



COFFEE DIRECTORATE



ROBUSTA COFFEE GROWERS' MANUAL

1st Edition, 2022



FOREWARD

Coffee is a crop of economic importance in Kenya introduced into the country by the French Missionaries in 1893. It is one of the major cash crops contributing to the Kenyan economy in terms of foreign exchange earnings, employment creation, food security and is a source of livelihoods to farmers in the rural areas. The coffee sub-sector contributes 0.2% of the country's GDP. At independence the country produced 44,000MT that increased to 128,862MT by 1988 after which it has declined to the current production level of 36,873MT. Kenya produces Arabica and Robusta coffee. It is envisioned that the promotion of Robusta coffee will contribute to an increase in the total production within the country.

The Coffee Directorate is promoting Robusta Coffee production in five counties of Homa-Bay, Kisumu, Siaya, Busia and Bungoma. This initiative was prompted by the crop diversification aspect which is anchored on the AFA strategic Plan, whose aim is to promote processing and value addition. The initiative is also anticipated to counter the high volumes of Robusta coffee products imported into the country thus, saving the country the much-needed foreign exchange.

The target counties are endowed with suitable environmental conditions for Robusta coffee production that includes high and well distributed rainfall, high humidity, adequate land for expansion little competition from other enterprises.

In conclusion, the focus on Robusta coffee production will not only increase the overall national coffee production but will also enhance the country's potential towards industrialization, improved farmer's incomes and livelihoods. There are great prospects for the sub-sector given the massive support it has received from the various stakeholders including the Coffee Directorate, National and the County Governments and the positive response by the farmers towards the production of Robusta coffee.



ENG. ENOSH AKUMA
DIRECTOR
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PREFACE

Kenya is renowned for her mild Arabica coffee production grown in medium to high altitude areas. The country spends lots of foreign currency in importing instant Coffee (Robusta products) every year yet there exists potential to produce Robusta coffee in the low-lying humid areas of the Western and Lake Basin Regions. Robusta Coffee import substitution is expected to enhance grower incomes and contribute to food and nutrition security. Robusta production is also anchored in AFAs SP under crop diversification which will promote agro-processing and value addition especially by SMEs in the counties. Increased Robusta production in the country is likely to attract investors in instant coffee plants which create employment.

Farmers in low altitude areas of Kenya with adequate rainfall, specifically the lake, Coastal and Western regions that have the potential to produce high quality and marketable Robusta coffee. There is sufficient under-utilized land which can be put under coffee production as a cash crop for the regions. The ecological conditions like altitude, temperature and rainfall are suitable for growing Robusta coffee.

For the last two years (2018/2019 and 2019/2020) and 2020-2021, AFA Coffee Directorate has supported 522 farmers spread across the five Robusta growing counties with a total of 92,200 Robusta coffee seedlings, thus contributing additional 80Ha under Robusta in the country. On full maturity of the seedlings planted, the production is projected to have increased by 300 MT of clean coffee and generate an expected income of KShs.7.5 Billion. This will impact positively in promoting food security and increased income as envisaged in the vision 2030 of government under the food security and manufacturing pillars.

The main objective of this Coffee Robusta manual is to serve as a guide to coffee extension officers, farmers in Robusta growing counties of Kenya. It touches basic tips on how to produce Robusta coffee from the nursery, coffee husbandry, harvesting, and wet and dry processing, regulation and marketing. The manual is envisaged to help farmers adopt Good Agricultural Practices that will enhance quality and productivity hence improved livelihoods.

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ABBREVIATIONS AND ACRONYMS

AFA	-	Agriculture & Food Authority
CBD	-	Coffee Berry Disease
CD	-	Coffee Directorate
CRI	-	Coffee Research Institute
KALRO	-	Kenya Agricultural, Livestock & Research Organization
CLR	-	Coffee Leaf Rust
CWD	-	Coffee Wilt Disease
GAP	-	Good Agricultural Practices
GMP	-	Good Manufacturing Practices
COP	-	Code of Practice
GDP	-	Gross Domestic Product
PLWD	-	Persons Living with Disabilities

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CHAPTER 1

1.0 ROBUSTA COFFEE GROWING IN KENYA

1.1 Background

Coffee is the second most traded commodity in the world after oil and has been a strategic crop in the economy of Kenya since its introduction into the country in 1893 by French Missionaries that settled in Bura, Taita Taveta County. It is one of the major cash crops of Kenya, both in terms of foreign exchange earnings, employment creation, food security and improvement of the livelihoods of farmers in the rural areas. Coffee is grown in 33 counties out of the 47 counties in Kenya with a total of 119, 675 Ha under coffee production.

There are two main species of coffee grown in Kenya namely Arabica (*Coffea Arabica*) and Robusta (*Coffea canephora*). Though Kenya is renowned for her mild Arabica coffee production which is grown in medium to high altitude areas, there also exists a great potential for Robusta production in low altitude parts of the country particularly the lake basin and coastal region.

Robusta coffee is currently grown in 5 counties (Kisumu, Homabay, Siaya, Bungoma and Busia) with a potential of expansion to Kilifi and Kwale counties in the coastal region.

Robusta coffee was introduced in Busia, Siaya, Kilifi and Bungoma counties to provide farmers with an alternative cash crop. Total area under Robusta was estimated at 853Ha by 1993. The sessional paper No.1 of 1986, anticipated large increase in Robusta coffee production by the year 2000 to 34,900MT. Busia had the largest acreage followed by Bungoma and Siaya, with Kilifi County registering 9 Ha.

Coffee Directorate supported rehabilitation and introduction of Robusta coffee production along the Lake Basin region and Western Kenya mainly in the Counties of Busia, Bungoma, Siaya counties and some extent in Kisumu and Homabay Counties in the year 2018-2021.

As at the end of 2021 the area under Robusta coffee production in these counties was 150Ha. These Counties have suitable ecological conditions for growing Robusta coffee. If the crop is properly promoted, it can provide a sustainable income to the farmers in this region since it has high potential yields of 4,000 kg per hectare per annum.

Western Kenya region has the potential to produce high quality and marketable Robusta coffee. It has a lot of under-utilized land which can be put under coffee. In the past, the region was producing high quality Robusta coffee but currently the production has gone low due to lack of funding and failed marketing systems. The reintroduction of Robusta in Kenya will enhance crop diversification that will promote agro-processing and value addition especially by SMEs in the growing counties. This will in turn boost coffee production in Kenya and save foreign exchange from importation of instant coffee.

CHAPTER 2

2.0 ROBUSTA COFFEE PRODUCTION

2.1 Ecological Requirements of Robusta Coffee

Robusta Coffee (*Coffea canephora*) is grown in low altitude areas of Kenya, ranging from about 600 meters to 1,400 meters above sea level. Robusta coffee does well in areas with hot, wet and humid weather. Temperature range ideal for Robusta production is 18° - 30°C, the minimum temperature should not be below 10°C. Well distributed annual rainfall ranging from 900 to 2000mm is recommended. The soils should be fertile, deep (at least 1.5m), well drained, slightly acidic (pH 4.5 - 6.5), sandy loam to clay loam with a high-water holding capacity.

2.2 Characteristics of Robusta Coffee

Robusta has a shallow root system and grows as a robust tree or shrub to about 10 m tall. Robusta coffee is self-pruning whereby old and unproductive branches dry and fall off the tree. The tree does not have secondary branches and flowers irregularly, taking about 10 –11 months for cherries to ripen depending on rainfall distribution and produces oval-shaped beans. It has a greater crop yield per tree, contains more caffeine and less sugar and is less susceptible to common pests and diseases as compared to Arabica coffee.

2.3 Nursery Management

Robusta coffee is a cross pollinated plant thus self-incompatible. Due to the natural form of cross-pollination, the seed collected from the plants will have a high level of heterozygosity, causing a great variation among the plants.

The plants established from seed will be different in terms of shape, size, coffee bean sizes and non-uniformity in ripening of fruits, susceptibility of insect pests and diseases, drought tolerance, vegetative vigor and the production capacity. To ensure that the genetic uniformity is maintained, it is recommended that the Robusta coffee is reproduced through asexual reproduction. This includes propagation using cuttings and tissue culture plants. The success of this procedure is dependent on the use of good quality planting materials.

2.3.1 Clonal Garden Establishment

- A coffee clonal garden is an establishment of mother trees that have been derived from clones which have undergone a pre-selection and are free from coffee diseases including Coffee Wilt and Coffee Leaf Rust.
- The seedlings are established in the field at a spacing of 1 m x 1 m.
- The holes are prepared at least 3 months before planting at a depth of at least 2 by 2 by 2 feet, separating the top soil from the sub soil.
- During filling of holes, the top soil is mixed one debe of well composted manure and 100g of Triple Super Phosphates (TSP) or 200g of Single Super Phosphate (SSP). This to be carried out one month before planting.
- The coffee seedlings to be established in an East west direction
- After 12-18 months, prune the primaries leaving only the last two pairs. The stems are bent in an East west direction and pegged down in a horizontal position to encourage growth of orthotropic (vertical) suckers
- Vertically growing suckers are suitable for Vegetative propagation since lateral branches retain the horizontal habit and only produce low growing bushes.
- The suckers grow from the dormant buds at each node providing a good supply of cuttings

- The suckers are harvested when they attain an age of six (6) months



Clonal Garden Establishment and Maintenance

2.3.2 Maintenance of a Clonal

- i) CAN application at the rate of 300g/tree/year applied in 2 equal splits during rainy periods for regeneration and growth of suckers
- ii) Irrigation where available
- iii) Keep the clonal garden weed free
- iv) Application of manure to enhance healthy sucker formation at least every two years
- v) Prune old and woody sections of the plants. Do not allow bearing wood to develop



Robusta Clonal Garden

2.3.3 Harvesting of suckers

Suckers should be harvested early in the morning or in cold weather and maintained in wet conditions and under shade



Harvested Suckers

2.3.4 Requirements for Robusta Nursery Site

- (i) Permanent supply of clean water
- (ii) Accessibility for ease of transport
- (iii) Land tenure security
- (iv) The site should be secure. To be constructed in a safe environment
- (v) The nursery site should be level or gentle in slope
- (vi) Sheltered from strong wind
- (vii) Avoid valleys where cold winds settle at night

2.3.5 Nursery Construction

- (i) The nursery to be constructed in East to West direction
- (ii) The beds should be 1-1.5 m wide for ease of weed management and watering
- (iii) The shade net used for propagator should be 75% and 50% for the hardening shed. This should be done at least 2.74m (9 feet) from the ground level.

2.3.6 Construction of the Propagator

- (i) Propagators are constructed by excavating an area of 1.5m wide by any convenient length with a foundation depth of 37.5cm.
- (ii) The propagator is filled with gravel to a height of 15cm and a 22.5cm layer of river sand is added to achieve good drainage
- (iii) Erect 1.2m posts spaced at 1.5m to make a frame using metallic rings, timber or flexible sticks
- (iv) A 22.5 cm wall of stones or offcuts is raised around the propagator for support and to avoid surface runoff
- (v) The rooting media used can be either top soil, cypress sawdust, river sand
- (vi) The polythene used to cover the propagator should be UV treated with a 1000 gauge
- (vii) A watering system should be fitted to the propagator to ensure constant supply of water to regulate the relative humidity



Construction of a Propagator

2.3.7 Propagation through Cuttings

- (i) Harvesting of suckers is done when the mother bushes have produced mature suckers at least six (6) months old that have attained pencil size thickness
- (ii) Harvesting of suckers should be done early in the morning when the atmospheric relative humidity is relatively high.
- (iii) About 2 or 3 single node cuttings can be generated from one sucker when the mother garden has been properly managed.
- (iv) Single node cuttings are prepared by making a cut at an angle below the node but retaining the pair of leaves which have been reduced by half
- (v) The cuttings are planted in polybags filled with a 2-inch top layer of red soil and the remaining 7 inches of potting media (3:2:1 of top soil, river sand and manure) or directly in a propagator using subsoil as rooting media
- (vi) Callus formation begins 3 weeks after planting and is complete in 5-6 weeks. Root development follows after 8 -10 weeks
- (vii) Watering should be done adequately and cover the propagator within the same day to prevent moisture loss and should be airtight
- (viii) Hardening of seedlings starts at 2 months after propagation by opening the propagator for 1 to 2 hours a day in the morning or evening hours. After three months the propagator is fully opened
- (ix) The seedlings are ready for field establishment after 7 to 8 months



Preparation of Robusta rooted cutting using subsoil as a rooting media



Rooted Cuttings

2.3.8 Nursery Diseases and Insect Pest Management

Common diseases and insect pests in the nursery are:

(i) Brown Eye Spot

This disease occurs when the soil is too wet and/or when there is too much shade.



Brown eye spot (Cercospora coffeicola)

Symptoms

The fungus causes small brown spots on the leaf, usually with a reddish-brown margin and eventually turning grey in the Centre and falling off.

Control

- Spray the seedlings with 50g copper oxychloride in 20ltrs of water
- Reduce watering frequency
- Maintain shade at 50%

(ii) Green scales

Symptoms

- Rows of flat oval green scales along main leaf veins and near tips of green shoots
- Sticky honey dew and sooty mould growing on leaves
- Presence of attendant ants climbing on infested coffee seedlings



Green Scales (Coccus alpinus)

Control

Spot spray with white oil /D-C Tron plus at a rate of 100 ml in 20lts of water

(iii) Leaf Miner

Symptoms



Leaf Miner Damage

(iv) Green scales

Symptoms

Irregular brown blotches on the upper side of the leaves, covering white caterpillars of size 12mm (½ in) long within the “mine”.

Control

Spray with Fenitrothion (Sumithion) solution at 0.2% (40ml in 20lt of water)

2.4 Economics of Coffee Production

The farming of Robusta coffee should be business oriented in order to maximize the profits. The farming needs to be driven by both good agricultural practices (GAP) and good manufacturing practices (GMP) that ensures sustainable quality of the product. The practices should ensure efficient and effective use of resources to maximize the output. Proper record keeping needs to be done for monitoring of the business performance.

Factors that affect profitability are:

- i) Tree productivity- This is production per tree
- ii) The total cost of production
- iii) Milling loss- This is dependent on the quality of the coffee produced
- iv) Market price- This is dependent on the supply, demand and the quality of the coffee

Enhancing Profitability

To enhance profitability of farming Robusta coffee, the following factors need to be put into consideration:

- i) Planting high yielding and disease resistant varieties
- ii) Efficient use of resources to lower the costs of coffee production
- iii) Adoption of innovative farming technologies to increase production
- iv) Application of good agricultural practices from initial field establishment to processing.

2.5 Field Establishment

2.5.1 Introduction

Robusta coffee is a perennial plant with a long lifespan. Appropriate establishment is required to enhance root development and anchorage, nutrient and water uptake for sustainable production.

2.5.2 Robusta Coffee Varieties

Research on Robusta coffee in Kenya is ongoing and new selection are expected to be released soon. The current Robusta selection under commercial production comprise of two cultivated varieties/land races, Nganda and Erecta that were introduced from Uganda in the early 1970s. The Nganda variety can be identified by its spreading canopy while Erecta has an upright canopy thus the name Erecta.

The Robusta Research program also geared at development of Arobusta coffee which is a cross between Arabica and Robusta and are characterized with enhanced yield and beverage quality and ideal for production in non-traditional Robusta coffee areas. The Arobusta coffee variety selections are at an advanced stage with several promising lines that will be released soon as commercial varieties

2.5.3 Soil Sampling for Analysis

Soil sampling involves the collection of representative samples (random sampling) from the whole farm for the purpose of analysis. This process should be carried out during the dry season and involves the following steps:

- i) When sampling, ensure you have two containers, soil auger, a fork jembe or panga and packaging bags (for the samples)
- ii) Take samples from the various parts of the farm. Collect samples outside the tree canopy between 4 trees
- iii) At the sampled point, dig out and place the topsoil (first 6") separately from the subsoil (6 - 18"). Mix the topsoil and the subsoil separately and take 1 or 2 handfuls from each and put in separate containers. Repeat this at the other sampled points
- iv) Thoroughly mix the soil in each of the containers and take a sample of about 1kg of topsoil and 1kg of subsoil
- v) Put the topsoil and subsoil in separate packages and label appropriately giving your name, location and address (postal and email). Send the samples to the laboratory for analysis
- vi) At least 5 sampling holes (cores) should be dug for a small farm of 1 acre and below. For larger farms add 2 - 3 cores per every additional acre
- vii) Undertake soil analysis every 2 - 3 years to determine the type and amounts/rate of fertilizers to apply



Soil Sampling

2.5.4 Land preparation

- (i) Prepare the land before the planting season by digging out all tree stumps, roots, bushes and grasses, and determine the soil conditions through soil analysis
- (ii) Land cleared of trees within 6 months should not be used for coffee planting because of the risk of *Armillaria*, a fungal disease which causes root rot
- (iii) Make terraces or other soil conservation structures where the land has steep slopes
- (iv) Protect bench terraces by planting grasses e.g., blue grass (*Paspulum notatum*) on the benches to stabilize them

2.5.5 Layout and preparation of planting holes

- (i) Recommended spacing for Robusta coffee is 3.05m by 3.05m (10 ft by 10ft) to achieve a plant population of 435 trees per acre or 1,075 trees per hectare
- (ii) Prepare 2 ft marking pegs sharpened at one end using available materials such as twigs. Other materials required are sisal twines and tape measure
- (iii) Mark positions where the coffee will be planted with pegs to create regular patterns to facilitate farm management.
- (iv) Dig holes of 60cm by 60cm by 60cm in depth (2ft by 2ft by 2ft) at the marked points. Dig the holes at least 3 months before planting to allow for better water and root penetration through the soil because it has had time to loosen and soil borne pest management
- (v) When digging the holes, keep the fertile topsoil separate from the subsoil.
- (vi) Fill holes with top soil mixed with one debe (20 litre container) of well composted farmyard manure plus 100g

Triple Super Phosphate (TSP) or 200g Single Super Phosphate (SSP). Where the soil is acidic, add 100 grams of Dolomitic Lime. The holes should be filled up with a slight heap one month before planting

- (vii) Mark positions where the coffee plants will be planted with pegs and realign before planting
- (viii) Re-align before planting



Top soil mixed with 1 debe manure

Digging of holes and preparation of infilling



Planting hole after in filling

2.5.6 Field Planting

- (i) Open soil mound sufficiently to accommodate the taproot and other roots. Do this after the onset of rains and the soil is sufficiently wet to about 60 cm (2 ft) deep.
- (ii) Gently, remove the potting material and carefully loosening caked soil around the roots to ease water uptake and root

development.

- (iii) Place the plant in the hole with the collar at level with the surrounding soil. Maintain the nursery mark when covering the seedling.
- (iv) Regularly inspect the planted field to identify dead plants and replace them as soon as possible.



Field Establishment

2.5.7 Field Maintenance of Young Coffee

Coffee fields need to be constantly maintained to allow for proper growth and performance of coffee. The various maintenance practices include; soil and water conservation, mulching, weed control, nutrition and watering. Keep the area around the planted seedlings free of weeds for the first two years. Use of non-chemical methods is the most preferred weed control method in young coffee although careful application of herbicides is also recommended by covering the young coffee during sprays to accidental contact with the plant. Apply recommended herbicides to control the weeds.

2.6 Integrated Soil Fertility and Water Management Practices

Integrated soil fertility and water management is a collection of different practices that include soil and water conservation, use of organic and inorganic fertilizers. It aims to maximize efficient use of applied nutrients and soil organic matter usually depleted due to cultivation. Nutrient losses are costly, wasteful and can also be a source of environmental

contamination. The losses occur through run-off, erosion, leaching and crop removal without replacement through harvested products.

Soil fertility and water conservation management involves the following practices:

(i) Mulching

Mulching has several beneficial effects to the young coffee plants which include:

- (a) Moisture retention during dry periods
- (b) During decomposition there is supply of nutrients and encourages root development
- (c) Weed growth suppression
- (d) Soil structure improvement thus enhanced water penetration and minimizes soil erosion
- (e) Moderates soil temperature during the day
- (f) Reduction in incidences of thrips.

Mulch Application

- (a) Materials suitable for mulching of the young crop include Napier grass, maize stover, wheat straw, bean trash, banana leaves, coffee husks, grasses or any other dead plant material. However, a prolonged use of Napier grass could cause magnesium deficiency as it contains high potassium content.
- (b) Place the mulch 1 foot from the coffee stem to prevent infection with collar rot or attack from ants and termites.



Mulching

- (ii) Terracing and planting blue grass at the face of the terraces to minimize rainwater runoff.
- (iii) Digging water basins at some points of the terrace to preserve rain water. The water seeps through the soil slowly to the neighboring coffee trees and preserve trees during the dry period.
- (iv) Grass Strips to control surface run-off

2.7 Shade Trees

It is important to incorporate shade trees in coffee farms. The shade trees help to regulate temperature, enrich the soil with humus while minimizing soil erosion and reduce the intensity of hailstone damage. Depending on the nature of the canopy, the recommended spacing is 10-15 metres staggered. The trees should be periodically pruned to maintain shade cover of not more than 30%.

2.7.1 Characteristics of Suitable Shade Trees

- (i) Should not provide excessive shade to coffee (not more than 30%).
- (ii) The fruit trees recommended must have higher canopy than coffee so as to tap light at a higher storey and the canopy must be regulated, through pruning
- (iii) Should have a deeper root system to reduce direct competition for resources with coffee.

2.7.2 Recommended Shade Trees

- (i) Cordia
- (ii) Albizia
- (iii) Macadamia
- (iv) Mangoes
- (v) Avocado
- (vi) Grevillea robusta
- (vii) Sesibania

(viii) Calliandra

(ix) Leuceana



Shade Tree

2.8 Irrigation

Irrigation is the artificial application of controlled amounts of water to the soil at predetermined intervals to supplement rainfall especially when the tree is carrying a heavy crop. Irrigation may be done through drip, overhead, basin, or using a bucket.

2.8.1 Irrigation of Young Coffee

Water the seedlings at least two times a week until they are well established during dry weather conditions. Regulate the amount of water applied to encourage deeper root establishment

2.8.2 Benefits of Irrigation

- (i) Increases production especially during low rainfall seasons
- (ii) Increase coffee bean sizes thus a higher proportion of premium grades

- (iii) It may be used to induce flowering and allows timely ground fertilizer application in case of rain failure
- (iv) It protects the tree from damage arising from overbearing when there is drought

2.8.3 Types of Irrigation

- (i) **Drip Irrigation** – Water is delivered through laid out drip lines that have equally spaced openings. It is the most economical in terms of water use and efficiency
- (ii) **Overhead Irrigation** – This is the use of sprinklers to apply water above the coffee bushes. It is expensive, uneconomical in water usage and predisposes the coffee trees to disease attacks.
- (iii) **Basin Irrigation** – Holes are dug between the coffee trees and water is applied into holes
- (iv) **Bottle Irrigation** – This is the use of bottles to apply water under the tree canopy.

2.9 Weed Management

A weed is any undesired plant growing within the coffee field. Control of weeds should be done before they produce seed (fourth leaf stage). Weeds compete with coffee plants for water and nutrients and eventually lead to reduced crop growth, low yields, poor quality coffee beans and loss of income.

There are five methods of weed control - cultural, mechanical, chemical, biological and Integrated.

2.9.1 Cultural weed control is done by mulching, close spacing of the crops or using cover crops.

2.9.2 Mechanical weed control is done by hand weeding, hoeing, slashing or using a simple engine driven weeding implements such as motorized weeding equipment. Do not weed using a hoe in the rainy season as it increases the risk of soil erosion. It is recommended to use a regular hoe for weeding young coffee and a forked hoe for opening up hard soil pans in mature coffee to avoid injuring the root system of the coffee plants.

2.9.3 Chemical weed control is the use of herbicides in the management and control of weeds and should be used as a last resort. It is advisable to slash the weeds first and then spray the re-growth with herbicides while they are still tender and soft and before they flower and become hard. Use recommended herbicides at recommended rates. It is not advisable to use chemical weed control in coffee plants less than 2years old to minimize risk of killing or damaging them.

2.9.4 Biological

Livestock grazing (sheep and poultry). In areas where the climate is hot and humid, there is fast growth of weeds, such weeds can be managed by grazing sheep and poultry such as ducks and Guinea fowls. Edible weeds can be used as vegetables where herbicides are not used. Chicken are not suitable because they scratch the ground and hence expose the roots of young coffee trees. Goats are also not allowed because they can de-back the coffee trees. Cattle are not allowed because they can break the coffee trees and can also trample the young coffee trees.

2.9.5 Integrated

It is an approach to manage weeds using a combination of several methods. Its more cost effective and avoids indiscriminate use of herbicides that might lead to residue accumulation.

2.10 Intercropping

This is the growing of another crop alongside coffee to increase farmers returns though maximum utilization of the available growing space. Intercropping can be carried out within the first 18 to 24 months after coffee establishment or during change of cycle by clean stumping. Ideal intercrops should have the following characteristics: early maturing to fit in the rainy periods only, should not be creeping plants unless the crop is trained on stakes and not alternate hosts to coffee pest and diseases.

Recommended intercrops include beans, tomatoes, Irish potatoes and cabbages. The intercrop must utilize only the 1.5m space between coffee rows and number of rows to be reduced as the coffee canopy expands.



Intercropping in young coffee



Unplanned Robusta coffee intercropping

CHAPTER 3

3.0 ROBUSTA COFFEE NUTRITION

The coffee plant requires adequate supply of nutrients in order to produce optimally. For high coffee yields, there is need for adequate and timely supply of both macro and micro nutrients. The nutrients can be supplied from various sources such as fertilizers, manures and composted plant materials. A fertilization program needs to be developed based on soil conditions, crop productivity, and other cultural practices. Farmers are advised to have their soils analysed at laboratories accredited by the relevant bodies.

The recommended fertilizer regimes for Robusta coffee are as follows:

3.1 Inorganic fertilizers

Inorganic fertilizers are manufactured artificially and contains minerals or synthetic chemicals. Inorganic fertilizers can be in form of granular, powder and liquid packaging. They can be soil or foliar applied.

3.1.1 Soil Applied Inorganic Fertilizers

- (i) For the first two years' nitrogen should be applied as either CAN or Ammonium Sulphate (AS) at the rate of 50g/tree/application. This to be done in four applications per year.
- (ii) For mature coffee, AS and CAN are applied alternatively at the rate of 100g/tree/application or as per soil analysis recommendation. Four applications are made in a year in the months of March, May, August and November
- (iii) NPK 17:17:17 or 20:10:10 is applied at a rate of 250g per tree six months before flowering based on the soil analysis report.

3.1.2 Foliar Applied Inorganic Fertilizers

These are formulations of soluble and liquid fertilizers applied on the foliage of coffee trees to supplement soil applied fertilizers. The aim is to correct nutrient deficiency and supplement nutrient availability during dry weather, cold spells, when a tree is carrying a heavy crop or pest attack. Flowering can be boosted by application of zinc and boron as foliar feeds 2 months before main flowering.

Application

Its best applied when temperatures are low especially early in the morning or late in the evening to prevent leaf scotching.

3.2 Organic Fertilizers

Organic fertilizers are derived from decomposed organic matter that creates a natural source of plant nutrients. Application of the organic material to the soil improves its quality, texture, physical, chemical and biological composition. The organic matter includes farmyard manure, compost, composted coffee pulp and crop waste.

Application

- Apply 1-2 dekes of well decomposed manure/coffee pulp once a year during the dry weather, a month before the rains.
- Dig a shallow furrow about 30cm wide and 4 inch deep starting from the drip line going back to the stem.
- Apply the manure and mix with the soil using a fork jembe.

3.3 Robusta Coffee rehabilitation and renovation

Rehabilitation is the stumping or pruning of coffee trees to rejuvenate diseased, aging or otherwise underproductive trees. Renovation is the entire replacement of diseased, aging or otherwise unproductive trees with new plants. It also involves infilling dead spots in existing farms and planting more coffee to attain optimal plant density.

3.3.1 Importance of Renovation and Rehabilitation

- i) Brings back into production coffee trees that have been neglected and improves quality.
- ii) Rehabilitation of neglected farms contributes to increased National production.
- iii) Renovation helps to bring back farms into profitability.

3.3.2 Factors to consider in renovation and rehabilitation

- i) **Extent of diseases and insect pest attack:** some pest and disease damage can be overcome without replanting but severe outbreaks can necessitate replanting.
- ii) **Climate change:** increasing temperatures and moisture stress can demand replanting with drought – tolerant varieties, or varieties that are particularly suited to yield in certain climatic condition.
- iii) **Agricultural practices:** poor agricultural practices can lead to the deterioration of trees to the point where they require R&R. It is important that R&R is always accompanied by GAPs to prevent the same decline.
- iv) **Age:** coffee production, quality and resistance to diseases may deteriorate with age that may necessitate renovation.
- v) **Succession management:** lack of proper succession management within coffee farming business leads to negligence of the farms upon the demise/incapacitation of the owner/ investor.

3.3.3 Rehabilitation and renovation process

- Rehabilitation is normally conducted after the peak productive period and may involve pruning or change of cycle.
- It starts by clean stumping, then raising of suckers and finally selecting two or three suckers raised as the new heads.
- Maintain GAP to avoid trees deteriorating again.

3.3.4 Steps in undertaking rehabilitation and renovation

- i) Assess short- and long-term viability of R&R based on cost, capacity and farmer willingness to invest.
- ii) Design a program and focus on farmer need analysis.
- iii) Identify and partner with suitable support organizations.
- iv) Source for funding by either own savings or grant/loan.
- v) Implement the components of the program.
- vi) Follow up to monitor efforts and evaluate results.



Rehabilitation of Robusta coffee by clean stumping

CHAPTER 4

4.0 ROBUSTA COFFEE CANOPY MANAGEMENT

4.1 Introduction

Canopy management in Robusta coffee is the overall process of ensuring optimal production of the bearing wood in order to maximize annual regular cropping. It includes pruning, tree training, de-suckering and change of cycle.

4.2 Pruning

Pruning is the removal of broken, dead, unproductive, aged, diseased and pest damaged stems. It is an essential task for maintaining strong and healthy coffee trees. Pruning is done to create well structured, healthy trees that give good cherry yields over the productive cycle.

4.2.1 Benefits of Pruning Coffee

- a. Maintain the correct balance of the leaf area for optimum crop yield and improve the quality of the produce.
- b. Eliminates unnecessary competition for nutrients by removing unproductive wood, hence allowing the tree to produce good crop yields year after year.
- c. Removes weak branches that will not yield, or that will yield minimal crop.
- d. Creates better access to the canopy of the tree when spraying pesticides.
- e. Reduces the die-back caused by over-production and keeps the tree in a state of vigorous and productive growth.
- f. Creates conditions that are less favorable to pests and diseases attack

4.3 De-suckering

De-suckering is the removal of suckers that grow from the main stem or at the base of the trunk. These “suckers” (water shoots) should be removed using secateurs when they are still very young, tender and succulent. De-suckering is done to check excessive growth to avoid competition from many suckers, open up the canopy, enhance productivity and to achieve less disease and pest incidences. It is carried out at least every 4 months. Do not allow suckers to grow unless they are raised for the purpose of change of cycle or replacement of broken heads.

4.4 Change of cycle

It is the process of rejuvenating or renewing old bearing heads to raise new bearing heads from the developing suckers. It can be carried out through gradual replacement or clean stumping.

4.4.1 Gradual replacement

In case of 3 heads, remove 1 head facing the east direction first and for 2 heads, cut off the inside primary branches leaving a bearing head 2.5ft from the top. This will open up the tree and allow the suckers to grow.

Allow only suckers originating at least 12-18 inches (just below knee high) from the ground and remove any other suckers arising or originating above or below the recommended height.

When the suckers are about 18 inches, cut off and leave 2-3 suckers to develop into new bearing heads.

A year later the new suckers will be ready to bear the crop. Remove 1 head facing east and leave 1 head to bear with the new heads.

In the next bearing season remove the remaining head and allow the young heads to continue bearing.

4.4.2 Clean Stumping

It is the removal of all heads from the farm. It should be done in blocks to allow continuous income generation by the farmer.

CHAPTER 5

5.0 INSECT PEST AND DISEASE MANAGEMENT

5.1 Introduction

Robusta coffee is more tolerant to pest infestation and is well adapted to warm and humid equatorial climates. Control of diseases and insect pests is important since it protects the coffee tree and crop against damage in order to ensure maximum production and quality.

5.2 Coffee Diseases

The common diseases affecting Robusta coffee are Coffee Leaf Rust (CLR) and Coffee Wilt Disease (CWD).

5.2.1 Coffee Leaf Rust (*Hemileia vastatrix*)



Coffee leaf rust

Symptoms

- Pale yellow spots appear on the underside of the leaves at the onset of infection
- The spots later change to yellow/orange powdery masses
- Affected leaves fall off prematurely in case of severe infection. This condition may cause dieback if not controlled

Conditions favoring high disease incidences

- Humid conditions
- Wind and or rain that disperses the spores

- After the dispersal of spores, at least 3 hours of wetness on the leaves are required for them to germinate. Only germinating spores on the lower surface of a leaf can penetrate and cause infection

Management of Leaf Rust

- **Cultural** –Regular change of cycle
Use of resistant varieties and conversion of susceptible varieties to resistant ones through top working.
- **Chemical** – This entails the use of recommended Copper-based fungicides. Timing is critical for the control of leaf rust and the sprays should be applied before the commencement and during the early period of the rainy season. For effective management:
 - Start the 1st round of spray just before the onset of the short rains (October) and repeat 3 weeks later (November)
 - Start the 2nd round of sprays before the onset of long rains (Mid-February) and do 2 more rounds at 3 weeks' interval (March and April) if the infection persists
 - In case the infection is severe (20% of leaves have rust), it is necessary to use a systemic fungicide such as Alto or Bayleton. Do not spray more than 2 times a year to avoid accumulation of high Maximum Residue Levels (MRL's)
 - Adhere to the recommended spray programme as improper use of fungicides may lead to development of resistance by the pathogen

5.2.2 Coffee Wilt Disease (CWD) *Fusarium xylarioides*



Coffee wilt disease

Coffee wilt disease is a major disease affecting Robusta coffee but currently confined to Eastern Africa. The effect of CWD in Kenya is still restricted to certain farms however, there is need for scouting within the farms for early detection and management.

Symptoms

- The affected coffee tree may start by yellowing and/or curling of leaves, wilting and rapid leaf defoliation.
- Progressive die back of whole tree starting from the apex (tips) of the stem spreading downwards to all branches and eventually the whole plant dies once the bark is chipped,
- At advanced stages, cracks (or cankers) usually occur around the collar region (area of the main stem just above the soil) of the stems of affected plant.
- Coffee berries on the affected tree ripen prematurely, dry up, but remain attached to the primary branches.
- An infected and dried up coffee plant remains firmly rooted in the ground

Control

- Use of clean planting materials and resistant varieties
- Affected trees to be uprooted and destroyed
- The area where there were infected trees, should be left to fallow and an alternative crop planted for at least 1.5 years

- Wounds in coffee trees should be treated with recommended fungicides eg captan
- Berries from infected trees should not be harvested together with coffee from healthy trees to avoid transmission of the disease to the healthy trees
- Field tools in infected fields must be sterilized with disinfectant before moving from one tree to another and before use in a fresh field.

Robusta is rarely attacked by coffee berry disease and red blister disease. To control their spread in cases of severe outbreaks, fungicides recommended for Arabica coffee can be used. Some of the fungicides include copper formulations such as red copper, green copper, blue copper or chlorothalonil.

5.3 Coffee Insect pests

The insect pests attack coffee flowers, berries, leaves, branches, stems and roots leading to reduction in yields and coffee quality. Major insect pests affecting Robusta coffee include: -

5.3.1 Coffee Berry Borer (CBB) *Hypothenemus hampei*

This is an important pest for Robusta coffee. It is characterized by one or more small round holes near the apex of mature green or ripe berries. The damaged bean has blue green stains and may contain up to 20 larvae of different sizes.



Coffee berry borer



Damage caused by berry borer

Cultural control

The cultural control practices include maintaining 30% shade in coffee farms, regular coffee picking especially during the coffee peak period, remove infested berries from ground or on the trees. The infested berries should be burned or buried deep in the soil and the remaining crop is stripped after the end of harvesting season.

Chemical control

Spraying with the recommended chlorpyrifos based insecticides.

If the infestation was severe in the previous season, spray twice at 3-week interval that is at 15th and 18th week from the main flowering.

5.3.2 Black and white ants

The ants are controlled by budding the stem with either 750ml Decis 25EC or 700 ml Dursban 480EC in 20l of water. Add 15g Methylene blue as a marker. The cultural control is through cutting off branches touching the ground and weeds that touches on branches thus removing any bridges for the ants.

5.3.3 Thrips

These are tiny sucking insects that reproduce in mass during the dry period.



Thrips (Diarthrothrips coffea)

Symptoms

- White silvery patches with black spots on leaves, berries and green shoots
- Heavy infestation causes defoliation

Control

- **Cultural**
 - Mulching, shading and irrigation
 - Use of sticky traps
- **Chemical** -Spray using a recommended insecticide at Economic threshold level (ETL) of 1-2 insects per leaf when there is drought and 2-3 when there are rains.

5.3.4 Green scales and Mealy bugs

They suck the sap from the shoots leading to reduced production and quality.

Symptoms and damage

- Rows of flat oval green scales along main leaf veins and near tips of green shoots
- Mealy white masses of insects (Mealy bugs) between clusters of berries and/or flower buds
- Sticky honey dew and sooty mould growing on leaves
- Presence of attendant ants on infested coffee trees



Green scales Mouldy soot on berries, branches and leaves

Control

The management of green scales, brown scales, white waxy scales and the Kenya mealy bugs is similar.

Cultural:

- De-suckering and removal of branches touching the ground
- Proper weeding to avoid weeds becoming bridges to the ants

Chemical:

- In case of severe infestation, spray the infested trees (spot spraying) with mineral oil e.g., white oil or DC-Tron plus (100ml in 20 litres of water)

Integrated method:

- Apply a 6-inch band at the base of the trunk with a recommended insecticide e.g., dursban/sumithion at a rate of 700ml in 20lts. This will prevent attendant ants thus giving room for natural enemies (lady bird beetles) to control the scales.
- Smoothen the trunk by rubbing before applying the insecticide.

5.3.5 Root Mealy bug

This is a soil-borne pest that infests the roots of coffee plants. The infested tree turns yellow, wilts and eventually dries. When the trees are uprooted, the white mass of insects (bugs) is exposed.

Symptoms and damage

- The leaves turn yellow leading to wilting and drying of the tree
- On uprooting of the affected trees, stunted Roots that are encased in clusters of greenish and white fungal tissue are observed
- White bugs are visible after peeling off the fungus.

Control

Cultural

- Uproot infested trees, leave the holes open for 3 months and replant as recommended under coffee establishment

Chemical

- Apply the recommended insecticide during establishment and/or infilling.
- Ground application along the drip line of infested coffee trees with recommended insecticides when soils are wet.



Coffee infested with root mealy bug

CHAPTER 6

6.0 COFFEE HARVESTING AND PROCESSING

6.1 Robusta Coffee Harvesting and Post-Harvesting Handling Practices

Harvesting is one of the critical steps within the coffee value chain where quality of coffee can be either compromised or maintained. Coffee berries ripen progressively and may be picked at two weeks intervals over a period of about 2 months. Good post-harvest practices are critical in maintaining quality.

In order to harvest properly farmers must stick to the following harvesting quality controls:

- Ripe red cherries should be selectively picked by hand. Well-harvested coffee maintains quality and attracts better prices in the market.
- Use clean containers while harvesting in order to avoid contamination.
- Fallen cherries should not be picked from the ground during harvesting. These cherries are frequently contaminated with Ochratoxin A that may be from mould growths.
- After harvesting hand sort the coffee berries to remove over-ripes, immature cherries, leaves, twigs and start drying the coffee the same day of harvesting.

6.2 Robusta Coffee Processing

There are two methods for Robusta coffee processing namely dry processing and wet processing. Proper coffee processing is important because it sustains bean quality and thus ensures better prices to growers. The major difference between dry and wet processing is how the fresh cherry is treated.

6.2.1 Wet processing

Wet processing is more complex than dry processing, requiring specific equipment and the availability of large quantities of clean water. Green coffee beans produced in this type of processing are usually of better quality and commands higher prices. There are two methods of wet processing which include:

(a) Full wash process

This process entails the physical removal of fresh cherry skin manually or by a powered pulping machine with addition of water (pulping). The sugar coating (mucilage) is allowed to ferment over one to two days and then the parchment is washed thoroughly to remove all traces of fermented mucilage. The parchment is dried until the bean inside reaches 10.5-11% moisture content. This process requires large quantities of water and requires very good management of the fermentation and washing process to ensure the coffee flavor is not compromised in the process.

(b) Semi-wash process

In this process, the skin of the fresh cherry is physically removed by a pulping machine with addition of water, as in full-wash processing. The mucilage is then removed immediately after pulping using a mucilage remover. Immediately after removing the mucilage, the clean parchment is ready for drying until the bean moisture reaches 10.5-11%.

(c) Drying of parchment

The drying of parchment coffee takes between 10 to 15 days. Parchment coffee must be properly dried to avoid mould growth and contamination in order to achieve/maintain good quality. It is advisable to dry parchment coffee on raised wire mesh platforms under moderate sun to avoid cracking of the parchment skin. Coffee should not be dried directly on the ground/soil or dirty

surface as this may lead to dirty coffee or earthy flavors in the finished coffee product. Coffee should not be spread out too thick (more than 2 inches) on the drying surface/areas. Good storage of dry parchment coffee is essential using clean sisal/jute bags and on pallets in clean stores.

6.2.2 Dry processing

Dry processing involves sun drying of cherry immediately after harvesting and the final product is Robusta buni. The process of drying buni coffee takes 14 -30 days depending on weather conditions. Dried buni coffee must have moisture content of 10.5-11% prior to milling. It should be black in colour and must have no smell and free of extraneous matters such as stones, dust and mould that may lead to development of Ochratoxin A (OTA). Proper drying of coffee leads to maintaining good quality of the coffee. Always dry coffee on raised drying tables built with wire mesh. Cherry must be turned regularly to allow uniform drying and should be covered at night and during rainfall to avoid re-wetting. During the first two or three days of drying ensure that the layer is as thin as possible (not more than 4 cm or 1.5 `thick) to speed the drying process and avoid mould growth.





Hand sorting and sun-drying of Robusta coffee cherry

6.3 Robusta Coffee storage

Parchment or Buni must be well stored to avoid contamination and mould growth. A good parchment store should have the following features:

- It should be isolated from strong smelling liquids such as petrol or paraffin or diesel, or agricultural fertilizers and chemicals to avoid contamination of the final cup.
- The coffee store should have cemented floor, plastered wall and must be well ventilated.

Storage conditions:

- Parchment or dry cherry (Buni) should be stored in either clean sisal or jute bags.
- Do not store parchment or Buni in polybags bags as the coffee will absorb moisture leading to the growth of moulds
- The coffee bags should be placed on pallets that are raised to at least 15cm to avoid wetting by ground moisture and stacked bags should be placed at least 30cm away from the walls and ceiling.
- Proper procedure for receiving coffee into storage should be developed. The first in first out (FIFO) system should be followed.



Store equipped with wooden pallets, 15cm above the floor

6.4 Milling and Grading

Milling involves mechanical removal of husks and silver skin from the dried Buni and parchment coffee (in case of wet processing) is delivered to dry mill for milling to remove the husks. The green beans are graded into Robusta coffee grades based on density, size and shape.

6.4.1 Grading

(a) Robusta coffee grading by density.

Grading by density, size and shape is only a fair estimate of coffee quality. The actual quality of coffee is assessed by experienced coffee cuppers after roasting and brewing a sample of the coffee already graded by size.

The dry processed Robusta coffee (Buni) is milled and graded into the following grades using a gravity separator.

S/ No	Grade	General Description
1	RH	Robusta Heavy
2	RL	Robusta Light

(b) Size Grading

The wet processed Robusta coffee (parchment)it is milled and graded using standard screens into the following grades:

Screen Size 1/64	mm	Grade	Bean Size Tolerance %
20	8.00	1	5 ¹
19	7.50		
18	7.10		
17	6.70	2	
16	6.p		
15	6.00	3	
14	5.60		
13	5.00	4	
12	4.75		
<12	<4.75	5	

6.5 Robusta Coffee Quality Analysis

Robusta coffee is a type of coffee that is used to produce instant coffee which is preferred by many global consumers.

6.5.1 Classification

Robusta coffee classification follows the same protocol with the Arabica coffee except in the cupping format. Green coffee is traded based on grades and class and this determines the final market price. Coffee classification in Kenya is based on bean grade and liquor quality.

6.5.2 Coffee classification procedure

In coffee classification, the attributes of raw, roast and liquor are evaluated and recorded.

Raw: colour, formation, size, defects

Roast: Brightness, centre cut, uniformity, defects

Cup/ liquor: fragrance, aroma, body, acidity, sweetness, uniformity, taint, fault, clean cup, aftertaste, balance.

Overall class: This is the average of raw roast and cup Class 1 the best and class 10 the worst.

6.5.3 Green Coffee defects

After milling coffee, the following are the common defects in the green beans:

- a) Amber beans which have yellowish appearance and usually due to iron deficiency.
- b) Black beans which have the surface and the interior partly black, which may arise from faulty drying or poor storage leading to mould growth.
- c) Diseased beans which arise from infections particularly from coffee berry disease and other fungal infection in the farm or storage
- d) Faded coffee which has whitish pale appearance due to mould growth on the surface or prolonged storage.
- e) Some of the beans are ragged and dark at the tip. This defect occurs when coffee is under dried above 11% moisture content and stored in humid conditions
- f) Foxy beans that have a brownish silver skin that results from wet processing of over ripe cherry

6.5.4 Coffee cup defects and their causes

S/No	Defect	Cause	Prevention
1	Earthy	Soil contact with coffee	Coffee recovered from soil should be processed separately
2	Potato	Poor storage in humid conditions	Store coffee in a cool dry place
3	Woody flavour	Prolonged storage	Coffee should be processed and sold immediately
4	Fruity	Over ripe coffee	Timely harvesting
5	Musty flavour	Poor storage and overripe	Store coffee in a cool dry place and avoid re wetting of coffee

6.5.5 Coffee quality descriptors

a) Green Coffee

Colour – Greenish to yellowish and brownish

Coated - beans covered with over 50 % silver skin results from drought or overbearing conditions

Black beans - due to overripe coffee that has been harvested after falling off the tree

Pales/quakers/faded - trees grown under poor conditions(drought) resulting to yellowish cherry

b) Liquor

There are three components at this stage that describe quality of the cup

i) **Acidity** - a sharp and pleasing characteristic and depends on origin of the coffee

Pointed - fine acid sharpness

- ii) **Body** - a strong mouth-feel and full pleasant characteristic as opposed to being thin
- iii) **Flavor** - it's the general descriptive sweetness of coffee
- c) **Off-flavors** - this constitutes the poor undesirable cup quality as a result of poor processing and husbandry
 - **Musty** - beans stored in wet places
 - **Earthy** - wet earth flavor- coffee that had contact with the soil
 - **Grassy** - greenish flavor prevalent in coffee harvested when premature
 - **Woody** - hard wood like flavor found in old coffee which has been stored too long.

Fine - coffee with distinct quality characteristics e.g. acidity body and flavour

Fruity - strong overripe prevalent in coffee left too long in the cherry

Sour - a sharp excessively acidic biting flavor

Sweet - a nice clean soft coffee free of any harshness

Thin - flat lifeless coffee lacking in body or acidity

6.5.6 Green Robusta grades

a) **Fine Robusta**

To be considered fine Robusta, the coffee shall have zero (0) primary defect and no more than five (5) secondary defects in 300g sample

b) **Premium Robusta**

To be considered premium Robusta, the coffee shall have zero (0) primary and (8) secondary defect in a 300g sample

c) Off Grade Robusta

Coffee containing more than (8) combined primary and secondary defects per sample shall be considered of commodity of off grade coffee

d) Specialty Robusta coffee

Specialty coffees are very high-quality Robusta coffee which have niche markets and are evaluated using CQI /SCA coffee analysis protocol

Green bean analysis.

Primary defects	Full defect threshold
Full black	1
Full sour	1
Dried cherry pod	1
Foreign matter	1
Severe insect damage	5

Primary defects have a direct impact on the cup quality of coffee

Secondary defects	Full defect threshold
Partial black	3
Full sour	3
Immature	5
Withered	5
Flouter spongy	5
Chalky white	5
Broken chipped or cut	5
Parchment bean	5
Shell	5
Hull or husk	5
Slight insect damage	10

Secondary defects impact mainly of the appearance of coffee but not necessary the cup quality.

CHAPTER 7

7.0 MARKETING

7.1 Co-operatives Societies, Estates, Associations and Companies

These are registered and licensed institutions for the purpose of aggregating Robusta coffee from members to facilitate marketing and payments. These institutions also source and guarantee credit facilities for their members as well as sourcing of farm inputs in bulk for their members at discounted prices.

7.2 Marketing Systems

There are two marketing channels in Kenya through which Robusta coffee is sold namely; the Central Auction and Direct Sales. The Central auction is managed by the Nairobi Coffee Exchange Management Committee, the membership of which is drawn from the industry stakeholders. Coffee marketing agents who have been contracted by coffee growers competitively offer coffee for sale to coffee dealer (exporters) to the highest bidders. The Directorate annually licences the marketing agents and dealers who participate at the auction floor.

a) The Central Auction

Robusta coffee growers can offer their coffee for auction at the Nairobi Coffee Exchange through licensed marketing agents/brokers.

b) Direct sales

The **Direct Sales** entail engagement between the grower marketer and overseas buyers. Grower marketers are coffee growers who are licenced to market own coffee directly to overseas buyers. However, in cases where the growers do not have the capacity to market directly, the process is facilitated by commercial marketing agents by way of drawing sale agreements between a grower and a buyer and those offering marketing logistics.

Growers are paid net proceeds less deduction of agency fee, management fee, storage charges, transport charges, milling and cost of export bags among others.

7.3 Payments

Growers are supposed to be paid by the agency responsible for marketing their coffee within a period of 14 days from the date upon which their coffee was sold. Coffee payments to societies or estate farmers of Robusta coffee are made in US Dollars.

It is advisable for Robusta coffee growers to form marketing co-operative societies for purposes of aggregating coffee volume for sale.

Upon receipt of coffee proceeds from the marketing agents or from the buyer through direct sales, the society management officials are required to prepare payment calculation requests (PCR) for purposes of calculating the payment rate to be made to individual farmers based on the quantities of cherry or parchment delivered for processing whichever the case.

7.4 Value Addition

Robusta coffee is very important for value addition in coffee. This is because it is an important ingredient in instant coffee. To reduce the quantity of instant coffee imported into the country, Robusta coffee growers should take advantage of this by increasing Robusta coffee production to facilitate establishment of value addition plants in the country. This will save the country on the much-needed foreign exchange used to pay for the import of processed Robusta coffee.

With increased production of Robusta coffee, the Directorate, through consultations with strategic investors, may initiate establishment of value addition plants for instant coffee production in one of the regions where the crop is grown. This will offer ready market for Robusta coffee while at the same time creating employment for the youth as well as saving on foreign exchange.

7.5 Trade Promotions

The Directorate, by nature of its mandate, spearheads the promotion of Kenya Coffee in both domestic and international markets. Robusta coffee is one of the coffee types which has a niche market and has high demand in both local and international markets. To enhance awareness creation, the Directorate will support organized Robusta coffee co-operative societies by organizing exhibitions, trade fairs, shows, trade missions and expos to showcase their coffee. This will help Robusta farmers get buyers, roasters and investors through market linkages. Further, the Directorate may include the names of Robusta coffee growers in its Supply Chain catalogue usually shared with Kenyan embassies abroad and other stakeholders for more market linkages creation.

7.6 Domestic and International Markets

Demand for Robusta coffee is growing in the local market. Unfortunately, the instant coffee consumed locally is imported. To leverage on this, the Directorate has partnered with a number of local Kenyan universities and other institutions of higher learning to promote consumption of locally grown Kenyan Coffee. Robusta coffee is popular with the youth who are the majority in the institutions and therefore the growers stand a chance of benefiting from this partnership. Such partnerships offer ready market for Robusta coffee grown in the country.

There is also increasing number of coffee houses in the country which serve instant coffee to their clientele. To take advantage of this growth of numbers of coffee houses, the Directorate promotes the consumption of Kenyan grown Robusta coffee in these coffee outlets. Further, the Directorate is also promoting the stocking of Kenyan Robusta coffee in the shelves of value chain supermarkets in the country.

In the international front, countries like Italy, Netherlands, Finland, Denmark and most of the EU member countries are keen in importing Robusta coffee from Kenya. The Directorate in partnership with foreign embassies in the country, has made arrangement for investors to promote production of Robusta coffee in Kenya which will be used to feed their manufacturing plants located in foreign countries. Robusta co-operative societies who would wish to export their produce directly to the international markets will be accorded the necessary trade facilitation.

7.7 Trade facilitation

The Directorate undertakes to support Robusta coffee farmers and co-operative societies through licensing, issuance of International Certificate of Origin (ICO), and also the issuance of clean coffee movement permits. The Directorate will also capacity build co-operative society officials and estate farmers on market requirements and marketing intelligence. The capacity building will incorporate the use of competitive packaging, branding, labelling and E-Marketing. Licensed Robusta coffee exporters are opted in the single window system for purposes of export.

7.8 Warehousing

These are licensed, registered, designated and bonded warehouses where coffee is stored after milling and in readiness for export.

CHAPTER 8

8.0 REGULATIONS

8.1 Government Policy and Strategy on Robusta Coffee Production in Kenya

Robusta Coffee research is a centralized service carried out at coffee Research Institute (CRI) in Ruiru. The Robusta research program aims to promote Robusta production in the Lake Victoria basin and the Coast region through development of varieties with high yield and quality, tolerant to diseases and moisture stress.

According to the Kenyan Constitution 2010, agriculture is a devolved function. All Robusta coffee growers will be registered and licensed by the respective county governments whether as cooperatives, unions, associations or individual estate growers. By joining and producing through farmer organizations too would enhance the achievement of economic benefits from Robusta coffee production through pooling resources, commodity bulking, increasing bargaining power and chances of directly dealing with exporters.

After the devolution of the Agricultural function, the extension services were also devolved and therefore will be offered by the devolved units.

Production, processing and marketing of coffee in Kenya is a regulated process due to the importance of the coffee value chain to the country. From the farm to the fork there is a need for both registration and licensing of players to ensure a well guided and coordinated sector that promotes growth for the stakeholders and the country at large.

There are two marketing systems in Kenya through which Robusta coffee is sold namely; the Central Auction and Direct Sales. The growers offer their coffee at the central auction through their appointed licenced Marketing Agents. The licenced buyers competitively bid for the coffee where the highest bidder is confirmed as the buyer.

8.1 Registration and Licensing

In order to regulate the industry, all players along the value chain are registered and licensed in line with the provisions of the constitution on devolution of functions. All nursery operators, growers, wet and dry mills and ware houses are registered and licensed by the respective county governments while Marketing agents, Warehousemen, exporters and roasters are registered and licensed by the national government.

8.2 Corporate Governance

Adherence to the principles of sound corporate governance is key to the success of any institution. Growers' institutions involved in the production and marketing of Robusta coffee must adhere to principles of good corporate governance as provided for in numerous policy and legal guidelines.

Grower institutions are required to observe prudent financial management in all facets of the institutional management while observing gender equity and equality in their leadership structures as well as reflecting the face of Kenya by mainstreaming of women, youth and Persons living with disabilities (PLWD) in line with the Kenya constitution 2010.

8.3 Standards and Code of Practice

Kenya coffee is mainly grown as a crop for domestic and export consumption in the domestic and global markets. This makes it important to ensure that products supplied to those markets meet the necessary requirements in terms of quality and food safety.

Production, processing, warehousing and marketing of Robusta coffee should be carried out in compliance with the Kenya coffee standards and the industry Code of practice (COP)

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