



MINISTRY OF
FOREIGN AFFAIRS
OF DENMARK
Danida

Pineapple 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.

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.

Pineapple 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 Agri-preneurs. 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 guide 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 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 spearheaded 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 will be 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, and Aquaculture.

MESPT through GEAP tasked multidisciplinary teams to develop resource materials tailored for extension service providers and farmers. This Coconut 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 Coconut. 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.

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Programme Manager, Green Employment in Agriculture Programme

Acknowledgements

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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Chapter I: Introduction

I.1 The pineapple plant

Pineapple [*Ananas comosus* (L.) Merr.] is a tropical fruit with exceptional juiciness, vibrant tropical flavor and immense health benefits. Mature fruit contains sugar, a protein digesting enzyme bromelin, citric acid, malic acid, vitamin A and B. Pineapples may be cultivated from a crown cutting of the fruit, possibly flowering in 20-24 months and fruiting in the following six months.

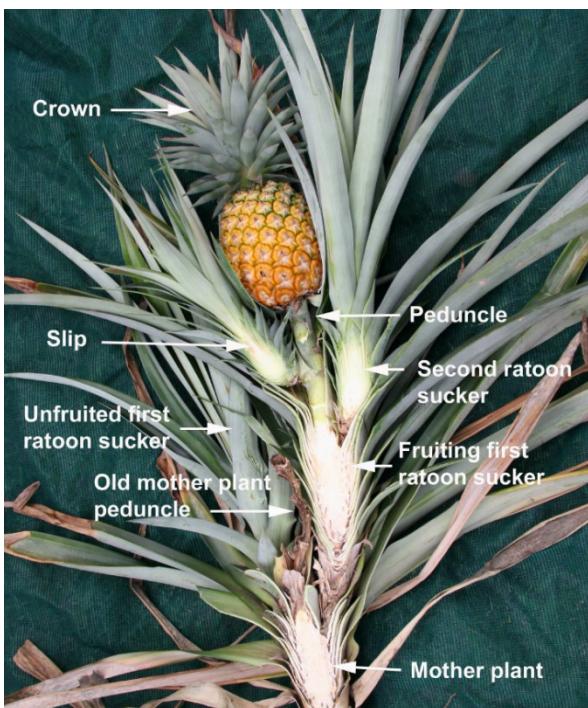


Figure I: The pineapple plant

Pineapples are consumed or served fresh, cooked, juiced and can be preserved. The fruit is eaten fresh where available and in canned form worldwide. This fruit is highly perishable and seasonal.

Agro-Climatic Requirements

The table below indicates ideal soil and climatic requirements for pineapple production

Soil	Climate
Soil that is loose, light, well-aerated or well-drained and rich in humus	Annual rainfall between 760 and 1,500 mm evenly spread throughout the year
Slightly acidic soil, with a pH between 4.5 and 6.0	Average temperature 25°C – 30°C
On flat ground or a slight slope at low altitude	Exposure to direct sunlight To achieve this, avoid the presence of large trees in the planting area



Pineapple grows in warm and humid climates. The pineapples are commercially grown over a wide range of latitudes from 30° N in the northern hemisphere to 33°58S in the Southern hemisphere. Pineapple grows well in tropical and subtropical climate ranging from mild coastal climate up to an altitude of about 1000 meters provided the area is free from frost. The optimal growth temperature lies between 25 to 30°C and more specifically at 23 - 24 ° C. Good fruit quality is attributed to growing sites having a combination of relatively cool night temperatures, sunny days and day temperatures ranging from 21 to 29.5°C but not exceeding 32°C. It can be grown in areas that have a relatively high atmospheric humidity and an average rainfall of 760-1,500 mm. Severe cold reduces the sweetness of fruits. Strong sunshine causes sun burning on fruits. Hence partial shade is desirable in areas receiving high intensity of sunlight. It requires well distributed annual rainfall.

1.2 Economic importance and production

The origin of pineapple has been traced to Brazil and Paraguay in the Amazon basin where the fruit was first domesticated. The most widespread variety is Smooth Cayenne. Pineapple production is concentrated in the tropical regions of the world. The smooth Cayenne cultivar is extensively cultivated in many tropical countries. There exists several hundred varieties, but the most widely grown are Smooth Cayenne, Queen and in the past decade introduced variety called MD2 which commands 80% of the global trade in pineapples.

In Kenya pineapple is predominantly grown by large scale producers. Large-scale production is concentrated in Central Kenya, while the small scale production is concentrated at the Coast, Central and Western Regions of the country. Large-scale pineapple production in Kenya is dominated by three farms; Delmonte (K) Limited based in Thika, Kakuzi limited based in Murang'a and Ndemo farm based in Kilgoris. Kakuzi has a total of 100 ha under pineapple while Delmonte has 18,000 ha and Ndemo farm has 200 ha under pineapple production. These large-scale producers contribute close to 90% of all pineapples grown in Kenya.

Chapter 2: Planting Materials and Propagation

2.1 Varieties

Major varieties of pineapples cultivated in coastal Kenya are: *Smooth cayenne*, *MD2*, *Sugar loaf* and *Queen*. However other varieties are available for use.

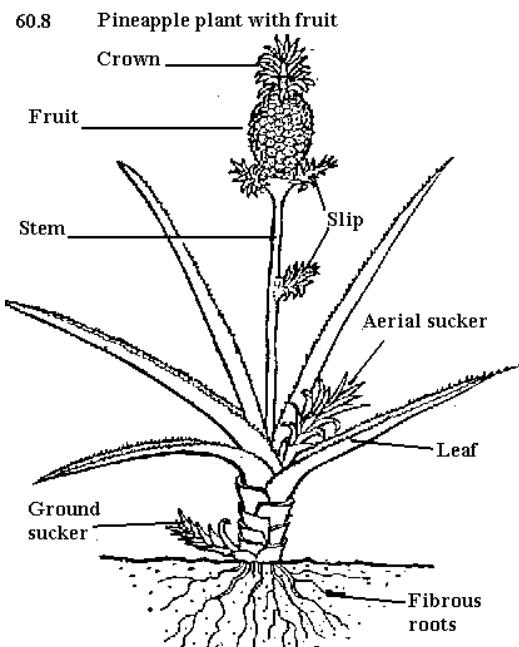
Variety	Attributes (Characteristics)
Smooth cayenne 	<p>Has cylindrical shape, high fruit productivity, fruit is large fleshy and yellow in colour, few slips, very good canning, leaves are spineless and has high fruit quality.</p> <p>In addition to being very good for canning, this variety is also good in fresh fruit and juice production. The pulp after juice extraction can be used in the production of doughnuts, bread rolls or cakes and flavour meat and fish dishes.</p>
MD2 	<p>The MD2 is sweeter than the other varieties. It grows to a uniform size, ripens evenly and has a longer shelf life than other varieties. It has high brix (sugar) and low acidity between 0.4- 0.45%.</p> <p>It is grown mainly for fresh fruits, juices production. However it can be canned and the pulp after juice extraction can be used in the production of doughnuts, bread rolls or cakes and flavour meat and fish dishes.</p>
Sugar loaf 	<p>This is conical in shape, it has spines on the leaves. It remains green when ripe, the skin is difficult to peel when ripe and it produces a lot of slips at the base of the fruit.</p> <p>Used mainly for fresh fruits, juice and the pulp after juice extraction can be used in the production of doughnuts, bread rolls or cakes and flavour meat and fish dishes.</p>

Queen 	<p>Has conical fruit form, productivity is moderate, fruit size is small and sweet, golden fresh fruit colour, few slips, fruits are not good for canning and therefore eaten fresh, leaves have spines and unpleasant to work in.</p> <p>Used mainly for fresh fruits, juice and the pulp after juice extraction can be used in the production of doughnuts, bread rolls or cakes and flavour meat and fish dishes.</p>
Red Spanish 	<p>Red Spanish has orange colored skin, are somewhat smaller than Smooth Cayenne, and their flesh is more fibrous.</p> <p>Used mainly for fresh fruits, juice and the pulp after juice extraction can be used in the production of doughnuts, bread rolls or cakes and flavour meat and fish dishes.</p>

The pineapple waste can be used in the production of methane gas, medicine, fiber and animal feeds

2.2 Propagation

Pineapple is propagated asexually from various plant parts. The parts are suckers, slips and crowns. Slips and crowns are most common.



Crowns: Crowns are currently the preferred planting materials which are cut from the fruit at harvest. The wound is allowed to dry (cure) and the crowns are dipped in fungicide and planted soon

after harvest. Crowns grow more slowly and are less drought resistant than slips but may have the potential to develop better root systems. Crowns should be graded by weight to minimize variability in the field

Planting materials should be obtained six to eight weeks after harvesting. Choose planting materials similar in size and type to drained uniform flowering and fruiting. The crown will bear in 22 to 24 months; slips in 18 to 20 months; and suckers in 16 to 18 months.

The planting materials should be cured by exposing them to sunlight for one week or more depending on the weather conditions. Curing prevents infection and rotting of planting materials (Bartholomew D.P. et al 2002)

2.3 Quality of Planting Materials

Select the cultivar best-suited to the region by observing, if possible, what is happening in the area. The weight of the propagules to be planted in a single plot must be uniform and between 300-600 g. The size is irrelevant. The base of the propagules must be dry, with no trace of nematodes or rot, and the core must be clean and have no trace of insects.

To enable the young plants to develop harmoniously, facilitate maintenance operations (application of fertilizers) and schedule the cutting (selling the fruit in one batch) for a given plot. You are strongly advised to plant propagules of the same weight in the same place. On the other hand, to obtain staggered production of the fruits and sell them in stages, it is advisable to use propagules of different weights. This approach carries all the same risks in terms of the technical care of the plot (the rational use of fertilizers, development of disease and pests, particularly core rot, nematodes, symphylans, etc.) due to the extended length of the production cycle of low-weight propagules.

2.4 Preparation of the plant material

Calibration consists of grading the propagules in groups according to their size, weight and breadth. Whatever the origin of the propagules (self-produced or external purchase), they must be placed in bundles on the floor, head down, so that they can be easily handled during transport and counting, and to facilitate the closing over of the base to reduce the risk of rot caused by black root rot.

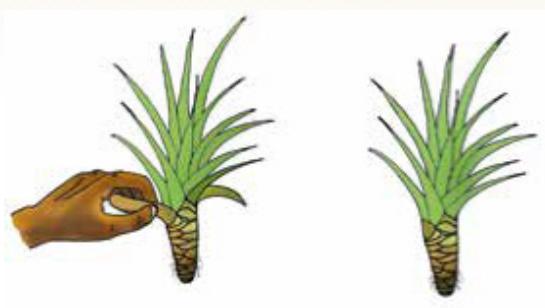
Sorting

500-600 g 400-500 g 300-400 g 200-300 g



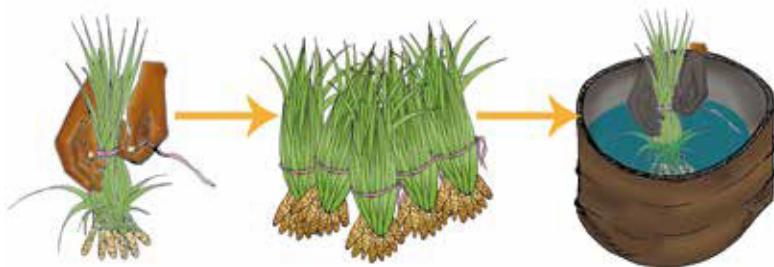
Trimming

Trimming consists of removing the roots and flakes at the base of the propagule to reveal the eyes from which the new roots will grow.



Disinfection

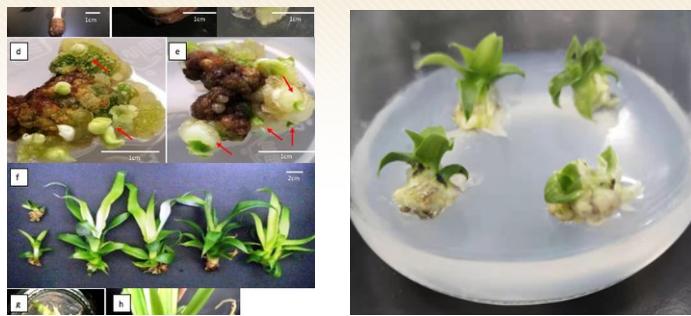
Disinfection is an operation that consists of disinfecting the plant material in a solution of fungicide and insecticide to prevent attacks by different insects (particularly cochineals) and Phytophtora diseases. After trimming, soak the propagules in water containing fungicide and/or insecticide (complying with the manufacturer's recommended doses and wearing protective gloves). Soaking can be done in a solution of fosetylaluminum (500 g of Aliette) and chlorpyrifos-ethyl (750 ml of Durban 4E) in 200 l of water for 20,000 propagules, making sure not to keep this solution for more than 24 hours. After this time, the solution becomes ineffective. Place the treated propagules in a standing position for 12 hours to ensure that the product is evenly distributed



Tissue Culture

Tissue culture is a technique in which small tissue pieces or organs are removed from a donor plant and cultured aseptically on a nutrient medium. Tissue culture (TC) is the cultivation of plant cells, tissues, or organs on specially formulated nutrient media. Tissue culture is seen as an important technology for developing countries for the production of disease-free, high quality planting material and the rapid production of many uniform plants.

Tissue culture involves the use of small pieces of plant tissue (explants) which are cultured in a nutrient medium under sterile conditions. Using the appropriate growing conditions for each explant type, plants can be induced to rapidly produce new shoots, and, with the addition of suitable hormones new roots.



Rapid seed multiplication

This entails multiplication of plantlets from pineapple crown leaf buds. These are raised in a nursery with sterilized rooting media to control infections (*Muti et.al 2017*).

Chapter 3: Crop Management

3.1 Spacing and crop Establishment

A systematic method of planting pineapple is recommended. It is advisable to classify the planting materials such as seedlings, slips, suckers or crowns. There are two methods of planting pineapple; the single –row method and the double row method.



Planting in single rows are commonly used in small farms and double rows in commercial plantations. Planting density depend on preferred market, the higher the planting density the smaller the fruits. Local fresh fruit markets prefer bigger fruits while processors prefer medium-sized fruits (1.3-1.5 Kg.). Plant is done during the onset of the rainy seasons or anytime in places with evenly distributed rainfall (<https://farmerstrend.co.ke/trending/pineapple-farming-in-kenya2023>).

Intercropping



3.2 Good Agricultural Practices

Manure and Fertilizer

Before doing such application of fertilizer it is necessary to determine the nutrients levels of the soil and the nutrient requirement of the pineapple crop through soil analysis. The recommendation of fertilizer dosage to pineapple depends on the inherent fertility of the soil.

Organic and inorganic fertilizers may be used for pineapple production. The inorganic fertilizer use is most popular for small and commercial growers. Organic fertilizers may be used to produce organically grown pineapple for selective markets. However for soils with low organic matter content, the use of both organic and inorganic fertilizer combination is highly recommended. After all growing Pineapples in soil having good organic matter and high fertility is always beneficial in getting more production.

- However, pineapples crops require a minimum of 15 gm of Nitrogen and 15 gm Potassium per each plant.
- This crop does not require a lot of phosphorous for its healthy growth.
- However, if your soil is less fertile, then application of 4 gm of P₂O₅ is also beneficial for getting a higher yield.

Guide to the fertilization of pineapple is presented in the table I below.

Table I: Fertilizer recommended in small farms

Fertilizer	Months after planting	Amount per Hectare (Kg)	Number of Bags per Hectare (50 Kg bag)
Ammonium Sulphate	2	500	10
Muriate of potash	2	250	5
Calcium Ammonium Nitrate (CAN)	2	500	10
Ammonium phosphate	4	500	10
Di-ammonium phosphate	4	500	10
Ammonium sulfate	6	500	10
Calcium Ammonium Nitrate (CAN)	6	500	10
Muriate of potash	6	250	5
Urea	8	250	5

Commercial farms adopt different fertilization program where small dosages are applied at monthly intervals.

Flower Induction

Flower induction allows year-round production, ensures more uniform flowering and fruiting, and gives higher income especially during off-season. It also stabilizes production, which assures the fresh market and processors of continuous supply of fruits.

The time of induction is determined by plant size. In small farms, plants are induced when they have 55-60 functional leaves. In large farms, fruit quality required for processing is achieved if induction is done when plants have at least 36 functional leaves, weigh 2.6-2.8 kg, or reached 1.2 m tall in middle elevation and 1.0 m lower in lower elevation.

Calcium carbide (CaC₂) or 'kalburo' used in the early 60s gives 60-70% flowering. In the early 70s, ethephon was commercially used. It is more effective and could induce 90-100% flowering. Ethephon is sold as Ethrel 480 with 48% or 480,000 ppm (1% = 10,000 ppm) active ingredient.

Irrigation

Pineapple is grown mostly as rain-fed crop in this area. During scarcity of rainfall irrigation pineapple once in 10-15 days is advisable wherever facilities exist to ensure good crop.

Weed Management

Weeds are one of the major constraints in obtaining high yields in pineapple. Weeds compete with pineapple for nutrients, water and sunlight. They also serve as alternate hosts of other pests and ideal place for breeding and multiplication of rodents. Weed management systems that provide adequate control comprise of a blend of several appropriate components or methods. The various possible weed control components include preventive, cultural, chemical and integrated weed management methods.

Preventive Methods

These include the use of high quality and disease-free planting materials.

Cultural Methods

These include harrowing, hand-weeding, inter-row cultivation, mulching and intercropping. Harrowing removes weed flushes and an effective way of reducing weed reserves in the soil. Hand-weeding or hoe slashing can be conveniently done only during the early stages of crop growth especially with single-row planting or double rows. As the pineapple plant grows, the foliage covers the spaces between rows and hand-weeding would be difficult because of the pointed leaf tips and sharp margins. Inter-row cultivation with animal-drawn plows can be conveniently done during the early stages of growth of the crop with the same reason as for hand-weeding. Mulching the base of the pineapple plant with weeds that are cut through hand-weeding or inter-row cultivation help in weed control, water conservation and improvement of soil nutrient status. Intercropping of other crops between pineapple rows can help reduce weed growth and augment the income of pineapple growers.

Chemical Method: The use of herbicides or weedicides to kill the weeds with minimum or no injury to the crop. Use herbicides properly. Read, understand and follow instructions on the herbicide label. Be sure that the weeds infesting the plantation are those that can be controlled by the herbicide. Apply the herbicide at the recommended rate and appropriate stage of growth of pineapple and weeds. Calibrate the sprayer in the area that will be sprayed before applying the herbicide.

Integrated Weed Management: The use of a combination of appropriate weed control components in a system based on ecological, economic and sociological considerations.

Chapter 4: Pests And Disease Management

Several pests and diseases are known to damage and reduce the yield and quality of pineapple fruits. Described below are the diseases and insect and mite pests considered important or potentially destructive to pineapple.

4.1 Diseases

- Phytophthora heart rot.
- Phytophthora root rot.
- Base (butt) rot.
- Fruitlet core rot
- Green fruit rot.
- Inter fruitlet corking.
- Leathery pocket.

Heart Rot (*phytophthora spp*)

Heart rot or stem is a common disease of pineapple. The green leaves turn yellowish green and tips turn brown. The central whorl of leaves when affected will come out with a gentle pull. Basal portion of the leaves shows signs of rotting and emits foul odour. The disease is controlled by good drainage, proper selection of healthy planting material and prophylactic treatment of material with Dithane Z-78 (3g/litre water).



Signs and Symptoms:

- Extensive rotting of the tissue or at the base of the plant
- Change in color of the 'heart' leaves to a yellow or light brown with a reddish tinge.
- Leaf edges curve back and it is easy to pull from their point of attachment.
- Base of the leaf are yellowish-white, soft and watery with distinct brown margins.
- Growing points of the stem also exhibit a cheese-like appearance.
- A pungent smell is emitted from the rotting bases of the leaves.

- Rotting of the young fruits
- Roots of the young plants will also rot.

Management Strategies

Proper weeding and soil cultivation: Care should be taken not to contaminate the growing heart with soil infected with heart rot pathogen.

Proper drainage: Well drained soil with plant beds raised as high as possible at least 23 cm high should be intended for pineapple plantings. Provide drainage canals. For commercial plantations, construct systems of drainage canals and water intercepts for outside run-off, as part of heart rot management.

Pre-planting chemical dip treatment: Dipping the lower half portion of planting materials into systemic fungicide cleared for pineapple and active against Phytophthora is a standard practice in heavily infected areas. One such fungicide is fosetyl-Al. Prevent the spread of foci of infections in the field by prompt rouging and proper disposal of infected plants followed by spraying fungicides against Phytophthora.

Soil pH management: Maintaining soil pH near optimum for pineapple (pH 4.5 - 6.5) will help minimize damage from heart rot.

Root Rot (*Phytophthora cinnamomi*)



Management

Use of disease-free planting material. Do not transplant pineapple plants displaying symptoms of root or heart rot.

Pesticides. Fungicides, while effective, represent increased production costs and should only be used when necessary and considerations of effect on environment should be made.

Fruit core/Fruit let Core Rot or Brown Rot



Causal Organisms: Fruit let core rot or brown rot is a complex disease. The following pathogens have been associated with the disease:

- *Fusarium subglutinans*,
- *Penicillium funiculosum*;
- *Pantoea ananatis*
- *Pseudomonas ananas*
- *P. funiculosum*

Symptoms and Signs:

- Un-even coloring or ripening of the fruit.
- Affected eyes may become brown and sunken as fruits ripen.
- Cut fruits turn brown to black discoloration of the flesh below the blossom cup.
- Interval symptoms show light to dark brown, moist, firm decayed, mottled areas at the center of the fruitlet or eye.
- At the later stages, decay may affect all the tissues immediately surrounding the floral cavity.

Fruits affected by inter-fruitlet corking take on unnatural glossy appearance and show cork formation beneath the skin in between fruitlets. Leathery pocket is manifested by cork formation at a deeper level, in the ovaries at the base of individual flowers. *Fusarium subglutinans* also cause Fusariosis or gummosis. On the other hand *Pantoea ananatis* and *Pseudomonas ananas* cause bacterial fruitlet rot and fruitlet black rot, respectively. Bacterial fruitlet rot (*P. ananatis*) infection starts in the floral parts of cracks in the eye cavity and result in an internal browning, which is usually not apparent externally. However, badly infected fruits are dull and hard. Fruit black rot (*P. ananas*) is characterized by brown to almost black discoloration of the placental lobes and loculi of one or more fruitlets. Like the bacterial fruitlet rot, black rot symptoms are difficult to see without cutting the fruit.

Management Strategy: No effective control measure had been found. Decreasing mite population is suggested in other countries.

Marbling

Causal Organism: Marbling is due to the bacterium *Pantoea ananatis* and (=*Erwinia uredovora*. Certain species of *Acetobacter* have also been reported to be associated with the disease.

Symptoms and Signs

Marbling is a disease of the ripening fruits. Diseased fruits show no visible surface or symptoms but it has a hollow sound when tapped. When cut, affected fruits shows the brown blemishes or spots and abnormal hardening of the internal tissues; browning of internal fleshy tissues which varies from yellowish or reddish brown to very dark dull brown occurring as speckles and streaks or in large continuous masses.

Management Strategies

Fruit is susceptible to fruit marbling if the fruit is of low acidity. Application of potash fertilizer which may usually increase fruit acidity, is a practical control measure.

Pink Disease

Causal Organisms

Acetobacter aceti, Gluconobacter and oxydans

Symptoms and Signs

Pink disease is difficult to diagnose because the infected fruit has no external symptoms. When cut, fleshy tissues of infected fruits produce a peculiar odour and watery exhibiting purplish or brownish-pink color. During canning, a dark brown is observed when it is sliced.

Management Strategies

- Maturity indices of fruit must be properly observed.
- The fruit should be harvested before 90% of the eyes become yellow.
- Careful handling of fruits will minimize the disease damage.

Yeasty Rot

Causal Organism

The disease is caused by unidentified yeast and other fermenting organisms.

Symptoms and Signs

- Bubbling exudation of gas is occurring in the infected areas or injuries
- The skin turns brown, leathery and the whole fruit become spongy.

- The presence of large gas cavities of the decaying flesh of the fruit.
- Fibrous tissues are left in the leathery skin.

Management strategies

- Adequate protection of maturing fruit against sunburn.
- Avoid bruising of fruit during harvesting, handling and packing.

Butt Rot and Black Rot, Soft Rot

Causal Organisms

Butt rot and black rot are caused by the same fungus *Chalara paradoxa* (de Seyn) Sacc. [*Thielaviopsis paradoxa* (DeSeyn) Hohn]. *C. paradoxa* is also known to attack other crops like sugarcane, coconut, and banana.

Symptoms and Signs

Butt Rot sometimes called base rot- affecting the base or butt of planting materials and young plants. The affected central tissues of the base are destroyed leaving stringy fibers. The tissues turn black because of the pathogen. Infection may extend up to the stem causing wilting, browning, and drying of the lower and central whorl of leaves. Affected newly planted crowns and young plants are killed and can be easily pulled off the ground. Plants that may survive become severely stunted.

Black Rot is a postharvest disease. It is also called water blister or sometimes Thielaviopsis rot. The disease may start at the base or in growth cracks or injuries on the surface of the fruit. Early symptoms are the water-soaked and slightly darkened skin over rotten tissues that readily break under slight pressure. If the fruit is cut open, a soft decay characterized by water-soaked and dark yellow tissues can be seen. In advanced stages, the core disintegrates with the flesh; diseased tissues become grayish black and may be covered with black spores of the fungi. A peculiar odor accompanies the decay. (Abdullah H et.Al 2009).

Management Strategies

Butt rot control

- Storing newly detached crowns, slips or suckers by piling with their butt on top, and exposing them to sunlight for at least a week before planting.
- Freshly detached crowns, slips or suckers must be treated with an appropriate systemic fungicide before planting.
- Previous pineapple plantation site must be free of pineapple trash; disc-in pineapple trash in soil and let them decompose; if plenty of trash remains on the site, spot burn it during the dry season.

Black Rot Control

- Fungicide dip treatment. To control black rot, treat fruits within two hours after harvesting by dipping into systemic fungicides cleared for use in pineapple fruits.

- Low temperature storage. Refrigeration of the fruit at 7.2oC will prevent the development of the disease and such condition may be used for short term storage.
- Sanitation. Packing stations should be regularly disinfected.
- Proper packing. Avoid packing injured, sunburned, and wet fruits. Infected fruits should not be shipped because considerable decay may ensue even before the container shipping temperature is attained.
- Harvesting precaution. When the dry growing season is followed by wet periods, plants are usually under stress and fruits are more prone to growth cracks, which predispose them to the disease.

4.2 Pests

Nematodes



Management and Strategies

- Crop rotation: Avoid frequent replanting of pineapple in the same field. Practice rotation with cereals if economical.
- Proper land preparation: Plow or disc soils during summer to expose it to solar radiation. Fallow field for 6-8 weeks before final harrowing and planting. Field should be free of pineapple trash
- Nematicides soil treatment: Examine the soil for nematodes before planting. If severely infected, treat the soil with Nematicides.

Insects and Mites

Pineapples are infested by a variety of insect pests and mites. Some pests that affect pineapple plants are mealy bugs, scale insects, thrips, fruit borer, bud moths, midgets, fruit flies, white grubs, beetles, weevils, termites and mites

Pineapple Mealybug (*Dysmicoccus brevipes*)



Nature of Damage

Mealybugs infest all plant parts, from the crown of the fruit all the way down to the roots. Infestation of new plantings may arise through mealybugs being carried over on new planting materials. Symptoms include black spot and a viral infection on the fruit tissue (mealybug wilt). Infected plants becomes stunted as the root system is progressively affected and eventually collapses, finally the leaves curl up and become discolored.

Management strategies

- Monitor mealy bug infestation and presence of ants starting at four months after planting and repeat at monthly intervals until flower induction.
- Examine all plants in the periphery and after every ten rows.
- Record the exact location of plants infested with mealybugs on a field map. Indicate if mealybugs are attended by ants.
- Spray the base of the plant with recommended insecticides following the manufacturer's recommended dosage.
- Practice crop rotation in heavily infected area.

Nature of Damage

Scale insect sucks plant sap mainly on the undersurface of leaves, which consequently turn yellow or dry up.

Management Strategies

Natural enemies like the Aphytis parasitoids cause about 60-80% parasitization of both the male and female scale insects. Likewise, larvae and adults of minute and black coccinellid beetles are quite active and efficient in checking scale insect population in the field. Spray recommended insecticides when scale insect population is at moderate level (2-3 scale insects per leaf), following the manufacturer's recommended dosage.

Mites

Pineapple Mite (*Steneotarsonemus ananas*)



Nature of Damage

Infested leaves become brownish and in severe infestation, the affected plants become stunted.

Management Strategies for Mites

Mites can be controlled by using miticides. Apply at the first appearance of mite damage repeat the spraying after 8-10 days if necessary. Test the chemicals on a few plants first for any varietal toxicity before using in commercial scale.

White Grub, June Beetle, Toy Beetle

Nature of Damage

Very young grubs feed on organic matter and then on roots as they grow older. Roots are eaten up and plants become stunted. Patches of yellowing in the field are signs of grub infestations.

Management Strategies

- Collect grubs during planting.
- Timing of planting/weeding; As much as possible do not plant from June to August to escape high population of ovipositing adults. Likewise weeding should not coincide during these months since females prefer to lay eggs on freshly tilled and weed-free fields than one crop-covered fields.
- Trapping gravid females. Gravid females are strongly attracted to lay egg on moist soil high in OM. Decomposing sawdust and animal manure are preferred by the insect as a substrate for egg laying. Plots measuring 2 m x 1 m can be prepared around the periphery of the plantation where animal manure or sawdust is mixed with the soil. In a 1-ha plantation, about 10-12 such plots can be prepared in June to mid-August. Which is the peak of egg laying. These plots should be mulched with dried leaves, maintained moist, and should be located in shaded areas to minimize water evaporation. Grub collection can be done during late August to September. Grubs can be fed to chicken.
- Use of recommended insecticides; Control should be directed against the first and second larval instars since they are more susceptible than the third instar larvae. The first instar larvae are mostly found near the soil surface and feed on organic matter while the second instar larvae start to feed on the roots. In contrast, the third instar larvae are much bigger than the early instars, stay deeper in the soil; and feed voraciously on the roots.

Rodent Pests



Ratus tanezumi and *R. exulans* are the common species of rats observed in pineapple plantations in Luzon. *R. argentiventer* or other less common species may also cause damage when present in the field.

Rat damage in pineapple begins during flowering and continues up to maturity in the absence of control methods. It is more serious when pineapples are grown underneath coconuts and are adjacent to rice fields. Evidently, there is an active movement of rodents between the rice fields and the coconut-pineapple intercrop. Once rice is harvested, the rats move in to the adjacent field planted to pineapple for harborage and food source.

Management Strategies

The main target of rodent control should be to reduce crop damage. Killing rats should be a secondary goal. Rat control must be safe to human beings and animals, not harmful to the environment, and acceptable to farmers. No single method fits all situations, in fact, several methods may be necessary to reduce or prevent crop damage. Some techniques in regulating rodent populations in pineapple fields are cultural, mechanical, and chemical methods.

Cultural Method

Reduce harborage (such as clean culture) to limit the incidence of burrowing animals and discourage animals from using the crop fields as breeding sites. Generally weedy fields would sustain more damage than clean fields. Incorporate crop residues in the soil after harvest to reduce harborage. This is applicable only in a certain growing period of the crop since the crop itself can also serve as a shelter or harborage for the animals.

Mechanical Method

The mechanical method involves direct killing or exclusion by manual or mechanical means. Two of the most popular ones are the trapping and bounty system.

Trapping system – maybe use in small areas where use of poisons may pose safety hazards. This should be done continuously since rats from other places may migrate to the area being protected.

Bounty system - This system is supported by local and national laws, which requires all citizens to help regulate rodent population. The people are given rewards or cash payments for carcasses or rats' tails turned in. The campaign is usually intensified when crops are susceptible but the timing is often too late

Chemical Method

Chemical method or baiting with rodenticides is still considered the most popular means of rodent control. Rodenticides that are used in the country are either acute or slow.

4.3 Weed Management

Weeds are one of the major constraints in obtaining high yields in pineapple. Weeds compete with pineapple for nutrients, water and sunlight. They also serve as alternate hosts of other pests and ideal place for breeding and multiplication of rodents.

Weed management systems that provide adequate control comprise of a blend of several appropriate components or methods. The various possible weed control components include preventive, cultural, chemical and integrated weed management methods.

Cultural Methods These include harrowing, hand-weeding, inter-row cultivation, mulching and intercropping. Harrowing removes weed flushes and an effective way of reducing weed reserves in the soil. Hand-weeding or hoe slashing can be conveniently done only during the early stages of crop growth especially with single-row planting or double rows. As the pineapple plant grows, the foliage covers the spaces between rows and hand-weeding would be difficult because of the pointed leaf tips and sharp margins. Inter-row cultivation with animal-drawn plows can be conveniently done during the early stages of growth of the crop with the same reason as for hand-weeding. Mulching the base of the pineapple plant with weeds that are cut through hand-weeding or inter -row cultivation help in weed control, water conservation and improvement of soil nutrient status. Intercropping of other crops between pineapple rows can help reduce weed growth and augment the income of pineapple growers.

Chemical Method: The use of herbicides or weedicides to kill the weeds with minimum or no injury to the crop. Use herbicides properly. Read, understand and follow instructions on the herbicide label. Be sure that the weeds infesting the plantation are those that can be controlled by the herbicide. Apply the herbicide at the recommended rate and appropriate stage of growth of pineapple and weeds. Calibrate the sprayer in the area that will be sprayed before applying the herbicide.

Integrated Weed Management The use of a combination of appropriate weed control components in a system based on ecological, economic and sociological considerations.

Chapter 5: Pineapple Harvesting, Post Harvest Management and Value Addition

Pineapple attains flowering at 10-12 months after planting and attains harvesting 15-18 months after planting, depending upon the variety, time of planting, type of planting material used.

Harvesting should be done with a sharp knife, severing the fruit stalk with a clean cut in such a way that the fruit is not damaged and crown is retained. Such fruits can be stored without any fear of damage for 3-4 weeks after harvest in a well- ventilated cool place.Yield has been recorded of 40-50 t/ha.

5.1 Maturity Indices

When pineapple fruit is already mature, the eye of Red Spanish variety develops reddish brown to yellow orange while Smooth Cayenne and other similar varieties will produce golden yellow when it is ripened.

On large scale planting shell color is generally used to determine the various stages of maturity.

Harvest Queen Fruit when the shell color is green but the grooves between the eyes show widening and yellowing.This maturity stage correspond to a diameter of not less than 10 cm and is appropriate for fresh marketing to distant markets and for processing into dried pineapple product. For immediate consumption and minimal processing,fruit should be harvested when the first two layers of shells or eyes at the base show yellowing.

Shell color is not a reliable guide for Smooth Cayenne but the following harvesting indices will guarantee high eating quality and consumer acceptability.This include the calendar method (harvest not later than 149 days after flower induction), and total soluble solids content (not less than 140 Brix).

5.2 Harvesting



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5.3 Postharvest Handling

Packinghouse Operations

Fruit must be prepared for marketing in a packinghouse where they are well protected from intense heat, sunlight, and rain. A packinghouse could also serve as a trading post for pooled produced by small farmers. Quality control system can be implemented so that the fruit will meet the quality requirements of the clients.The appropriate size of the packinghouse would depend on the volume of fruits that would pass through the area at one time (As a rule, for every ton, a floor area of 20 m² is required).

Trimming

Pineapples harvested with the peduncle on should be trimmed close to the base of the fruit to minimize injury to other fruits during packaging or bulk transport. Trimming can be done using sharp, clean knife or a shear.

Sorting and Grading

Variability in size and degree of ripeness due to variations in growing conditions occur in many harvested pineapples. It is necessary, therefore, to do preliminary sorting in the field where defective fruits are culled and no longer hauled to the Packinghouse. Final sorting and grading in the packinghouse should be made according to the requirements of the client or market. Packinghouse: Final sorting and grading in the packinghouse should be made according to the requirements of the client or market.

For local market, sorting according to size forms the basis for pricing. For export, fruits should be sorted according to the degree of ripeness and weight and graded following Grades and Standards for Pineapple.

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Harvesting should be done with a sharp knife, severing the fruit stalk with a clean cut in such a way that the fruit is not damaged and crown is retained. Such fruits can be stored without any fear of damage for 3-4 weeks after harvest in a well-ventilated cool place. Yield has been recorded of 40-50 t/ha.

Packing and Packaging

Pineapples are packed manually in containers (baskets, crates, or cartons) in a flat pack manner with fruits lying on the sides in an alternate crown-to-base fashion. This manner of packing is recommended for Queen because of its small size. For Smooth Cayenne, it is better to pack the fruits inside a container in an upright position in a crown-to-crown or base-to-base fashion. In this method, less damage in terms of bruising and compression is incurred for the relatively large-sized Smooth Cayenne. For export, wooden boxes should be used and the packing methods appropriate for each variety should be strictly observed. Shredded papers are placed between fruits to cushion against vibrations and impact during transit.

Storage

Pineapples can be stored at a low temperature but they are subject to chilling injury (blackheart). Blackheart is characterized by the appearance of dark brown, water-soaked tissues near the core and by a distinct fermented odor. This disorder develops during cold storage below 20°C and symptoms manifest 2-3 days after withdrawal from the cold condition. For Queen and Smooth Cayenne, the optimum refrigerated storage temperature is 20°C and no chilling injury develops up to 14 days. Waxing prior to low temperature storage is recommended to alleviate the development of blackheart.

Transport

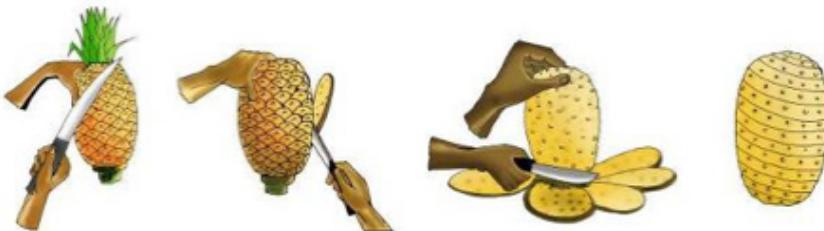
In the Philippines, bulk transport using jeepneys or small, non-refrigerated vans is the most economically feasible method of transporting pineapples from growing areas to market centers. To reduce compression or physical damage during bulk transport, the vehicle should be provided with horizontal dividers. Fruits should be arranged lying on their sides in an alternate crown-to-base fashion. Transport should be done during the coolest time of the day or during nighttime. For export, transport by sea or air requires recommended low temperature throughout the handling chain.

5.4 Value Addition

Pineapple Consumption and Processing Methods

Fresh Pineapple

- Cut off the crown and the lower part.
- Remove the rough external skin.
- Cut the pineapple from top to bottom and if necessary remove the spine.
- Slice the flesh for eating.



Steps for peeling the fruit

Collecting the juice



The remaining pulp can be dried for use in the preparation of doughnuts, bread rolls or cakes, or to flavour meat and fish dishes.



Solar dryers

Chapter 6: Green Technologies and Mechanization

Many green technologies aim to reduce emissions of carbon dioxide and other greenhouse gases.

6.1 Green technologies

6.1.1 Solar

Solar power is one of the most successful green technologies and is now cheaper to deploy than fossil fuels in many countries.

6.1.2 Waste Management

Green technology helps manage and recycle waste material. It allows it to be used for beneficial purposes. This technology is used for waste management, waste incineration, and more. A lot of recyclable material has allowed individuals to create plant organic fertilizer, sculptures, fuel, and even furniture. Recycling waste to useful products also creates employment opportunities for youth and women.

6.1.3 Solar supported irrigation systems

Solar operated pump which siphon water from a pond, well or borehole into an overhead tank and the water used in irrigation either through drip or other irrigation systems such as sprinkler or other.

The table below summarized some of the green technologies in pineapple production:

Green technology	Product	Beneficial use
Green fuel	Methane gas	Cooking
Compost	Organic manure	Organic fertilizer
Industrial waste	Fiber	Bags, packaging material, sculptures and furniture
	Peels and crown	Animal feed
	Pulp	Doughnuts, bread rolls or cakes and flavouring of meat and fish dishes
Industrial effluent	Water	Irrigation
Farm and other processes wastes	Mulching	Conserve of soil and water Smother weeds Increase soil microbial activity Improve soil structure

6.2 Mechanization

Thoroughly clear the site of all types of weeds (any species other than that to be grown), stumps, shrubs, roots, etc. This can be done manually, chemically, or using machinery.

6.2.1 Hand Tools

The following tools are commonly used: machete, files, chainsaw, knives, pickaxe, dabas, hoes, guiding line (200 m), fork and backpack sprayer, and then a cart or wheelbarrow for transport.



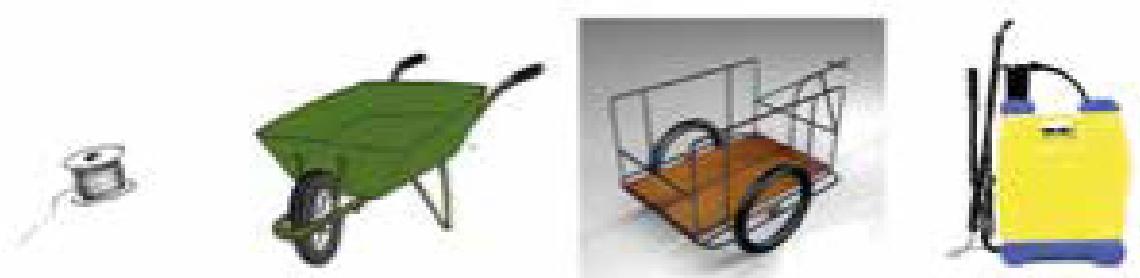
Machete

Knife

Lime

File

Chainsaw



Guiding line

Wheelbarrow

Cart

Sprayer

6.2.2 Tractor drawn equipment

The equipment for mechanical preparation of the land is as follows: a bulldozer to clear forest areas, a rotary mulcher to crush plant cover and fill a former pineapple plot and a pulverizer (or cover crop) for tillage work.

Heavy pulverizer and caterpillar tractor for tilling the soil

Chapter 7: Business Opportunities In the Pineapple Value Chain

7.1 Business Opportunity

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.

7.2 Factors to consider/Types of Business Opportunities

Business opportunities are diverse. They include among others the following;

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

7.3 Investment

Business Opportunity	Opportunity Drivers	Investment requirements	Challenges
Production of fresh pineapples	High demand for fresh pineapple both for local and export market High farm gate prices of fresh pineapples	Suitable land, farm equipment	Climate change (prolonged drought) Limited access to adequate quality planting materials

Business Opportunity	Opportunity Drivers	Investment requirements	Challenges
Provision of quality planting materials (seed gardens/nurseries)	High and unmet demand for quality planting material Potential for expansion or growth There are no registered nurseries to provide certified planting material Low competition	Secured land (properly fenced), farm equipment, registration and certification, water source	Limited sources of appropriate planting materials Currently there is no certification scheme for pineapple seed
Production of tissue culture seedlings	Demand for uniform clean planting materials Low or no competition Potentially higher returns	Tissue culture laboratory	High cost of investment
Aggregation and delivery (transport) of the fresh pineapples to the market and/or processors	High demand for bulk Fresh fruit (for the local and export market)	Land, collection shades, sorting and grading facilities, transport services	Few and scattered Pineapple farms Poor access roads
Cottage processing of fresh fruits for juice and for jam	High demand Fresh fruit market saturation	Processing equipment	Seasonality of production
Dried pineapples	Niche market is available	Drying equipment	High cost of equipment
Canning of pineapples	Niche market is available	Processing equipment	Mixed varieties

7.4 Gross Margin Analysis

A simplified example of how to determine the gross margin (total revenue minus total variable costs) for an identified business opportunity – production per acre per year, in the value chain

Input Variables (Cost items)	Unit Cost (KES)	Quantity	Total Amount (KES)
Ploughing	3,000	Once	3,000.00
*Cost of seedlings	10.00	10,000	100,000.00
*Planting	2.00	10,000 pcs	20,000.00

Input Variables (Cost items)	Unit Cost (KES)	Quantity	Total Amount (KES)
1 st Weeding	4,000.00	once	4,000.00
2 nd Weeding	4,000.00	once	4,000.00
Harvesting	2.00	7,000 pcs	14,000.00
Pests/Disease control	2,000.00	3 Sprays	6,000.00
Manure/Fertilizer application	6,000.00	Once	6,000.00

Chapter 8: Gender Equality, Human Rights and Social Inclusion

8.1 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)

8.1.1 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

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).

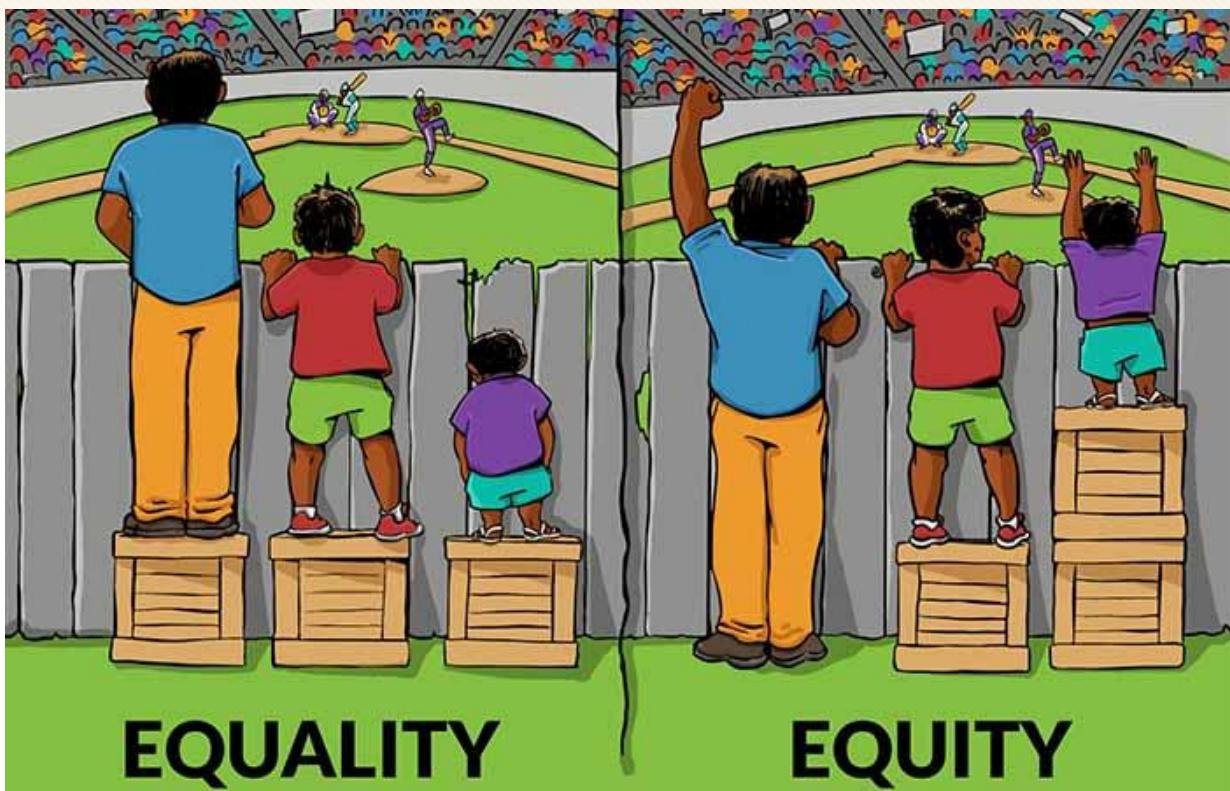


Figure 2 Equality and Equity illustrated

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.

Gender Integration Continuum

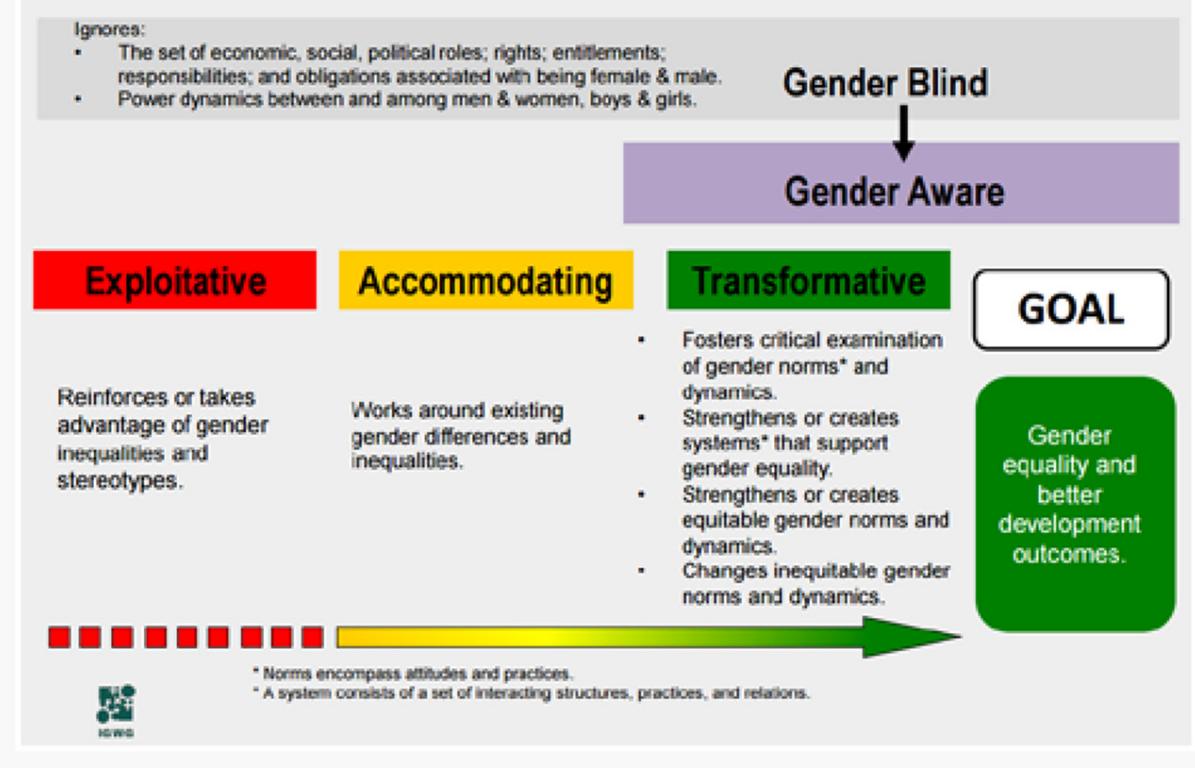


Figure 3: Gender Integration Continuum

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-based violence (GBV). Gender transformative approaches are characterized by explicitly centering 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.

8.1.2 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.

8.1.3 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.
8. **Address Social Norms:** Work on changing discriminatory social norms and practices that hinder gender equality. This can be done through community engagement, gender transformative approaches including Gender action learning systems(GALS), community conversations, model families, among others

that seek to address root causes of discrimination.

8.2 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
- 2. Everyone has rights despite differences
- 3. All have the right to live, and live in safety
- 4. No one may enslave you
- 5. No one may torture you
- 6. You have rights no matter where you travel
- 7. All are equal before the law
- 8. Human rights are protected by law
- 9. No one should be unfairly detained
- 10. All have a right to a fair trial
- 11. All accused are innocent until proven guilty
- 12. All have a right to privacy
- 13. All have the right to move freely
- 14. All may enjoy asylum from persecution
- 15. All have a right to nationality
- 16. All may marry and establish families
- 17. All may own property
- 18. All may think freely, including religion
- 19. All may freely express opinions
- 20. All may assemble peacefully
- 21. All may participate in governing
- 22. All have rights to dignity and social protections
- 23. All have free choices of employment
- 24. All have rights to rest and leisure
- 25. All have the right to an adequate standard of living
- 26. All have a right to education
- 27. All have rights to intellectual property
- 28. All have the right to a world that enables and protects rights
- 29. All rights have responsibilities and can only be limited when infringing on others' rights
- 30. No one can take away your human rights

Figure 4: 30 articles of Huma 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.



A human rights-based approach (HRBA): This is a conceptual framework based on international human rights standards and directed towards promoting and protecting human rights. HRBA seeks to analyze the inequalities which lie at the heart of development problems and redress discriminatory practices and unjust distributions of power that impede development progress.

HRBA is concerned with empowering people to know and claim their rights and increasing the ability and accountability of individuals and institutions who are responsible for respecting, protecting, and fulfilling rights. The HRBA approach aims to eliminate or at least diminish the impediments of existing exclusion and discrimination within the implementation of any programme or project. HRBA 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.

8.2.1 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

- i. minimize corruption.
- ii. have positive effects on conflict management.
- iii. 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?

8.3 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.

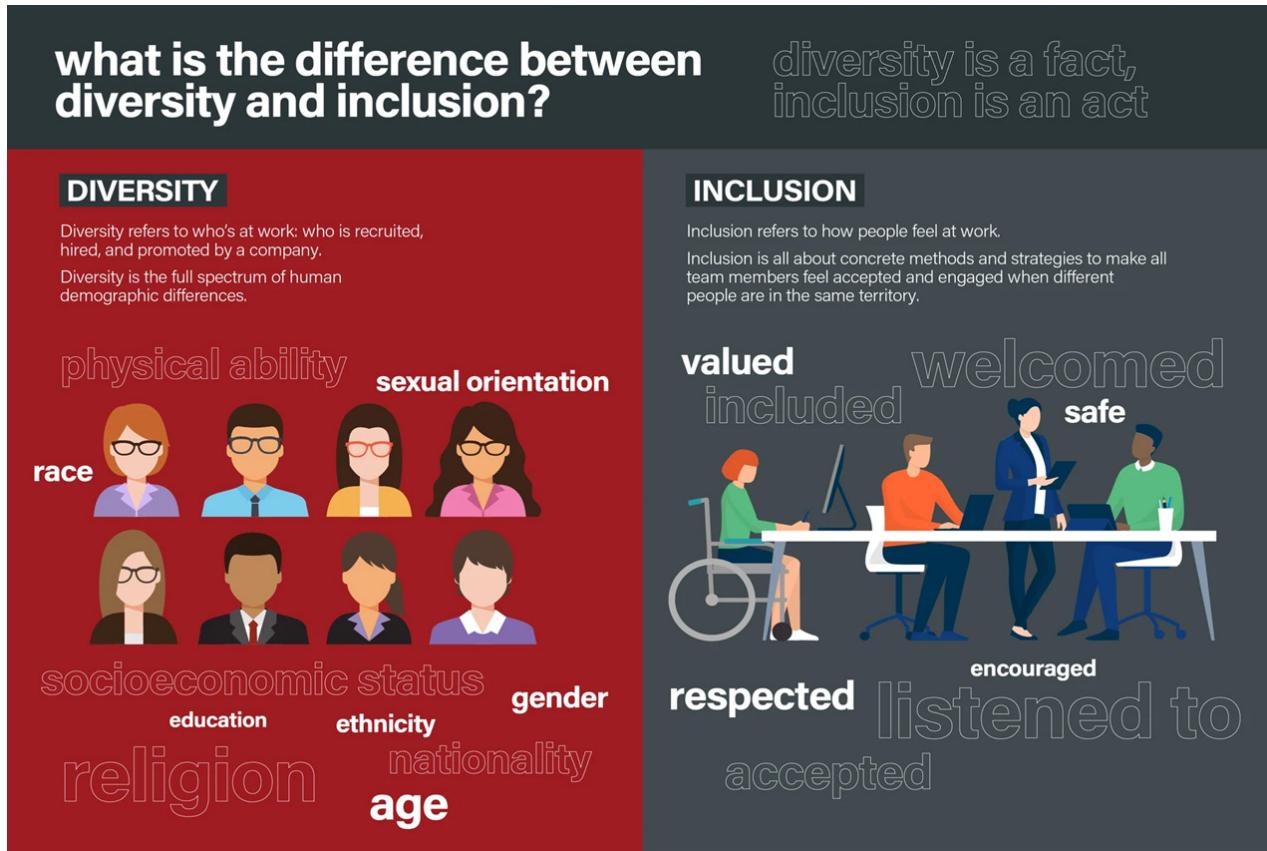


Figure 5 Diversity vs Inclusion DRP Group. (n.d.). What is the difference between diversity and inclusion? DRP Group. Retrieved November 14, 2024, from <https://www.drpgroup.com/en/blog/what-is-the-difference-between-diversity-and-inclusion>.

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.

8.3.1 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



PINEAPPLE 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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