social and environmental sustainability. Good Agricultural Practices in primary production relies on hazard identification and detection of appropriate prevention and control practices.

It relies on the implementation of Integrated Crop Management (ICM) and Integrated Pest Management (IPM) programs, pointing to practices producing economically viable foods, not affecting natural resources.

### **2.1.6 Good Manufacturing Practices (GMP)**

Good Manufacturing Practices are the basic operational and environmental conditions required to produce safe food. They ensure that ingredients, products and packaging materials are handled safely and that food products are processed in a suitable environment. They include practices preventing and controlling postharvest hazards affecting produce safety and having minimum effect on workers and the environment.

### **2.1.7 Good Hygienic Practices**

These include all those measures and conditions required to prevent and control produce contamination hazards, mainly biological. Implementation of GAP and GMP (at primary and post-harvest stages) includes hygiene practices to produce and handle safe products.

### **2.1.8 Standard operating procedures (SOPs)**

They are written, detailed and accessible description of measures for use by personnel explaining how each operation is performed. These procedures include cleaning method, maintenance, pest control, waste management, recall and training procedures.

### **2.1.9 Food safety risk assessment**

Food safety is the assurance that food will not cause harm to the consumer when it is prepared or consumed according to its intended use. (FAO/WHO, 1997). This guarantee means reducing risks that may result from foodborne hazards contamination during production and handling of produce. Contaminated fruits and vegetables are an important conduit of foodborne diseases (FBD), which represents a significant share of the global burden of disease, particularly in Africa. Foodborne hazards are biological, chemical, and physical contaminants with the potential to cause harm to human health.

### **2.1.10 Foodborne diseases:**

In developing countries, diseases resulting from contaminated fruits and vegetables can be higher in some areas and result in a higher percentage of affected population. Many outbreaks are not officially reported and therefore it is not possible to give accurate figures of diseases resulting from fresh produce like avocado in Kenya.

### **2.1.11 Development of a food safety management system**

Food safety is linked to the presence of food-borne hazards in food at the point of consumption. Since food safety hazards can occur at any stage in the food chain it is essential that adequate control be in place. The most effective food safety systems are established, operated and updated within the framework of a structured management system and incorporated into the overall management activities of the organization. This is referred to as Food Safety Management System (FSMS). Food Safety Management System outlines a systematic approach to the identification, evaluation, and control of food safety hazards in production farms and in food processing facilities.

### 2.1.12 Standards and legislations in food safety

Food safety standards and regulations are essential to ensure food is safe at all points along supply chains in both international trade and within nations. It influences agricultural output, the variety, quality and safety of food and the composition of diets. The primary purposes of food legislation are to protect the health of the consumer from fraud and to ensure the essential quality and wholesomeness of food. Food law must first provide the legal authority and an adequate legal framework for the food control activities.

Food controls are all mandatory activities necessary to assure the quality and safety of food in a country or region; and are applicable throughout the entire food system. The basic characteristics of a food control infrastructure include policy, legal and regulatory framework, institutional framework, control and enforcement programmes; data sets, conception and content inspections services; and analytical services. They are important in assuring a high quality, safe and nutritious food supply for the public and their good health; and for the economic benefits derived from trade in food.

### 2.1.13 National Standards

Kenyan standards are adopted from International Organization of Standards (ISO) and Codex Alimentarius Commission. National food safety regulations and standards are a fundamental part of the Kenyan food control system.

Kenya state agencies involved in food safety controls include:

Ministry of Health - Directorate of Public Health

Ministry of Agriculture, Fisheries and Irrigation - Horticultural Crops Directorate (HCD), Food Crops Directorate; Kenya Agricultural and Livestock Research Organization (KALRO); Kenya Plant Health Inspectorate Services (KEPHIS)

Ministry of Industry, Trade and Cooperative - Kenya Bureau of Standards (KEBS), Weights and Measures Department (WMD)

The functions of these agencies include sensitization and implementation of codes of hygiene and agricultural practices by stakeholders throughout the food chain. The following are some of the laws, regulations and standards related to issues of food safety directly or indirectly:

**KS 1758-2:2016 Code of Practice for Horticulture**, which, aims at providing rules for safe and sustainable production and supply of fruits, vegetables, Herbs and Flowers in Kenya for both export and domestic markets.

**National Food Safety Policy (2012)** addresses food safety concerns in the areas of legal and regulatory framework, information, education and communication, traceability, infrastructure, capacity building, emerging and reemerging food challenges, validation, inspections, certifications and self-assessment, institutional framework, mandates and capacity, monitoring and evaluation.

# Chapter 3: Avocado Propagation and Nursery Management

## 3.1 Introduction

Avocado is propagated by use of seeds or vegetative materials. Vegetative propagation is mainly through grafting to assure the quality standards of the fruit. In this context, the role of a nursery is critical. Nursery operations require operators to understand, observe and apply food safety measures in all activities. Nurseries should be able to provide quality and healthy seedlings that will provide fruit at maturity. Commercial nurseries must be certified prior to selling their products and services.

## 3.2 Common Varieties

Table 3: Common varieties

Variety	Characteristics	Pictorial
Fuerte	<p>Fuerte is one of the major varieties in export markets</p> <p>The tree is broad, very productive and susceptible to both Anthracnose and Scab.</p> <p>Pear-shaped fruit with medium seed</p> <p>Weight: 140 – 395 g per fruit</p> <p>Smooth thin green skin</p> <p>Skin remains green when fruits are mature</p> <p>Creamy, pale green flesh</p>	 <p>Source: SHEP PLUS</p>

Variety	Characteristics	Pictorial
Hass	<p>The tree grows tall and requires cutting back.</p> <p>Distinctive for its skin that turns from green to purplish-black when fruits are mature.</p> <p>Oval-shaped fruit with small to medium seed.</p> <p>Easy peeling.</p> <p>Great taste.</p> <p>Outstanding shelf-life and shipping characteristics.</p> <p>Longest harvesting duration</p>	
Pinkerton	<p>Long, pear-shaped fruit with small seed</p> <p>Large fruit that weighs 225 – 510 g per fruit</p> <p>Medium thick green skin with slight pebbling</p> <p>Green skin deepens in colour as it ripens</p>	
Reed	<p>Round fruit with medium seed</p> <p>Medium to large fruits with the weight of 225 – 510 g per fruit</p> <p>Thick green skin with slight pebbling</p> <p>Skin remains green when fruits are mature</p> <p>Easy peeling</p>	Picture: sandid on Pixabay
Puebla	<p>Small compact fruits resembling “Hass”.</p> <p>Skin of ripe fruit is black, thin and smooth.</p> <p>Fruit has a velvety flesh with nutty aroma and a rich butter taste.</p>	

### 3.2.1 Other varieties:

Linda, Ettinger, Simmonds, Lyon, Tonnage, Zutano, Hardy, Teague etc.

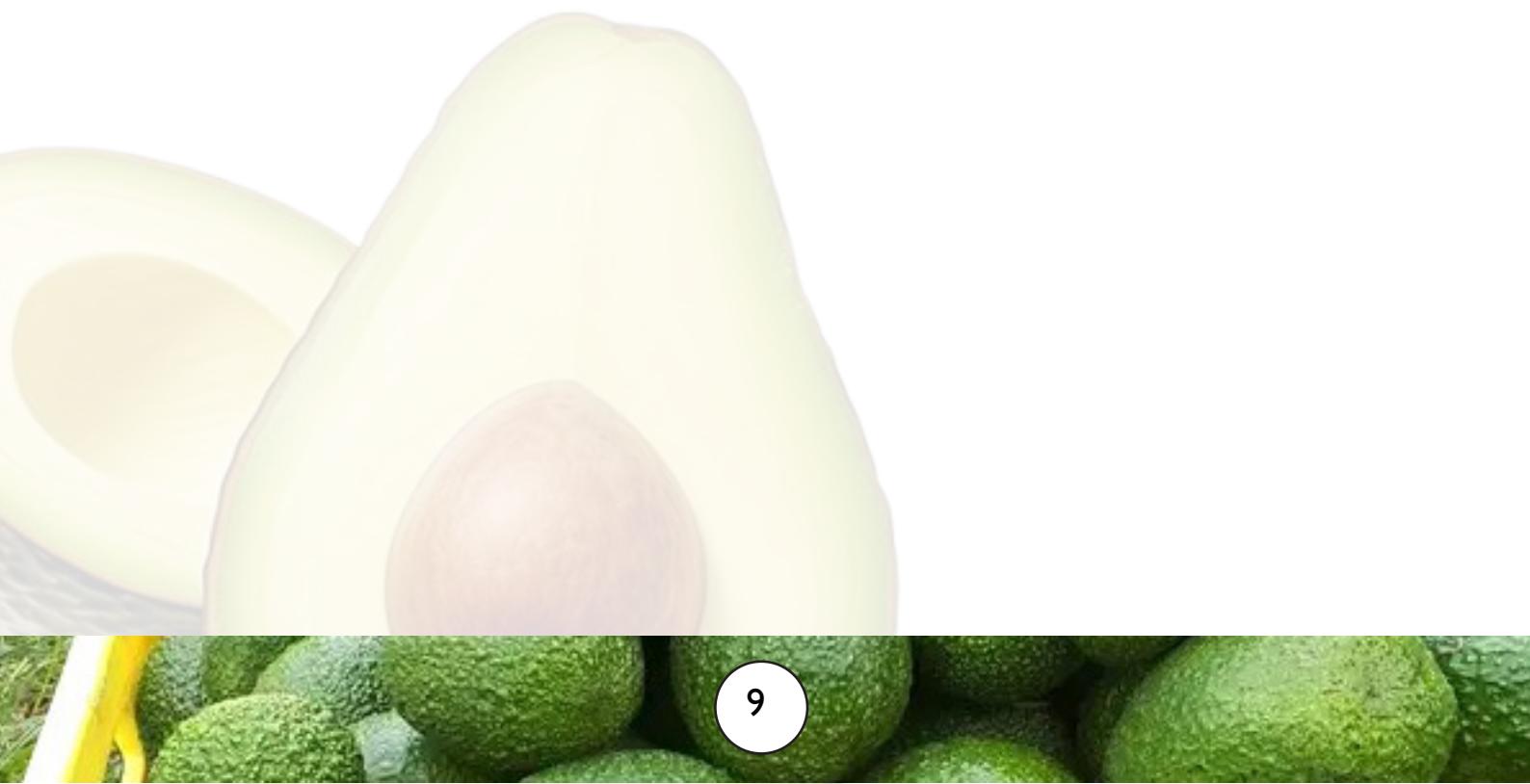
Note: Cultivars used as rootstocks are “Puebla” or “Local varieties”

### 3.3 Avocado nursery establishment.

It is important to use good quality seed in planting. Before planting a lot of seed, it is recommended to first check its viability by seeing if it germinates well. Once you have an idea about viability, then it will be possible to estimate how many seed need to be planted to get a certain number of trees.

Table.4:Avocado nursery

Benefits of raising avocado seedlings in a nursery	Key factors influencing setting up of a nursery	Nursery site selection
<ul style="list-style-type: none"><li>• It is convenient to look after the tender seedlings.</li><li>• Helps to provide favourable growth conditions, i.e. germination as well as growth.</li><li>• It is easy to protect the seedlings from pests and diseases.</li><li>• It reduces field management costs.</li><li>• Reduces growing season and helps use land efficiently.</li><li>• Improves uniformity of crop by selecting certified, healthy and vigorous seedlings in the nursery.</li></ul>	<ul style="list-style-type: none"><li>• Type of nursery</li><li>• Nursery site selection</li><li>• Sourcing of seeds</li><li>• Nursery structures</li><li>• Farm history</li><li>• Availability of funds</li></ul>	<ul style="list-style-type: none"><li>• Surrounding environment</li><li>• Isolation from orchards</li><li>• Area of land</li><li>• Topography</li><li>• Soil type</li><li>• Water supply</li><li>• Identification of potential food safety hazards</li></ul>



### 3.3.1 Nursery structure

**Table.5: Nursery structure**

Nursery structure	Key factors to consider	Covering materials
<ul style="list-style-type: none"> <li>• Nursery structure (plant house) provides a protected environment for tree growth.</li> <li>• Different structures provide different levels of control over light, heat and wind.</li> <li>• Some plant houses are also insect-proof (e.g. screen-houses), providing a barrier against insects that could damage trees or transmit diseases.</li> <li>• The size and sophistication of plant house structures varies depending on the budget, materials and what the house will be used for example a green house.</li> </ul>	<ul style="list-style-type: none"> <li>• Ground levelling</li> <li>• Construction of a drainage system</li> <li>• Construction of perimeter fence</li> <li>• Soil treatment</li> <li>• Framing materials</li> <li>• Covering materials</li> <li>• Nursery floors</li> <li>• Nursery benches</li> <li>• Control of temperatures in plant houses</li> </ul>	<ul style="list-style-type: none"> <li>• Modern structures in commercial nurseries are typically covered with:</li> <li>• shade nets</li> <li>• plastic film.</li> <li>• Insect-proof screens</li> <li>• polycarbonates.</li> <li>• In addition, all ventilation points must be screened.</li> </ul>



**Plate.I: Green houses and shade nets**

Source: <https://www.greenhouseht.com/>

Table 6: Nursery production areas, materials used and good practices

Area	Used	Good practice
Propagation	<ul style="list-style-type: none"> <li>• Sowing rootstock seed</li> <li>• Grafting scions to rootstocks</li> </ul>	<ul style="list-style-type: none"> <li>• Isolated from orchard trees and sources of diseases and pests.</li> <li>• Clean work surfaces.</li> <li>• Maintain personnel and facility hygiene</li> <li>• Sterilization of propagation material</li> </ul>
Potting	<ul style="list-style-type: none"> <li>• Potting-up germinated root-stock seedlings</li> <li>• Potting grafted trees into larger containers</li> <li>• Cleaning pots</li> </ul>	<ul style="list-style-type: none"> <li>• Located near the stored potting mix and accessible by vehicles and trolleys.</li> <li>• Includes a well-drained washing area that is free of soil.</li> </ul>
Growing (unprotected area or plant house)	<ul style="list-style-type: none"> <li>• Germinating rootstock seedlings</li> <li>• Growing rootstocks and grafted trees</li> <li>• Hardening-off trees before sale</li> </ul>	<ul style="list-style-type: none"> <li>• Hardening-off trees grown in a plant house by exposing them to semi shade then full sun for a few days before sale.</li> </ul>
Dispatch	<ul style="list-style-type: none"> <li>• Sorting potted trees before transporting them away from the nursery</li> </ul>	<ul style="list-style-type: none"> <li>• Keep customers and their vehicles away from the clean production areas.</li> <li>• Maintain conditions for hardening-off.</li> </ul>
Wash down	<ul style="list-style-type: none"> <li>• Cleaning pots and equipment</li> </ul>	<ul style="list-style-type: none"> <li>• Use a clean water supply.</li> <li>• Used water should drain away from nursery trees to prevent contamination.</li> <li>• Keep the area free from soil.</li> </ul>
Chemical	<ul style="list-style-type: none"> <li>• Storing and mixing chemicals</li> </ul>	<ul style="list-style-type: none"> <li>• Store chemicals in a cool and dry location.</li> </ul>
Area	<ul style="list-style-type: none"> <li>• Used</li> </ul>	<ul style="list-style-type: none"> <li>• Good practice</li> </ul>

Area	Used	Good practice
		<ul style="list-style-type: none"> <li>• Always wear protective gloves and clothing when handling concentrated chemicals.</li> </ul>
Systems	<ul style="list-style-type: none"> <li>• Irrigation unit</li> <li>• Water treatment system</li> </ul>	<ul style="list-style-type: none"> <li>• Keep corrosive fertilisers and chemicals away from equipment.</li> </ul>
Storage	<ul style="list-style-type: none"> <li>• Maintain separate areas for storing:</li> <li>• Water</li> <li>• Potting mix components and assembled mix</li> <li>• Chemicals</li> <li>• Equipment and machinery</li> <li>• Other supplies o Waste, before disposal</li> </ul>	<ul style="list-style-type: none"> <li>• Prevent stored water from being contaminated by pests and diseases.</li> <li>• Chemicals should be stored in a contained area in case of spills.</li> </ul>
Support services	<ul style="list-style-type: none"> <li>• Customer reception and office administration</li> <li>• Amenities</li> <li>• </li> </ul>	<ul style="list-style-type: none"> <li>• Keep non-nursery staff away from the clean production areas to minimize contamination.</li> </ul>

### 3.3.2 Tools and equipment

The basic tools needed by a small-scale farmer for a nursery include *jembes*, *pangas*, shovels, water cans, wheelbarrows, pruning knives, knife sharpeners, soil sieves etc. Here is the list of commonly used tools in a nursery:

Table 7:Tools used in nursery

Tool	Image	Use
Jembe		Helps to loosen hardened and compacted soil. Used to remove soil and weeds.
Machetes/Panga		Clearing bushes, weeds and plant residues.

Tool	Image	Use
Secateurs/ Clippers/Shears		Helps cut small branches.
Spade		Used for digging and lifting soil.
Soil auger		Used for soil sampling.
Bucket		Used for collecting.

Empty eco-friendly potting bags		For planting seedlings
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Filled eco-friendly potting bags		For planting seedlings
Wheelbarrow		Carry material, potted plants, sapling
Pruning knives		For pruning, trimming
Soil sieve		Soil preparation
Watering cans		Application of water.

Table 8: Equipment used in nursery

Equipment	Image	Use
Sprayer pumps		Helps spray a liquid, such as water, weed killers, pest maintenance chemicals etc.
Hose pipes		Irrigation, drip irrigation.
Shade net		Making shade net structure for avocado propagation
Other equipment includes benches, drip irrigation system, storage tanks, basic tool kit with spanners, screw drivers, knife sharpener,		

### **3.4 Establish and manage mother block**

The planting stock that maintained as a source for commercial propagation is referred to as a mother block. Care of mother plants is necessary to get good quality propagates and scion.

Invariably, separate space should be provided for establishment of mother block with desirable characteristics of varieties within the premises of the nursery. This is one of the most important inputs, which decides the fate of production efficiency of the orchards. Therefore, high yielding clones of recommended varieties from different locations should be selected for developing new mother block.

The selected plants should be planted in a closer spacing to get continuous supply of scions. These plants should be severely pruned to keep them in vegetative phase and to produce enough shoots for propagation purposes.

#### **3.4.1 Selection and management of propagation material**

Table.9:Selection and management of propagation material

Choice of Mother tree	Management of mother block
<ul style="list-style-type: none"><li>Selected and earmarked as best tree or Tree of Outstanding Merit (TOM) within each variety.</li><li>Tree is used for future multiplication.</li><li>Tree must have been tested for its performance over several years.</li><li>Free from pests and diseases, Vigorous, True-to-type, High yielding and Suitable for different environment</li></ul>	<ul style="list-style-type: none"><li>Care of mother plants is necessary to get good quality scions.</li><li>A mother block should comprise of popular plant varieties.</li><li>The scion shoots should be taken only from bearing plants.</li><li>These plants should be severely pruned to keep them in vegetative phase and to produce enough shoots for propagation purposes.</li></ul>

### **3.4.2 Raising seedlings**

#### **3.4.2.1 Nursery site selection**

- Nearness to quality water source
- Good drainage
- Security (animals, thieves etc)
- Accessibility to the road
- Availability of wind breaks (Casuarina, Grevillea etc)

### 3.4.2.2 Nursery Establishment

Prepare a seedbed of width 1M and a desirable length by removing farm soil from the seedbed to a depth of 30cm and refill the 30cm depression with sand.

Collect seed only from healthy and vigorous mother trees and from fruits which are mature and healthy rather than from off the ground.

Average to large-sized seeds generally produces vigorous seedlings.

Cultivars used as rootstocks are “Puebla” or “Local varieties” Fuerte is no resistant to Phytophthora (Duvenhage & Kphne, 1997).

Extracted seed should be treated in hot water (not exceeding 50oC) for 30 minutes then coated or dipped in a broad-spectrum fungicide (e.g. Metalaxyl) to prevent infection with Phytophthora cinnamon).

Seeds are planted with the flat basal end pointing downwards either in nursery beds or directly into eco-bags, about 20cm in diameter and 30cm deep.

Potting media: medium texture, sterilized if possible and with good drainage properties

Nurseries should be sited away from Pineapple fields as this is a source of Phytophthora cinnamon infection.

Avoid formation of hard pans on the potted plant by regularly pricking the soil with a sharp stick.

Scout regularly for pests and diseases, common pests are Aphids, White Flies, Cutworms and leaf miners.

Common diseases are Powdery Mildew and damping-off in case of excess watering

### 3.4.3 Grafting

The rootstocks will be ready for grafting **6 months after transplanting into biodegradable containers (6 X 9 Inches)**

The rootstocks are grafted using scions of desired variety

**4 to 6 months later**, the seedlings are ready for transplanting into the field and should be well healed and free from pests and diseases

Trees should be planted **at the beginning of the seasonal rainfall** and as soon as the rain has deeply penetrated the ground Trees planted at this time of the year have a full growing period ahead to establish themselves before the next dry season.

Plate.2: Grafting methods



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### **3.4.4 Transplanting**

The potted plants are carefully removed from their eco-bags in such a way that the soil around the roots is not disturbed the plant is placed into the planting hole

Topsoil mixtures filled into the hole first, followed by the subsoil and firming down

Never plant an Avocado tree deeper than the soil level it was in while in the eco-bag

After transplanting, the leftover soil is used to build a basin around each tree to collect water from rain or irrigation

Transplants must be watered regularly until they are established.

### **3.5 Water Requirements**

Avocados have large soft leaves and evaporate a lot of water in warm weather, so they need regular watering

Irrigation is required in-case of insufficient rainfall, especially during flowering and fruit setting

In Kenya, most established Avocado trees are rain-fed and receive their water needs without additional irrigation

The most crucial period when additional irrigation water may be required is around mid- January until April (the beginning of the long rains)

# Chapter 4: Crop Management

## 4.1 Introduction

Farmers' low Avocado yields result from their non-adoption of improved crop management practices developed by agricultural researchers. Some of the improved agronomic practices available for these farmers include timely land preparation, use of recommended fertiliser types, correct plant spacing, knowledge of physiological maturity indices, and improvement in harvesting techniques to avoid losses.

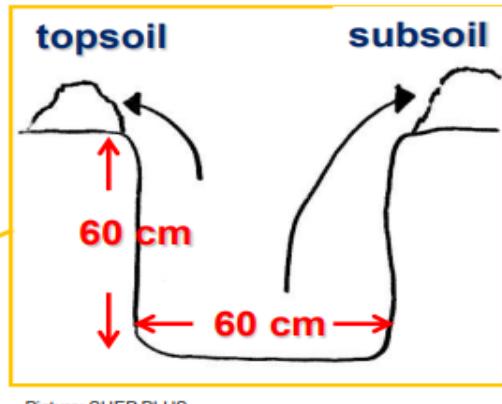
To optimize the productivity of Avocados, farmers need to adopt specific agronomic packages, without which the yield potential of improved varieties cannot be achieved. In addition, the weather vagaries occasioned by climate change effects make it necessary to incorporate adaptation or mitigation measures that can enable avocado farmers to increase their productivity. In this respect, climate-smart agronomic practices come to the fore. Therefore, there is a need to equip farmer facilitators from the targeted counties with skills and knowledge that will enable them to train farmers on innovative climate-smart Avocado agronomic practices that include seed selection techniques and disease and pest management strategies for increased production.

## 4.2 Land Preparation

Plate.3: Holing



Fig.2:Size of planting hole



**A Group Facilitator demonstrating how to prepare planting holes**

**Size of Planting Hole**  
Activate Window  
Go to Settings to  
15

### 4.2.1 Ploughing

Soils should be ploughed sufficiently to eliminate debris and clods

Plough to a fine tilth

Avoid field operations when it is wet to avoid soil compaction and hard pans which affect proper root development.

It is recommended to have the land ploughed at least 2-3 months before transplanting.

#### 4.2.2 Spacing

The usual spacing is 6-9m x 7-10m depending on growth characteristics of the individual variety and the type of soil, fertility status, agro-ecological conditions and agronomic practices.

Holes size: 60cm x 60cmx 50cm

Plant population: 44-92 trees per acre

### 4.3 Integrated Soil and Water Management Practices for Avocado Production

Increasing pressure on soil and water resources and soil nutrient depletion has called into question the changing strategies and approaches of soil fertility management and plant nutrition. Decline in soil fertility is the major constraint limiting the productivity of fruit crops. In addition, climate change has accelerated the decline of the agricultural sector performance through limited and unpredictable moisture availability for fruit and nut tree production.

There is a need to integrate existing technologies of Integrated Natural Resource Management (INRM), Integrated Soil Fertility Management (ISFM), Integrated Water Management (IWM) and sustainable intensification practices in smallholder production systems in addressing avocado nutrient requirements. The encouraged use of organic manure and green manure in avocado production is aimed at reducing production costs incurred from costly commercial fertilisers.

#### 4.3.1 Crop nutrition

##### 4.3.1.1 Basal Application

During the preparation of planting holes, manure/compost and basal fertilizer are applied to allow the soils to settle and establish.

The top and the subsoil are separated

Topsoil is mixed with one debe (20kg per hole = 4 tons per acre) of well decomposed manure and 250g of either Triple Super Phosphate or rock phosphate in the planting hole before refilling.

##### 4.3.1.2 Top-dressing

Fertilizer requirements per avocado tree.

Age of the tree	1-3 year	4-5 years	6-7 years	8-9 years	10-14 years	15 years+
CAN (g)	125	225	450	650	900	1300
TSP (g)	225	450	650	650	1000	1200
Muriate of Potash (g)	-	-	225	450	635	650
FYM (kg)	15	15	30	30	-	-

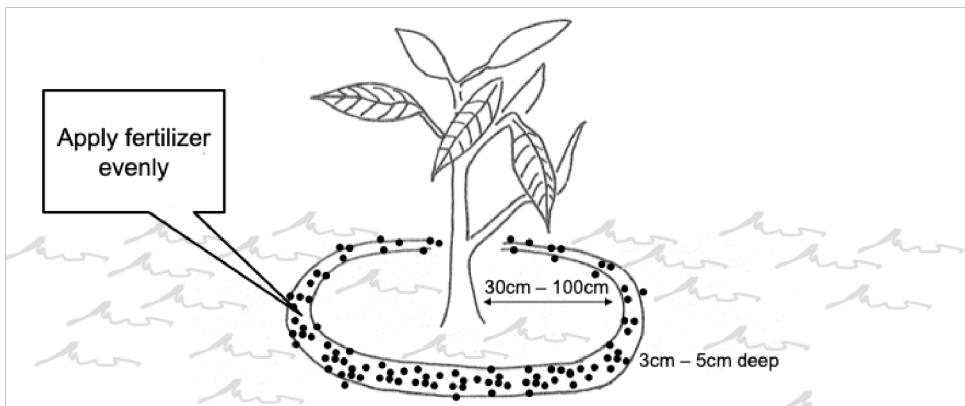
Table.10: Fertilizer application rates

#### 4.3.1.3 Application Methods

Apply fertilizer and manure around the tree canopy at the beginning of the rains

Incorporate well in the soil

Fig.3: Fertilizer application method



Source: SHEP PLUS

#### 4.4 Mineral Deficiency in avocados

Table.11: Mineral deficiency

Mineral	Symptom	Control
Zinc	Mottled leaves with light yellow areas between the veins and abnormal development of growing shoots.	Apply 250 g zinc sulphate for each year of age to a maximum of 4.5 kg/tree. The application should be done in a 60 cm circle around the tree.
Manganese	Progressive yellowing of the margins and inter-venial parts of the leaves while the veins remain green.	Spray the young leaves with foliar spray of manganese sulphate.
Iron	Loss of green colour in leaves.	Apply 360 g iron chelate per tree in acid soils. In normal soils 250 g of iron sulphate in 10 litres of water/ per tree will correct iron deficiency.
Chlorine	High concentration of chlorine in the soil may cause leaf burn, also damage the root system.	Apply lime and compost to neutralise the chlorine.

#### 4.5 Pruning and Training

Formative pruning is important to encourage lateral growth and multiple framework branching

To reinforce this shaping of the tree, remove all sucker growth originating from below the graft union.

Cut back shoots or pinch out the terminal buds of shoots growing straight up.

Training involves creating a strong central shoot from which extend spaced side branches at the desired height and the creating of a bare main trunk about 70cm in height.

Excessive pruning of a young tree will delay the productive phase

In later years, pruning is mainly undertaken to influence the size, quality and quantity of the fruits

The best time to prune is during the dormant season

This is also the best moment for the frequently required rejuvenation pruning aimed at bringing declining/neglected trees back to full productivity

Fig.4: Pruning method

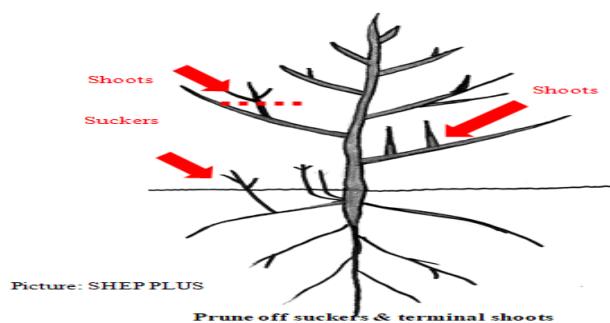




Plate.3: Well pruned hass avocado tree



Plate.4: Painted white to minimize sunburn on pruned areas

Source: [gregalder.com](http://gregalder.com)

# Chapter 5: Avocado Crop Health - Pests and Disease Management

## 5.1 Introduction

Avocado production is often constrained by damage caused by a range of insects, diseases, and weeds. Further, an acute shortage of knowledge among Avocado farmers on the recommended crop health management options frustrates them, and most of them may abandon the crop if timely interventions are not prioritised. Diseases such as anthracnose and Pests such as fruit flies render infested fruits less marketable.

Weeds also present competition for growth and development resources needed by the Avocado crop, especially at young stages, i.e., moisture, nutrients, light, and space. This module is, therefore, meant to help trainees understand the ecology, impact and recommended management practices for diseases, pests, and weeds to reduce production costs and improve Avocado yields.

## 5.2 Common pests in avocado

Table.12: common pests in avocado

Pest	Identification	Symptoms	Control
Caterpillar (left) and adult (right) of the False Coding Moth	 Adult is a small brownish, night-flying moth Females lay eggs singly, mostly on fruit Larvae are white to pinkish in color with brown to black head	After emerging from the egg, the young larva tunnels into the fruit The larva feeds from inside the fruit with frass or excrement being produced at the entrance of larval tunnels	Proper orchard sanitation Infested fruits (both on the tree and fallen) should remove regularly (at least twice a week) and buried at least 50cm or dump in a drum filled water mixed with a little used oil for 1 week. Use of pheromone traps

Pest	Identification	Symptoms	Control
Thrips	<p>Small slender insects 1 – 2 mm long with two pairs of fringed wings</p> <p>Adult Thrips attacking Avocado are dark brown or black, and the immature stages are yellow in colour</p> <p>The Red-banded Thrips can be distinguished by a bright red band across the abdomen of immature Thrips</p> <p>Feeding is most common on young fruit</p> <p>Older fruit with thicker skin is less susceptible to attack</p>	<p>Affected parts become whitish or silvery and are usually covered with dark-coloured droppings</p> <p>The infested plant tissues will turn brown and dry up, if the damage is too severe</p> <p>On fruit, feeding begins near the calyx, gradually producing a scar that can cover the whole fruit</p> <p>Attacked fruits develop a leathery brown skin</p>	<p>Conserve natural enemies: Thrips are attacked by predatory Thrips, Lacewings and Predatory Bugs</p> <p>If chemical control is considered, use products such as Lambda Cyhalothrin (PHI 3days)</p>

Pest	Identification	Symptoms	Control
<p><i>Armoured Scales on a leaf (left) and fruit (right)</i></p> <p>Scales</p>	<p>Scales are small, stationary brown greenish insects occasionally found sucking sap from Avocado leaves</p> <p>There are 2 types of scales: soft and armoured scales and both are protected by a shell</p>	<p>Discoloration, malformation, leaf and fruit drop, and retarded growth</p> <p>Damage is caused by toxic saliva, extraction of plant sap and honeydew in association with sooty mould</p> <p>A severe infestation forms a continuous crust over the under-side of leaves</p>	<p>Chemical control: Use of insecticide such as Malathion (PHI 14days)</p> <p>Conserve natural enemies such as parasitic wasps, ladybird beetles and lacewings, provided no broad-spectrum pesticides are used and no ants are present</p>

Pest	Identification	Symptoms	Control
fr	Some fruit flies lay eggs under the skin of the fruit that is just beginning to ripen, but others attack young and old fruit	When the fruit reaches about the size of a golf ball a sting lesion appears as a slight puncture mark surrounded by a white exudate As the fruit develops, the lesion becomes dry and turns into distinct star-shaped crack on the skin surface	Practise orchard sanitation. Practise monitoring. Trap flies using commercial pheromone traps - Methyl Eugenol (Bactrolure liquid) at 20 traps per acre. Remove infested fruits (e.g. those with dimples and oozing sap) twice a week and destroy by burying about 60cm deep

### 5.3 Common diseases in Avocado

Table.13:Common diseases in avocado

Disease	General information	Symptoms	Control
Root Rot (Die Black)	<ul style="list-style-type: none"> <li>A fungal disease; <i>Phytophthora cinamomi</i></li> <li>The most serious disease in nearly all Avocado producing areas of the world and in Kenya</li> <li>In areas subject to flooding and in poorly drained soils, trees of any age or size are likely to be infected by the fungus</li> </ul>	<ul style="list-style-type: none"> <li>Trees affected lose vitality, become sparsely foliated and do not produce a good crop</li> <li>Leaves are pale-green and wilted, branches usually become sunburned and die back in advanced stages</li> <li>Feeder roots get darkened, and decay and trees will eventually die prematurely</li> <li>The fungus can be spread or introduced to new areas by infested planting material, soil and irrigation water</li> </ul>	<ul style="list-style-type: none"> <li>Uprooting affected trees</li> <li>Hot water and fungicide treatment used for propagation</li> <li>Grafting on <i>Phytophthora</i> resistant/resistant rootstocks.</li> </ul>
Anthracnose	<ul style="list-style-type: none"> <li>This is a fungal disease</li> <li>It is important only in fruits, where it is the most serious disease affecting the Avocado</li> </ul>	<ul style="list-style-type: none"> <li>Dry spots, dark brown in color, form on the skin, leading to abnormal development</li> <li>In severe attacks, the young fruits drop</li> <li>It is mostly a post-harvest disease as the fruits are more susceptible when mature</li> </ul>	<ul style="list-style-type: none"> <li>Orchard sanitation</li> <li>Fungicides are normally used to control the disease besides other chemicals such as: Mancozeb and Propineb among others.</li> </ul>

Disease	General information	Symptoms	Control
Cercospora Fruit Spot	<ul style="list-style-type: none"> <li>• fungal disease</li> <li>• fruit disease impairing the quality of the Avocado</li> <li>• The severity of infection varies from season to season and can cause losses of up to 60 %</li> </ul>	<ul style="list-style-type: none"> <li>• Small, light-yellow spots later changing to reddish-brown appear on fruits and leaves which eventually become hard and crack, thus creating entry points for other decay organisms</li> <li>• Mature fruits are resistant</li> <li>• The disease development is favoured by humid conditions and high temperatures</li> <li>• The fungus is essentially spread by water splash and its spores are also wind-borne</li> </ul>	<ul style="list-style-type: none"> <li>• Orchard sanitation</li> <li>• Fungicides are normally used to control the disease besides other chemicals such as: Propine</li> </ul>
Scab	<ul style="list-style-type: none"> <li>• Scab is a fungal disease</li> <li>• It is common in humid areas</li> <li>• The fungus readily infects young, succulent tissues of the leaves, twigs and fruits</li> </ul>	<ul style="list-style-type: none"> <li>• Lesions appear as small dark spots slightly raised, oval to elongated</li> <li>• These coalesce, giving a corky appearance to the surface of the fruits-impairing the appearance but not the internal quality of the fruit</li> </ul>	<ul style="list-style-type: none"> <li>• Orchard sanitation: remove dead branches and twigs since they harbour the fungus</li> <li>• Also remove fallen rotten fruits from the field</li> <li>• Fungicides are normally used to control the disease besides other chemicals such as Mancozeb at pre-flowering, fruit formation, and after harvest</li> </ul>

# Chapter 6: Green Technologies and Mechanization

## 6.1 Introduction

Green Technologies (GT) refers to those friendly technologies that reduce environmental damage and contribute to both poverty reduction and sustainable agricultural development. In avocado farming, the green technologies that are employed include the following: zero tillage, organic farming, use of green manures and cover crops, residue burial, irrigation and integrated pest management as described below:

## 6.2 Irrigation

Soil moisture very often limits avocado production in those areas where long spell of dry weather prevails or where the rainfall is scanty and sparsely-distributed. The irrigation requirement varies according to the soil type and climatic condition. Plants require about 25 mm water per week. Farmers should ensure that they have access to enough water year-round as droughted avocado trees die fast. You should test your Irrigation water quality. High pH and bicarbonates create a free lime build up in the soil.

## 6.3 Mulching

Apply organic mulch around the base of the trees to reduce water loss, regulate soil temperature, and prevent weed growth.

## 6.4 Windbreaks

Plant windbreaks around the avocado orchard to protect trees from strong winds, which can cause evapotranspiration and soil erosion.

## 6.5 Green Manure and Cover Crops

The green manures and cover crops help to increase the organic matter content of the soil and help to prevent soil erosion. Cover crops (grasses and legumes) are recommended for seasonal cover and other conservation purposes such as scavenging unused fertilizer and releasing nutrients back into the soil for the next crop to use.

## 6.6 Zero tillage

No-till farming (also known as zero tillage or direct drilling) is an agricultural technique for growing crops or pastures without disturbing the soil through tillage. No-till farming decreases the amount of soil erosion that tillage causes in certain soils, especially in sandy and dry soils on sloping terrain. Other possible benefits include an increase in the amount of water that infiltrates into the soil, soil retention of organic matter, and nutrient cycling. These methods may increase the amount and variety of life in and on the soil. While conventional no-tillage systems use herbicides to control weeds, organic systems use a combination of strategies, such as planting cover crops as mulch to suppress weeds. There are three basic methods of no-till farming. “Sod seeding” is when crops are sown with seeding machinery into a sod produced by applying herbicides on a cover crop (killing that vegetation). “Direct seeding” is when crops are sown through the residue of previous crop. “Surface seeding” or “direct seeding” is when crops are left on the surface of the soil; on flat lands, this requires no machinery and minimal labor. Tillage is dominant in agriculture today, but no-till methods may have success in some contexts. In some cases, minimum tillage or “low-till” methods combine till and no-till methods. For example, some approaches may use shallow cultivation (i.e. using a disc harrow) but no plowing or use strip tillage.

## 6.7 Organic farming

The main aim of organic Coconut farming is the production of quality products that contain no chemical residues and maintain soil fertility. These are achieved by growing suitable intercrops under Coconut on rotation, recycling palm residues, appropriate tillage, and water management practices. Management of weeds and pests is done by encouraging a biological control through a balanced host-predator relationship augmentation of beneficial insect population and the mechanical removal of weeds and pests affected plant parts.

An organic production system is designed to:

- Enhance biological diversity within the whole system
- Increase soil biological activity
- Maintain long term soil fertility

Promote the healthy use of soil, water and air as well as minimize all forms of pollution that result from agricultural practices

Handle agricultural products with emphasis on careful processing methods to keep the organic integrity of the product at all stages.

Organic farming is based on the enhancement of the soil structure and soil fertility and the implementation of diversified crop rotation systems.

## 6.8 Mechanization of Avocado Production

### 6.8.1 Walking tractor

A Power tractor is a low powered two-wheeled agricultural implement, also referred to as a walking tractor 8-16hp that can be fitted with a rotary tiller, disk harrow, mouldboard plough, trailer, water pump or chisel at alternate times for easing farm operations. It can complete one hectare per day by one operator in about two hours though the machine could do more with a different operator. This will vary depending on the climatic conditions, soil types, soil moisture content, operator stamina and experience. Fuel consumption is about 15 litres per ha. Though these results may vary with the technical ability of the operator.



Plate.5:A hand operated power tractor

The power tiller can solve the following challenges:

1. Slow and tedious processes of seedbed preparation, in a commercialized Avocado plantation
2. Difficult to prepare a uniform fine tilth seedbed manually
3. Delayed operation leads to late planting
4. High cost of manual labour

The equipment has multiple uses and other advantages. A Power Tiller can be used in seedbed preparation, sowing seed, planting seed, spraying fertilizer, herbicide and even irrigation. In addition, it can also be used for transporting produce. A power Tiller is ideal where the land size is small. Farm sizes less than one hectare may limit maneuverability of conventional tractors and manual labour is costly and slow, hence the need for a power tiller.

#### 6.8.2 Wheeled Tractor

A small sized, 4 wheeled tractor is a low powered agricultural implement of 40-85hp that can be fitted with a rotary tiller, disk harrow, disc/ mouldboard plough, trailer, water pump or chisel at alternate times for easing farm operations. It can complete 4 hectares per day by one operator but can have two operators to run another 8 hours of 4 hectares coming to 8 per day. This will vary depending on the climatic conditions, soil types, soil moisture content and operator experience. Fuel consumption is about 15 litres per ha. Though these results may vary with the technical ability of the operator.

### Sample Land Preparation Practices/ Methods



Plate.6:Tractor drawn disc plough



Plate.7:Oxen Ploughing

The tractor has multiple uses and other advantages. A four wheeled tractor can be used in seedbed preparation, sowing seed, planting seed, spraying fertilizer, herbicide and even irrigation. In addition, it can also be used for slashing through a power take off device and transporting produce. Farm sizes less than one hectare may limit maneuverability of conventional tractors and manual labour is costly

and slow.

### 6.8.3 Tractor operated Soil Auger

With the high and increasing cost of manual labour, manual hole digging for transplanting avocado seedlings increases the cost. It is also a slow and tedious process. At the same time it is difficult to prepare a uniformly spaced holes. Delayed operations lead to late planting. The hole digger is a PTO driven machine that digs holes in rows on equal distances mechanically and economically. It also can be used for hole making for electric poles and farm hedges. It is best suited for tree plantation. It can dig about 90cm deep hole even diameter in just 30 seconds. By detaching augers, it can be used as a small crane.



Plate 8. Tractor operated hole digger

The auger digs a definite hole diameters and depths as desired. Users spend a short time to make the holes. The machine spends low amounts of fuel. It is easy to use, and can be used to a much greater depth, as the hole can be dug as deep as the entire length of the shaft. It mechanically removes soil from holes. The machine form a much neater hole, with a well-defined circumference. Holes can be made at pre-defined places by driving the compact tractor. Size of the hole is determined by the size of the auger used.

### 6.8.4 Motorised Sprayer

The sprayer is used to address the slow and tedious processes of manual spraying of avocado plants especially the young plants. The height of the tree requires a long projectile spray; since avocado has a high number of pests that invade leaf, flowers and fruits.



**Plate 9.A motorised sprayer**

Sprayers are man-portable units typically backpacks with spray guns. They are used to control weeds, insect and diseases. Manual sprayers are labour intensive and spraying labour is too expensive. It has lower pressure reducing its efficiency. Motorized sprayers therefore come in handy.

#### 6.8.5 Avocado harvesting poles

Manual avocado harvesting by climbing the tree is slower, untimely and risky. It also results in high level post-harvest losses.



**Plate.11: Harvesting using pole sticks**

Source: producereport.com

The harvesting pole can harvest fruits from trees that are as high as 10m tall.

- It works faster
- It can reach far end branches
- Does not use fuel and hence is cheaper
- Discourages child labour
- Easier to operate
- Cost effective

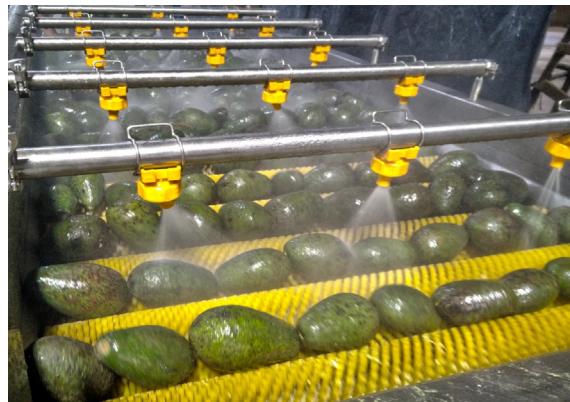
# Chapter 7: Postharvest and Value Addition

## 7.1 Introduction

Post-harvest management of avocados involves cleaning, sorting, storing, packaging, and transporting.

## 7.2 Avocado cleaning machine

The avocados are washed in two stages. First, they are immersed in water to remove dust from the surface. Then they are washed a second time by showering them using a jet system.



**Avocados immersed in water to remove dust and debris  
second time using water jets** Source: [www.freshplaza.com](http://www.freshplaza.com)  
[www.croftsltd.com](http://www.croftsltd.com)

Plate.11: Avocado washing machine      Plate.12: Avocado washing machine using water jets

**Avocados washed a**  
Source:

### 7.2.1 De-stoning and De-skinning

The fruit is taken to a de-stoning machine where 90% of the skin and pips are separated from the pulp. The degree to which the skin is separated from the pulp depends entirely on the quality of the oil that is to be produced. The amount of skin that is processed into the mash will affect the composition and colour of the avocado oil.

### 7.2.2 Mash preparation

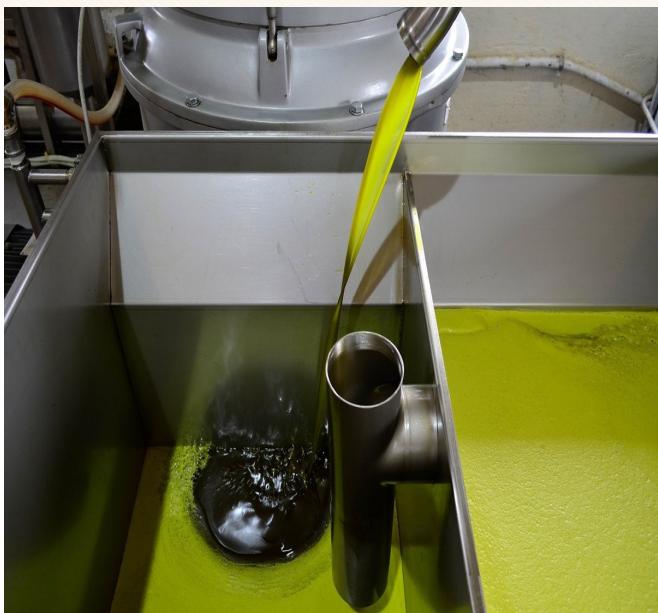
The pulp is pumped into a disc crusher, which rotates at 1400 rpm (rotations per minute). The mash converges at the centre and is sprayed towards the periphery by a toothed disc.

### 7.2.3 Thermal conditioning and kneading

The avocado mash is then pumped into kneading machines where it is stirred slowly and continuously at a monitored temperature. The kneading process causes small oil drops to be released. The small oil drops then merge into bigger drops that can easily be separated by a process known as centrifugal extraction.

### 7.2.4 Oil extraction and purification

Inside the centrifuge system, the mash is separated into solids, vegetation water and oil. A decanter centrifuge is used to separate the oil from the solid and liquid phases. The cold pressed avocado oil flowing from the decanter will have some degree of water and solids. It will be sent to a vertical centrifuge where residual water and solids are removed.



**Plate. I3:Extra virgin avocado oil**

**Source:** [www.tradinorganic.com](http://www.tradinorganic.com)

The avocado oil is packed in transparent or brown-coloured bottles depending on the type and quality of oil. Plastic / PET bottles, glass bottles, drums are used for packaging, depending on the brand, product, quantity and destination.

### 7.3 Uses of avocado pulp in food items

Avocado pulp is increasingly used in different kinds of food items and recipes. Some of these are given below.

### 7.4 Avocado spread (butter or margarine)

This is used on bread and in bakery products. Avocado pulp is blended with selected ingredients (e.g. oil, lemon juice, garlic, onion, salt) until it is soft and creamy. The product is packaged and kept in refrigerated/chilled conditions to prevent enzymatic deterioration. The product must not be stored at room temperature.



**Plate. I4:Avocado butter**

**Source:** [www.tasteofhome.com](http://www.tasteofhome.com)



**Plate. I5:Homemade guacamole**

**Source:** [jenniferskitchen.com](http://jenniferskitchen.com)



Plate.16:Guacamole processing machine Plate.17 Avocado smoothie Plate.18:Avocado ice cream

Source: [chocolatecoveredkatie.com](http://chocolatecoveredkatie.com)

Source: [Italian Pack](http://Italian Pack)

Source: [www.fanny.com.vn](http://www.fanny.com.vn)

## 7.5 Avocado smoothie, shake and Ice cream

A delicious thick and creamy drink, an avocado smoothie or shake is often consumed for breakfast. To the pulp are added ingredients such as cold milk, vanilla extract, sweetener (sugar or honey), pinch of salt and this is blended to prepare the drink. Crushed ice or other optional ingredients such as coconut milk or banana can be also added as per taste. Ice cream can be prepared by adding sweet, condensed milk, lime juice, heavy cream, regular milk. All ingredients are blended into a smooth puree and chilled to set into ice cream.



Plate.19: Open box with the base only

Plate.20: Labels on fresh avocados for export

Source: [www.sahalpack.co.ke](http://www.sahalpack.co.ke)

Source: [www.freshplaza.com](http://www.freshplaza.com)



Plate.21:Avocados being packed before export Source:A.P. Moller-Maersk

One vital function of packaging is to convey information; the main vehicle for this is the graphic design of the printing or label.



Plate.22:Pallets of avocado fruit packed and ready for export

Source: [www.globalcommunitieskenya.org](http://www.globalcommunitieskenya.org)

# Chapter 8: Business Opportunities In the Value Chain

## 8.1 Introduction

Businesses opportunity exists where and when sellers of goods and services interact in one way or another with buyers for profit gains. It may be existing/being practiced or potential (existing but not explored yet).Value chain business and/or market opportunities are the circumstances in which the specific value chain nodes exist and are therefore influenced by time and geographic/space variation.

## Factors to consider/Types of Business Opportunities

1. Business opportunities are diverse. They include among others the following.
2. Low competition due to the commodity characteristics (natural superior attributes and utility diversity)
3. Potential for expansion/growth
4. Emerging Markets
5. Potential for strategic alliance
6. A growing population which translates to an increasing demand
7. Changing trends in market demand (demand for processed and/or certification of goods)
8. Internet/On-line marketing (enabling wider networking)
9. Existence of free Knowledge hubs (including knowledge on business planning)
10. Existence of financial enablers

## 8.3 Investment Profiling for the Value Chain

Table.14: Investment profiling for the value chain

Business Opportunity	Opportunity Drivers	Investment Requirements	Challenges
Establishing of registered nurseries for provision of planting materials	High demand for clean and quality planting materials	Land and water	Certification conditions including and cost
Production of clean planting materials	Demand for uniform clean planting materials	Certified nurseries	High cost of investment

Business Opportunity	Opportunity Drivers	Investment Requirements	Challenges
Production of avocado fruits for the wide utility range of its products and byproducts.	Wide range of utilization of the avocado fruits and its byproducts	Land and working capital	Prolonged drought due to changing climatic patterns Limited access to clean/superior planting materials
Aggregation of avocado fruits, products and by-products. Delivery to buyers/consumers and cottage processors	Demand for high volumes of the Avocado products	Land, collection shades/centres, sorting and grading and processing facilities	Production units are scattered and yield small and uneconomical quantities
Cottage processing of avocado fruits and byproducts (oils, avocado milk shake, cake, flour, avocado paste, avocado smoothie and ice creams”)	High demand for processed products and byproducts	Processing equipment Standards' specification	Seasonality Cost of equipment Reinforcement of the standards

YIELD/Acre	Kg		0	0	8100	14175	14175	14175	14175	14175	14175
Value	Kshs		100	100	100	100	100	100	100	100	100
Returns (Kshs)	Kshs		0	0	810,000	1,417,500	1,417,500	1,417,500	1,417,500	1,417,500	1,417,500
Year			Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
Item	Units	Unit Cost	Qnty	Total Cost							Year 10+
Land Preparation	Acre	3,500	1	3500	0	0	0	0	0	0	0
Digging Planting Holes	No.	30	81	2430	0	0	0	0	0	0	0
Refilling Planting Holes	No.	10	81	810	0	0	0	0	0	0	0
Seedling Cost	No.	200	81	16200	0	0	0	0	0	0	0
Fertilizer costs	Kg	18	81	1458	1458	1458	1458	1458	1458	1458	1458
Manure/com-post cost	tons	1000	1.6	1600	1600	1600	1600	1600	1600	1600	1600
Cost of planting	No.	5	81	405	0	0	0	0	0	0	405
Topdressing	Kg	18	81	1458	1458	1458	1458	1458	1458	1458	1458
Weeding	acre	2500	1	2500	2500	2500	2500	2500	2500	2500	2500
Pest Management		0	0	0	0	0	0	0	0	0	0
Insect traps	No.	900	4	3600	3600	3600	3600	3600	3600	3600	3600
Fungicides		240	10	2400	2400	2400	2400	2400	2400	2400	2400
Insecticides	gms	240	6	1440	1440	1440	1440	1440	1440	1440	1440
Pruning	No.	5	81	405	405	405	405	405	405	405	405

YIELD/Acre	Kg		0	0	8100	14175	14175	14175	14175	14175	14175
Value	Kshs		100	100	100	100	100	100	100	100	100
Returns (Kshs)	Kshs		0	0	810,000	1,417,500	1,417,500	1,417,500	1,417,500	1,417,500	1,417,500
Year		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10+
Harvesting, Sorting and packaging	No.	50	81	0	0	4050	4050	4050	4050	4050	4050
Total Annual cost of pro- duction				38206	14861	18911	18911	18911	18911	18911	18911
G.M				-38206	-14861	790684	1408589	1408589	1408589	1408589	1398184

### Gross margin analysis

Table 15: Avocado Gross margin analysis

# Chapter 9: Gender Equality, Human Rights and Social Inclusion

## 9.1 Background

Studies conducted during implementation of the various value chains identified gender and human rights related challenges to participation. Women reported that cultural issues affected their rights to own land preventing their involvement in value chain activities as they could not make decisions on what to plant since all agricultural activities are dependent on land as a factor of production.

Gender roles ,triple roles for women -Reproductive. Productive and community management for women while Men's role is productive, and community politics were also sited as a hindrance to women's involvement in value chains .

Cultural practices like wife cleansing and inheritance, especially in some counties, denied widows an opportunity to participate in the value chain activities. Decision making at the household level relating to value chain selection were mostly done by men, though in some instances, women also participated in the process. But where men had migrated to towns, women were the sole decision makers on selection of value chain(s).in some counties, men dominated in decision making concerning value addition, grading, marketing, savings, access to agricultural and marketing information, as well as access to credit and training. Women and youth could not initiate any agriculture-based Income Generating Activities (IGAs) without permission from the husbands/fathers or the elderly men in the family due to cultural beliefs and patriarchy.

High illiteracy levels and low skills especially among women left them vulnerable in terms of technical matters in the value chain activities. Several farmer groups believed both English and Kiswahili languages be adopted during training, Trainers were said to use a lot of English when training and it confused the farmers making language and methodologies used a barrier.

Lack of markets: Exploitation by intermediaries affected the prices of most of the value chain produce. It was suggested that market linkages with potential external buyers be established and strengthened.

Gender and extension services - Extension services were provided to the farmers through group training and through telephone calls by private extension officers and county government extension officers. The youth indicated that the extension training courses were done early during the day when they had reported for other activities such as attending other fishponds, harvesting excluding them from the services. Women also complained that the time at which the extension trainings are done did not favour them as they are attending to domestic chores or farm activities denying them the opportunity to gain experience.

Youth attributed their inadequate participation in value chain production activities to lack of land ownership since the parents (fathers) were not willing to give them land on a permanent basis. As a result, there was serious conflict between the young men and their fathers in counties in some counties. The fathers felt that the sons (youth) were irresponsible people who would sell the land upon being given, and the money spent on drinking alcohol. This would render the entire family landless.

Widowhood – Women in all the sampled counties were targeted because of their status as widows, and the fight for family land and other capital assets always starts immediately after the husband died. Being a widow left them vulnerable to other families or even community members who want

their land and other assets. In some cases, family members secretly alter particulars of ownership documents such as title deeds to the disadvantage of widowed women.

People with disabilities often experience discrimination in their everyday life. Discrimination describes a situation where an individual is disadvantaged in some way because of a ‘protected characteristic.’ Discrimination takes place in different forms. It can be direct or indirect, manifest in the form of harassment, or there can be direct instructions to discriminate. Direct discrimination is based on negative attitudes, prejudice, and/or on discriminatory legislation. Indirect discrimination, for example, can be caused by physical barriers, such as stairs as the only means to get to vital locations, or using media. For example, people who are visually impaired or have difficulties hearing cannot use media without assistance.

Most of the respondents requested special training on gender mainstreaming and gender-based violence and human rights, hence this manual. The findings came from the report below and gender analysis of selected value chains conducted by the Gender Youth and Social Inclusion Advisor, MESPT in August 2024 (G.V. Masinde and C.K. Wambu, PhD November, 2021 Final draft report [A Gender Equality and Human Rights Approach for The Green Employment in Agriculture Programme \(GEAP\), MESPT](#))

#### **9.1.1 Definition and key concepts**

**Sex:** It identifies the biological differences between men and women. Kenya recognized and counted intersex persons during the census in 2019.

**Intersex:** Intersexuality is an overarching term that refers to human bodies that fall outside the strict male and female binary. The term refers to the many variations—often present at birth—that can affect a person’s reproductive or sexual anatomy, which may involve genitalia, hormones, reproductive organs, and chromosomes.

For example, these variations might include being born with “female” anatomy on the outside, such as a vaginal opening, but having “male” sexual organs on the inside.- [Intersex:What It Means, How It's Identified](#) accessed on 14/11/2024



Figure 1:Kenya recognizes three genders [Two genders? No, we should recognize the three in Kenya | Nation](#) accessed on 14/11/2024.

**Gender :** Refers to the socio-cultural differences and relations between men and women that

are learned, changeable over time, and have wide variations both within and between societies and cultures. The concept of gender also includes expectations held about the characteristics, attitudes and behavior of women and men (femininity and masculinity).

**Gender equality:** This is a human right that is enshrined in several declarations and conventions, including the legally binding Convention on the Elimination of All Forms of Discrimination against Women (CEDAW).

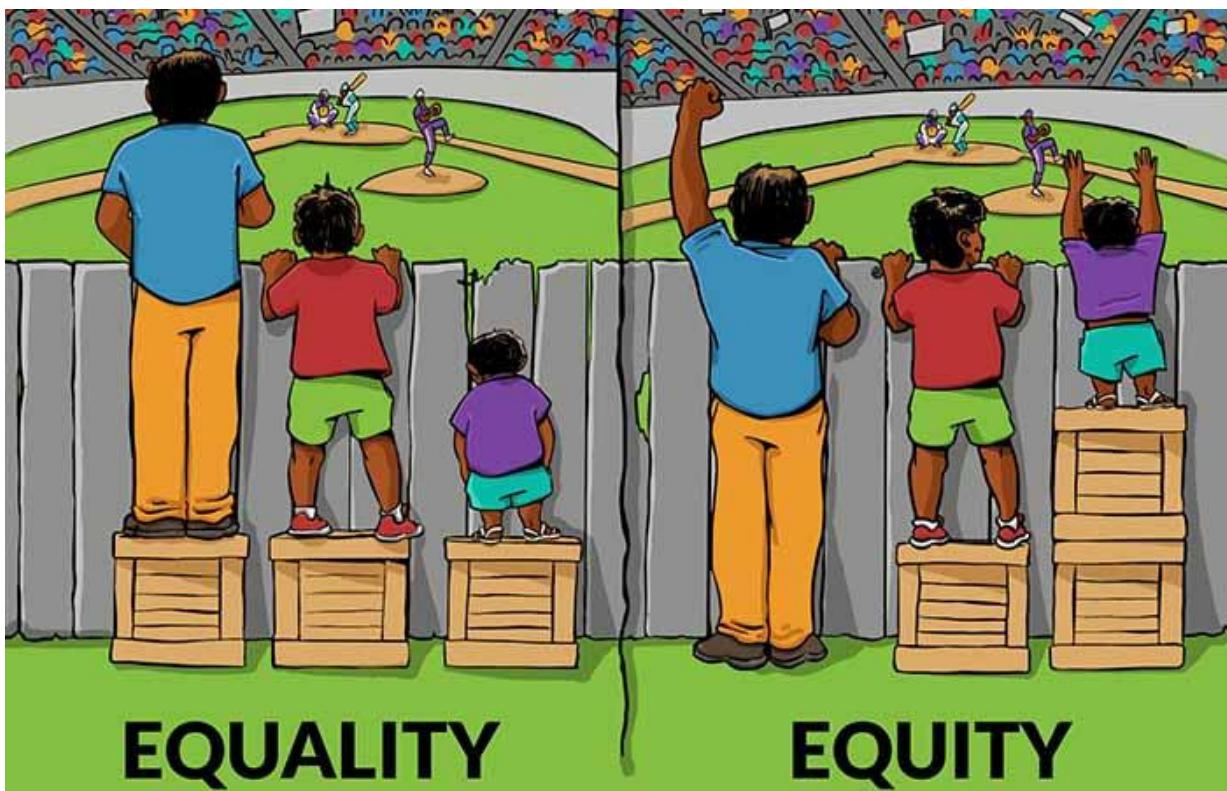


Figure 2 *Equality and Equity* illustrated [All You Need To Know About Gender Equity](#) Accessed on 14/11/2024

**Equality** does not mean that women and men are the same but that women's and men's rights, responsibilities and opportunities should not depend on whether they are born male or female. Gender equality implies that the interests, needs and priorities of both women and men are taken into consideration, recognizing the diversity of diverse groups of women and men(UN General Assembly, 1979). The centrality of **gender equality** to development is its establishment as a goal (goal 5) of the Sustainable Development Goals (SDGs) and included as a target in other SDGs.

**Gender Equity:** This is about fairness and being sensitive to the peculiarities of individuals, socio-economic groups, or communities. It is about equality of outcome or result of an intervention. Gender equity involves considering the different social, cultural, and economic situations of women, men, girls, and boys right from the design of an intervention through implementation to monitoring and evaluation.

**Gender sensitivity:** The ability to recognize the differences in terms of roles, contributions, needs and experiences of both women and men, and create a conducive environment for effective application of their specific knowledge, skills, and experiences in meeting their prioritized needs.

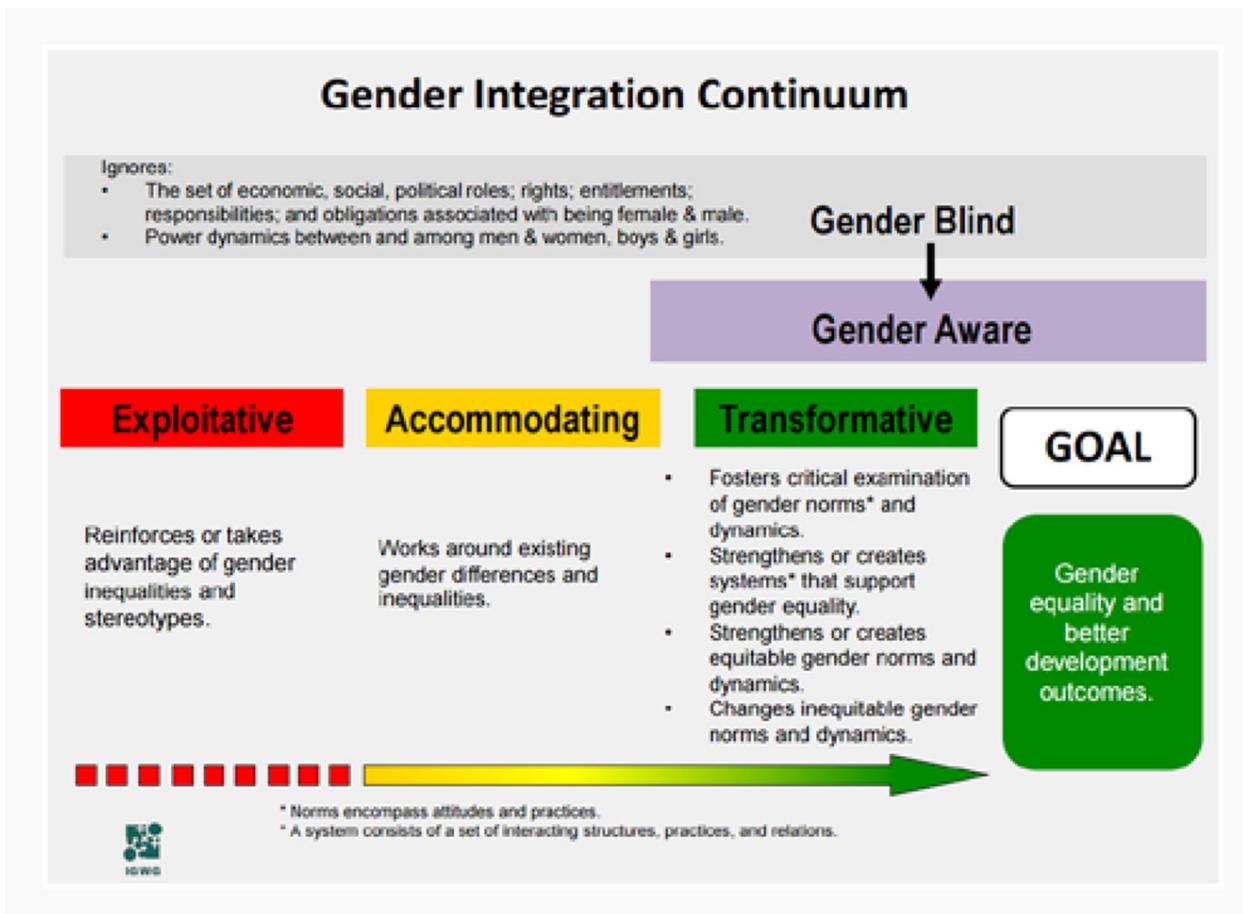


Figure 3: Gender Integration Continuum [About IGWG | IGWG](#) accessed on 14/11/2024

**Gender aware:** Recognizing or being aware of the existence of gender and gender differences in society; recognizing that men and women are positioned differently; that they have different experiences, different needs and interests, different strengths, and skills, and that these need to be considered while planning for any intervention.

**Gender responsiveness:** This describes the policies, programmes and projects that focus on transforming existing gender disparities to create a more balanced relationship between women and men in terms of power and decision-making as well as access to and control over productive resources. Gender responsiveness is key in meeting strategic gender needs(strategic gender needs are the needs women identify because of their subordinate position in society.These needs are long-term and relate to the empowerment of women. Strategic gender needs for women might include land rights, more decision-making power, equal pay, and greater access to credit. Addressing these needs allows people to have control over their lives beyond socially defined restrictive roles)

Practical gender needs are defined as: Needs that respond to immediate necessities such as adequate living conditions, water provision, health care, and employment. Gender-specific needs that do not challenge gender roles, such as access to healthcare, water availability, and employment opportunities.

### Gender transformative

Addressing gender imbalances, changing gendered power relations, and actively building equitable social norms and structures. An organization is aware that women and men do not have equal opportunities in the household, at community level or at work.They may, for example, create equal working conditions for women and men, recognizing that special means may be required to increase the number of women in management positions or to achieve an environment free from gender-

gender norms and are thus common for interventions that have the primary goal of addressing gender issues and transforming gender relations to promote equality.

Transformative Gender Programming includes policies and programs that seek to transform gender relations to promote equality and achieve program objectives. This approach attempts to promote gender equality by:

1. fostering critical examination of inequalities and gender roles, norms, and dynamics,
2. recognizing and strengthening positive norms that support equality and an enabling environment,
3. promoting the relative position of women, girls, and marginalized groups, and transforming the underlying social structures, policies and broadly held social norms that perpetuate gender inequalities.
4. Most importantly, program/policy planners and managers should follow two gender integration principles:
  - First, under no circumstances should programs/policies adopt an exploitative approach since one of the fundamental principles of development is to “do no harm.”
  - Second, the overall objective of gender integration is to move toward gender transformative programs/policies, thus gradually challenging existing gender inequities and promoting positive changes in gender roles, norms, and power dynamics.

**Empowerment:** Is about improving women's and men's status to enhance their decision making-capacity at all levels. It refers to the process in which women and men reflect upon their reality and question the reasons for their situation in society. It includes developing alternative options and taking opportunities to address existing inequalities. It enables them to live their lives to the fullest of their capabilities and their own choices in respect of their rights as human beings.

**Gender Mainstreaming:** **Gender equality** can be achieved by a strategy of mainstreaming which is defined by the United Nations, as ‘...the process of assessing the implications for women and men of any planned action, including legislation, policies, or programmes, in all areas and at all levels. It is a strategy for making women's as well as men's concerns and experiences an integral dimension of the design, implementation, monitoring and evaluation of policies and programmes in all political, economic, and societal spheres so that women and men benefit equally, and inequality is not perpetuated. The goal is to achieve gender equality.’

Gender mainstreaming aims to ensure that women and men, particularly those who are disadvantaged, equally participate in and benefit from the activities of a given organization, and that all implemented projects and programmes consider women's and men's concerns and experiences as an integral dimension of their cycles. This intervention ensures that existing democratic relations are protected, at the same time preventing the further perpetuation of inequalities and the creation of new ones.

### 9.1.2 The Business case for gender mainstreaming

**Gender mainstreaming** in Agri-enterprises is not only a matter of social equity but also makes strong business sense. Here are some key points that highlight the business case for gender mainstreaming in this sector:

**Increased Productivity:** Women make up a sizable portion of the agricultural workforce. By providing them with equal access to resources such as land, credit, and training, productivity can be significantly increased. Studies have shown that closing the gender gap in agriculture could increase yields on women's farms by 20-30%

**Enhanced Innovation:** Diverse teams bring varied perspectives, leading to more innovative solutions. Women often bring unique insights into agricultural practices and market needs, which can drive innovation and improve business outcomes.

**Market Expansion:** Women are key players in local markets and value chains. By empowering women, Agri-enterprises can tap into new markets and consumer bases, enhancing their market reach and profitability.

**Improved Financial Performance:** Companies that invest in gender equality tend to perform better financially. Gender-diverse companies are more likely to have higher returns on equity and better financial performance overall.

**Risk Mitigation:** Gender mainstreaming can help mitigate risks associated with labor shortages and community relations. Empowering women can lead to more stable and resilient communities, which in turn supports sustainable business operations.

**Compliance and Reputation:** Increasingly, investors and consumers are looking for companies that adhere to social responsibility standards. Gender mainstreaming can enhance a company's reputation and compliance with international standards, attracting more investment and customer loyalty.

By integrating gender mainstreaming into their operations, Agri-enterprises can not only contribute to social equity but also enhance their competitiveness and sustainability.

### 9.1.3 Steps to mainstream Gender

Gender mainstreaming in Agri-enterprises involves several strategic steps to ensure that gender considerations are integrated into all aspects of the business. Here are some specific strategies:

- 1. Conduct Gender Analysis:** Start with a thorough gender analysis to understand the distinct roles, needs, and challenges faced by men and women in the agricultural sector. This analysis should inform all stages of project planning and implementation.
- 2. Develop Gender-Responsive Policies:** Create policies that promote gender equality and address specific barriers faced by women and youth. This includes policies on equal access to resources, decision-making, and opportunities for training and development.
- 3. Capacity Building:** Provide training and capacity-building programs for both men and women to enhance their skills and knowledge. This can include technical training, leadership development, and financial literacy.
- 4. Gender-Responsive Budgeting:** Allocate budget specifically for gender mainstreaming activities. This ensures that there are sufficient resources to support gender equality initiatives.
- 5. Participatory Planning:** Involve both men and women in the planning and decision-making processes. This ensures that the perspectives and needs of both genders are considered and addressed.
- 6. Monitoring and Evaluation:** Establish gender-sensitive indicators and regularly monitor and evaluate the impact of gender mainstreaming activities. This helps in assessing progress and making necessary adjustments.
- 7. Promote Women's Leadership:** Encourage and support women to take on leadership roles within the enterprise. This can be achieved through mentorship programs, leadership training, and creating an enabling environment for women leaders.

1. Using Gender action learning systems(GALS), community conversations, model families, among others that seek to address root causes of discrimination.

## 9.2 Human rights

**Human Rights:** These are rights inherent to all human beings, independent of nationality, place of residence, sex, national or ethnic origin, race, religion, language, or any other status. All human beings are equally entitled to human rights without discrimination. These include the right to life, equality before the law, the right to work, social security, education, and the right to development. These rights are all interrelated, interdependent and indivisible(Access the comprehensive text here [30 articles on the 30 Articles of the Universal Declaration of Human Rights | OHCHR](#)

# UN Universal Declaration of Human Rights

Adopted: December 10, 1948

1. We are all born free and equal	16. All may marry and establish families
2. Everyone has rights despite differences	17. All may own property
3. All have the right to live, and live in safety	18. All may think freely, including religion
4. No one may enslave you	19. All may freely express opinions
5. No one may torture you	20. All may assemble peacefully
6. You have rights no matter where you travel	21. All may participate in governing
7. All are equal before the law	22. All have rights to dignity and social protections
8. Human rights are protected by law	23. All have free choices of employment
9. No one should be unfairly detained	24. All have rights to rest and leisure
10. All have a right to a fair trial	25. All have the right to an adequate standard of living
11. All accused are innocent until proven guilty	26. All have a right to education
12. All have a right to privacy	27. All have rights to intellectual property
13. All have the right to move freely	28. All have the right to a world that enables and protects rights
14. All may enjoy asylum from persecution	29. All rights have responsibilities and can only be limited when infringing on others' rights
15. All have a right to nationality	30. No one can take away your human rights

Figure 4: 30 articles of Human rights <https://rvalibrary.org/shelf-respect/law-library/national-human-rights-month/> Accessed on 14/11/2024

Children rights are also enshrined in the convention on the rights of the child(1989). Kenya enacted this into a children's act 2022.

gives equal attention to both achieving development goals and to the processes that are chosen to achieve these goals. So, within HRBA, the processes that enable the participation and inclusion of all stakeholders are important.

### **9.2.1 About Hrba And Pant Principles**

The HRBA builds on the norms and principles outlined in the Universal Declaration of Human Rights, and the subsequent legally binding UN treaties, which form the basis for all development cooperation. Application of the HRBA contributes to effective development cooperation processes and sustainable development outcomes. It challenges unequal power relations and social exclusion that deny people their human rights and often keep them in poverty and oppression. Microenterprise support Programme Trust (MESPT) is committed to the HRBA in all interventions.

HRBA places people living in poverty and oppression (rights holders) at the center. It is about:

- Empowering rights-holders to enable them to take action to address their situation and to claim their rights individually and collectively.
- Developing capacities and interests of duty-bearers to fulfil their obligations to respect, protect and fulfil human rights.

PANT is a tool that guides staff on the practical application of the HRBA.

It has four elements:

**Participation** : Do all stakeholders engage actively, in a way which allows rights-holders to contribute meaningfully and influence processes and outcomes?

Everyone has a right to freely participate in decision making that affects them and their environment. People of power have an obligation to offer meaningful participation and consultations to people affected. Everyone has the right to organize and hold opinions without any interference, and to seek, receive and impart information and ideas through any media regardless of frontiers. Promoting participation is essential for the outcome of projects and programmes. It is stated in international treaties that women, men, girls, and boys have a right to participate in decision-making that affects them. Social and cultural roles that are prescribed women and men have impact on their possibilities of choices, economic independence, access to natural resources, access to land tenure, access to clean and safe water, and decisiveness on housing, education, and livelihood.

**Guiding questions are:**

- Are fair and effective platforms for public-private dialogue in place, and do they give space to representatives of women and men with less power and status?
- Are measures taken to include and enhance the capacity of those with less knowledge and power so that they can participate meaningfully in the consultative processes? For example, do all stakeholders have sufficient and accessible information on the issues being addressed? Are they invited to truly participatory processes? Are barriers removed, e.g., no expensive travelling, not during busy seasons, not inaccessible for women or persons with disabilities?
- Are stakeholders actively engaged at all stages of the programming process?
- Do initiatives make space for vulnerable people to take actions of their own choosing to manage perceived risks? This is especially important in ‘transformative’ efforts that encourage profound changes in livelihood systems in response to climate change or market upheavals.
- **Accountability** : Who are the duty bearers on various levels, and do they have sufficient capacity and interest to be accountable to rights holders?

- The state has an obligation to respect, fulfil and protect the rights of its population. It entails a functional regulatory system for climate and environmental issues, labour law, land systems ; concrete plans for disaster risk reduction and response; rule of law including a justice system providing legal aid to poor and marginalized people and their organisations; and functional and accessible complaints mechanisms. Emphasizing the accountability of all actors (both state and non-state), whose actions impact the environment and natural resources, is a central element of HRBA. Asserting human rights without supporting effective and precise frameworks to hold duty bearers accountable is of little practical use. Strengthening the governance of natural resource management and securing natural resources tenure while also taking rights of local people, women and men, ethnic minorities, nomadic or other marginalized groups into account, can
- minimize corruption.
- have positive effects on conflict management.
- be a key step towards alleviating tensions in society and consolidating peace in post-conflict societies.
- **Guiding questions are:**
- Are the duty bearers and other actors with power identified?
- Does the initiative contribute to ensuring that public and private sector actors have systems in place to monitor and disclose social and environmental impacts according to national and international standards?
- Do monitoring and evaluation arrangements involve civil society organisations representing the concerned population?
- Are there consequences (legal, financial, or moral) for non-compliance with human rights objectives and principles?
- Has the contribution established accessible and effective mechanisms for redress and complaints?
- Does the contribution facilitate access to networks, organisations and other sources of information that may assist duty bearers to enhance their accountability and rights holders to claim their rights?

**Non-discrimination :**Are rights holders and the root causes of their lack of human rights identified and considered, particularly those most subjected to discrimination, marginalization, and vulnerability?

All women, men, girls, and boys are, without any discrimination, entitled to equal access to ecosystem services , market systems and natural resources as well as resilience for a standard of living adequate for their health and well-being. Discrimination may be expressed in law (explicit discrimination) and hence be part of official policy such as lack of land rights; or it may be found in practice and behavior (implicit discrimination)such as where a remote group cannot access water services because drinking wells provided by the state are too far away.

**Key questions are:**

- Are vulnerable groups specifically identified and targeted?
- Is there a proper analysis of the consequences of the contribution for these women, men, girls, and boys?
- Is there a plan for their inclusion and benefit including disaggregated data and indicators?
- Are tariffs and fees also adjusted to accommodate poor and marginalized groups?
- Are land and property rights addressed to ensure that women, minorities, and poor people are protected or compensated?
- Are the livelihoods supported resilient to risks related to climate and market volatility and uncertainty, and therefore relevant for vulnerable populations that cannot afford to shoulder uncertain risks?

**Transparency** :What measures are put in place to ensure that all stakeholders can access relevant information and knowledge regarding the contribution?

**Transparency** All people have the right to obtain information in an accessible and timely manner, e.g., about pollution levels, water quality, environmental health risks, exploitation plans, land use plans and disaster preparedness plans. Granting sufficient and accessible information to affected women and men in planning and policy making processes is of key importance to their ability to influence and monitor developments. It is also important to consider local traditions, survival strategies and indigenous people's dependence on natural resources, and ensuring that separate views are documented. It is also essential to consider access to natural resources for people living in poverty and that a long-term sustainable development can be promoted, to avoid future opposition and conflicts.

**Guiding questions are:**

- Are the plans and goals of the contribution made public and explicit in an accessible manner to all stakeholders concerned, including the most marginalized groups so that they understand benefits and risks?
- Will affected women, men, girls, and boys receive sufficient, timely and accessible information, including separate views on the plans, and will they be able to take meaningful part in and influence the process?
- Will access to information regarding the local risk situation be improved and will early warning systems be developed so that the ability of vulnerable groups to protect themselves and quickly recover after disasters is strengthened?
- Does the initiative contribute to capacities and commitments for greater transparency in policies and practice affecting land and natural resource tenure, particularly in new forms of land acquisitions and concessions?

### 9.3 Social Inclusion

Social inclusion is the process of improving the terms on which individuals and groups take part in society—improving the ability, opportunity, and dignity of those disadvantaged based on their identity.

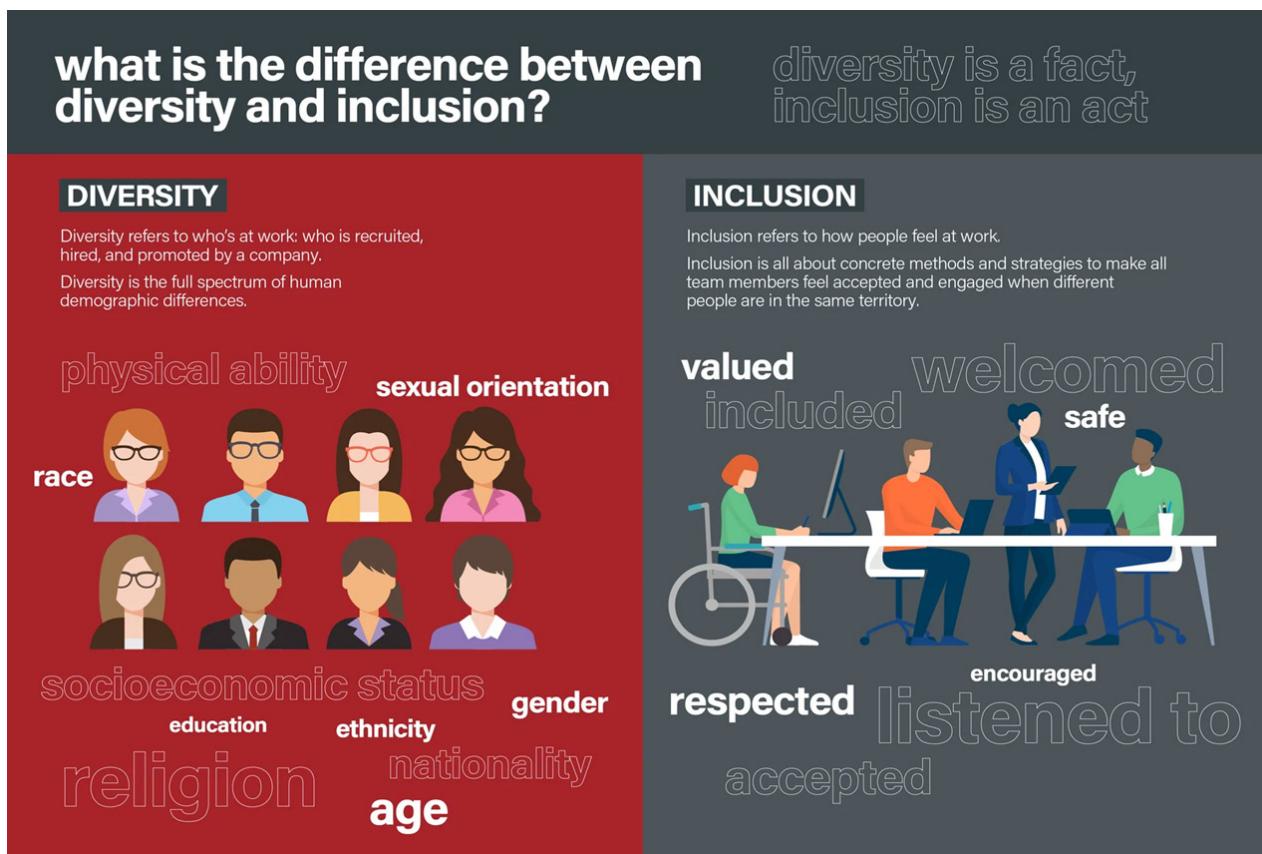


Figure 5 Diversity vs Inclusion DRP Group. (n.d.). *What is the difference between diversity and inclusion?* DRP Group. Retrieved November 14, 2024, from <https://www.drpgroup.com/en/blog/what-is-the-difference-between-diversity-and-inclusion>.

In every country, some groups confront barriers that prevent them from fully participating in political, economic, and social life. These groups may be excluded not only through legal systems, land, and labor markets, but also discriminatory or stigmatizing attitudes, beliefs, or perceptions. Disadvantages are often based on gender, age, location, occupation, race, ethnicity, religion, citizenship status, disability, and sexual orientation and gender identity (SOGI), among other factors. This kind of social exclusion robs individuals of dignity, security, and the opportunity to lead a better life. Unless the root causes of structural exclusion and discrimination are addressed, it will be challenging to support sustainable inclusive growth and rapid poverty reduction.

Social inclusion is the right thing to do, and it also makes good economic sense. Left unaddressed, the exclusion of disadvantaged groups can be costly. At the individual level, the most measured impacts include the loss of wages, lifetime earnings, poor education, and employment outcomes. Racism and discrimination also have physical and mental health costs. At the national level, the economic cost of social exclusion can be captured by foregone gross domestic product (GDP) and human capital wealth. Exclusion, or the perception of exclusion, may cause certain groups to opt out of markets, services, and spaces, with costs to both individuals and the economy.

Ensuring inclusivity means no one is left behind (leave no one behind-LNOB). The following steps make this possible.

### **9.3.1 Leave no one Behind**

#### **STEP 1: Who is being left behind? Gather data.**

Identify who is being left behind and in what ways, and who among them is the furthest behind.

- Gather and analyze all data and information on who in the community is left behind in group activities and project interventions-sub populations and geographic localities among others with due attention to the human rights-based approach and gender considerations.
- Include and analyze data and information from a range of sources, including from national statistical offices, national human rights institutions, international human rights mechanisms, ILO supervisory bodies, civil society organizations, particularly organizations of marginalized communities as well as women's organizations, and/or community-level data, citizen science initiatives and scientific journals.
- Seek feedback and input from diverse stakeholders, including groups and populations left behind, throughout the process, from initial gathering of data to review and analysis.
- Identify data gaps.
- Complement existing data where needed, to further understand which subpopulations may be left behind, and which ones are furthest behind, using participatory approaches to gathering data.
- Combine relevant national and UN development, human rights, conflict, inequalities, political, risk and humanitarian analysis for more joined up assessment of who is left behind and why – with a view to identifying the furthest behind.
- Triangulate the data from the above sources through a consultative analytical process to develop a mutual understanding across all interventions that consider the voices and experiences of communities together with other data sources.

#### **STEP 2: Why? Prioritization and analysis**

- Frame as problems the LNOB assessment's main findings are about the ways in which people are left behind. Identify the relevant human rights and international labour standards.
- Conduct a root cause analysis to identify why people are being left behind and to enable responses to the root and underlying causes of inequalities, including gender inequalities, vulnerability, deprivation, discrimination, displacement, and exclusion.
- Conduct a role pattern analysis.
- Conduct a capacity gap analysis.
- Questions to be asked at each step: Causal analysis WHY? Which rights are implicated that explain why there is a problem? Role pattern analysis WHO? Who is the duty-bearers? Who are the rights holders? Who must do something about it? Capacity gap analysis WHAT? What capacity gaps are preventing duty-bearers from fulfilling their duties? What capacity gaps are preventing rights holders from claiming their rights? What do they (each) need to act?

#### **STEP 3: What? What should be done?**

**Identifying what should be done and by whom.**

- Identify actions and interventions to address challenges, barriers, and capacity gaps. Areas include advocacy, enabling the environment, capacity development ,community empowerment, quality and accessibility of services, partnerships including civil society.
- Prioritize, considering the commitment to address the furthest behind first.

#### **STEP 4: How? How to measure and monitor progress**

- Help identify and contextualize LNOB indicators and targets – having a clear overview of data and data gaps and a plan for monitoring progress is an important precondition for effective follow-up and review.

- Quantitative and qualitative indicators will be necessary – measuring commitments, processes, and outcomes.
- Support innovative ways of tracking, visualizing, and sharing information.
- Develop the stakeholder capacity to monitor inequalities, including gender inequality and discrimination, including that of governments (national, subnational) and communities.

STEP 5: Advancing accountability for LNOB.

- Ensure accountability for LNOB within the organization and the interventions.
- Support the integration of LNOB in interventions follow-up and review processes, including in narrative reports.
- Support national accountability to people left behind.

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## **ANNEX I: Sample training programme**



## **BANANA VALUE CHAIN TRAINING WORKSHOP FOR XXXX**

**TRAINING VENUE: XXX**

**DATES: XXX**

## **SAMPLE PROGRAMME**

**ANNEX II.: List of participants who validated this value chain manual**

S/NO	NAME	INSTITUTION
1	Joseph Kairu	County Government of Siaya
2	Winston Motanya	County Government of KISII
3	Nicholas Manyinsa	County Government of KISII
4	Cecilia Mutuku	County Government of MACHAKOS
5	Paul Busienei	County Government of NAKURU
6	David Kimera	Youth Agri-Preneur
7	Lawrence Swanya	County Government of MACHAKOS
8	Kenneth Kagai	County Government of TRANS-Nzoia
9	Benedict Khanyifu	County Government of TRANS-Nzoia
10	Mwalimu Menza	Kenya Agricultural and Livestock Research Organization
11	George Kamami	County Government of MAKUENI
12	Moses Munialo	County Government of BUGOMA
13	Agesa Eric	County Government of KAKAMEGA
14	Benard Mainga	County Government of KWALE
15	Jane M Kamamu	County Government of KILIFI
16	Teresia Ndungu	County Government of NYANDARUA
17	Wilbur Mutai	County Government of UASIN-GISHU
18	Stephen Odipo	Kenya Agricultural and Livestock Research Organization
19	Solomon Mbivya	PAPA FARMERS Limited
20	William Mwangi	County Government of MAKUENI
21	Doreen Kinoti	Micro-Enterprises Support Programme Trust
22	Serah Nzau	Micro-Enterprises Support Programme Trust
23	Margaret Kikuvi	Micro-Enterprises Support Programme Trust



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