

# REPUBLIC OF KENYA



## DRAFT NATIONAL EMERGING CROPS POLICY

May, 2010

**Ministry of Agriculture,  
Kilimo House,  
Cathedral Road,  
P. O. Box 30028 – 00100,  
Nairobi, Kenya.  
Tel. +254-20-718870  
E. mail: [psagric@kilimo.go.ke](mailto:psagric@kilimo.go.ke)  
Website: [www.kilimo.go.ke](http://www.kilimo.go.ke)**

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## **FOREWORD**

Agricultural growth and development is crucial for Kenya's overall economic and social development. Agriculture directly contributes 24% to GDP and 60% of the export earnings. The sector has experienced growth from 2002 after a decade decline (-3 percent in 2002). However, in 2008 agricultural sector growth dropped to -1.7 down from 7.1 in 2007. The Government has outlined, in its Vision 2030 policy paper, the key role the Agriculture sector will play under the economic pillar and the Agricultural Sector Development Strategy (ASDS) 2009-2020, both of which aim at improving the standard of living of Kenyans. Agriculture has also been identified as one of the key sectors to deliver the 10 per cent annual economic growth rate envisaged under the economic pillar. Thus, the Government is committed to implementing actions that will make the agriculture sector vibrant.

One of the opportunities among others is the cultivation of new and emerging crops. These are plants whose potential is under-exploited, could contribute to food security, nutrition, health, income generation and environmental service and improving both the quantity and quality of useful products. The traditional and new uses of the crops such as biofuels, pharmaceuticals, nutritional, confectionary and cut-flowers have emerged in the recent past, while new economic realities such escalation of oil and fertilizer prices, increased food prices in the international and domestic markets, and developments in the international and domestic markets, have renewed interest in the emerging crops among farmers and other stakeholders due to enhanced economic value.

The challenges facing the sub-sector include; research, extension service provision, production, markets and marketing and processing. The dissemination of new technologies is poor due to lack or poor information base as far as these crops are concerned. The extension packages are limited due to the fact that the packages are based on information from other countries or traditional knowledge which may not be applicable in Kenyan situation. Further, the research efforts on emerging crops by the research institutions are disjointed. These shortcomings have resulted to continued underdevelopment of the sub-sector.

This policy has been developed to address the above challenges. The policy aims at giving clear direction for sustainable development of the emerging crop sub-sector and underscores the importance of public-private sector partnerships in accelerating growth in the sub sector. The policy has addressed issues pertaining to research, extension, production, processing, marketing and, institutional and legal framework. In each case, specific policy intervention measures have been proposed to address challenges along the value chain.

All the changes proposed in this policy paper will need to be supported by an appropriate legal framework and will require the support of all stakeholders for its successful implementation.

**Hon. Sally Kosgei, *E.G.H., M.P.***  
**Minister for Agriculture**

## **PREFACE**

Increased frequency and magnitude of variations in climatic parameters such as global warming, floods, drought, storms and other ecological disasters that have been witnessed in the recent past have caused environmental and climate change posing a serious challenge to the Kenyan agricultural sector. As a consequence agricultural land meant for growing of traditional conventional food crops has shrunk and productivity decreased presenting double pronged challenge to feed the ever increasing population. Alternative new crops that can withstand the calamities provide an opportunity to overcome these challenges and thus, the interest in emerging crops.

The National Policy on emerging Crops outlines the Government's policy on development of the emerging crop sub-sector. These plants, whose potential is under-exploited, could contribute to food security, nutrition, health, income generation and environmental service and are good in improving both the quantity and quality of useful products.

The objectives of the policy is to transform the emerging crops sub sector into a key player in enabling Kenya become a regionally and internationally competitive provider of agricultural products by transforming the industry, from a low-income, low-efficiency and low technological innovation subsistence farming through exploitation of the full agricultural potential. Thus, ensuring food security, increased farm incomes, poverty reduction and diversification at both farm and national level. In addition the creation of sustainable linkages among collaborating institutions for improved efficiency in the sector and the promotion of use of modern technologies in the sub-sector will be pursued.

The implementation of this policy will further form part of the larger policy, institutional and legal reforms that the Ministry is currently undertaking in various industries and commodity-specific sub sectors in order to create favourable environment for improved sector performance.

The Ministry's is grateful to all those who worked with the Ministry for their contribution in the formulation of this Policy.

Kiritu M. Wamai, EBS  
**Ag: Permanent Secretary**  
**Ministry of Agriculture**

## ACRONYMS

<b>AEZ</b>	Agro Ecological Zone
<b>ASALs</b>	Arid and semi arid lands
<b>ASCU</b>	Agriculture Sector Coordination Unit
<b>ASDS</b>	Agriculture Sector Development Strategy
<b>BOT</b>	Build Operate and Transfer
<b>CBD</b>	Convention on Bio-Diversity
<b>CITES</b>	Convention International Trade in Endangered Species
<b>EIA</b>	Environmental Impact Assessment
<b>EPC</b>	Export Promotion Council
<b>ERS</b>	Economic Recovery Strategy
<b>FPEAK</b>	Fresh Producers Exporters Association of Kenya
<b>GDP</b>	Gross Domestic Product
<b>GHG</b>	Greenhouse gas
<b>GIS</b>	Geographical Information Systems
<b>GoK</b>	Government of Kenya
<b>GPS</b>	Geographical Positioning System
<b>HCDA</b>	Horticultural Crops Association of Kenya
<b>IACS</b>	International Agricultural Centres
<b>IPR</b>	Intellectual property rights
<b>IPR</b>	Intellectual Property Rights
<b>ITK</b>	Indigenous technology knowledge
<b>KAM</b>	Kenya Association of Manufactures
<b>KARI</b>	Kenya Agricultural Research Institute
<b>KEBS</b>	Kenya Bureau of Standards
<b>KEFRI</b>	Kenya Forestry Research Institute
<b>KEPHIS</b>	Kenya Plant Health Inspectorate Service
<b>KEPSA</b>	Kenya Private Sector Alliance
<b>KIRDI</b>	Kenya Industrial Research Development Institute
<b>KWS</b>	Kenya Wildlife Service
<b>M&amp;E</b>	Monitoring and evaluation
<b>MENR</b>	Ministry of Environment and Natural Resources
<b>MoA</b>	Ministry of Agriculture
<b>MoCD</b>	Ministry of Corporative and Development
<b>MoE</b>	Ministry of Energy
<b>MoF</b>	Ministry of Finance
<b>MOLG</b>	Ministry of Local Government
<b>MoT</b>	Ministry of Trade
<b>MoT&amp;C</b>	Ministry of Transport and Communication
<b>NARS</b>	National Agricultural Research System
<b>NCST</b>	National Council for Science and Technology
<b>NEMA</b>	National Environment Management Authority
<b>NCST</b>	National Council for Science and Technology
<b>NMK</b>	National Museums of Kenya
<b>PIC</b>	Prior informed consent
<b>RELO</b>	Research and Extension Liaison Officer
<b>SP</b>	Agriculture Strategic Plan
<b>TRIPS</b>	Trade Related Aspects on Intellectual Property Rights
<b>UPOV</b>	International Union for the Protection of New Varieties of Plants

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## **EXECUTIVE SUMMARY**

The Government is committed to actions that will make the agriculture sector vibrant. One of the key opportunities is the cultivation of new and emerging crops. The Government is in the process of putting measures to develop and promote these crops to address food insecurity and poverty in the areas where there is potential for their production. Due to recent developments in the international and domestic markets, emerging crops have generated great interest among farmers and other stakeholders because of their enhanced economic value. However, their adoption has been slow in Kenya due to poor research-extension linkages, lack of agronomic packages, underdeveloped markets, and inadequate policy framework to support their development.

The potential for growing these crops is high but is still unexploited due to various challenges. These include uncertainty of market outlets, inadequate staff, and farmer knowledge, which is slowing down the rate of adoption. Establishment is picking up but documentation of initiatives is lacking because of poor coordination. A policy framework needs to be put in place in order to solve challenges of research, extension, production, processing, utilization, markets, market access, and address the environmental concerns.

The broad objective of this policy thrust is to transform the emerging crops sub sector into a key player in enabling Kenya become a regionally and internationally competitive supplier of new agricultural products by reversing the industry, from a low-income, low-efficiency and low technological innovation farming through exploitation of its full potential. The specific objectives of the policy are; to promote emerging crops as an alternative source of livelihood for rural communities, enhance research capacity to generate appropriate technology and formulate appropriate legal and institutional framework for emerging crops promotion among others.

This policy document is arranged in six Chapters. Chapter 1 gives the background information on the state of emerging crops in Kenya, the current situation, policy objectives, specific objectives, and finally the broad objective of this policy. Chapter 2 comprises the constraints encountered in research, extension, production, processing and utilization, markets and market access and finally, the environmental concerns. Policy interventions towards addressing the identified constraints are highlighted in Chapter 3. Chapter 4, 5 and 6 give the institutional framework, funding of the policy document and the implementation framework respectively. The Annex gives a review of emerging crops and the available industry information.

## **1. INTRODUCTION**

### **1.1 Background**

The agricultural sector has continued to be the backbone of the national economy contributing directly 24% of Gross Domestic Product (GDP) and 65% of the export earnings. In addition, the sector provides food security and livelihood of over 80% of the Kenyan population. The strengthening of the agricultural sector is a prerequisite for maintaining economic recovery and growth.

A number of guiding policies and strategies have greatly influenced the sector. These include the Agriculture Sector Development Strategy (ASDS), the Ministry of Agriculture Strategic Plan 2008-2012 and the Vision 2030. Under the SRA, the agricultural sector recovered from negative 3% in 2002 to positive 5.4% in 2006. The sector is now on a positive growth and development path. Under the Vision 2030, agriculture has been identified as one of the key sectors to deliver the 10 per cent annual economic growth rate envisaged under the economic pillar. Under this pillar the Government aims at promoting an innovative commercially-oriented agriculture through actions that will make agriculture realize the sector objectives.

Kenya's agriculture continues to be dominated by traditional high value export crops like tea, coffee and horticulture. Though these crops are a significant source of foreign exchange, they are cultivated by a small proportion of the nation's farming community. The cultivation of emerging crops will therefore provide one of the opportunities for providing an avenue to farmers in diversifying into new areas of commercial farming.

Emerging crops are promising plant species/varieties or cultivars that are either indigenous, wild or domesticated, introductions, or re-introductions that have potential for commercialization at regional or local level for food, fibre, fodder, oil, medicinal, ornamental, aromatic, timber etc. These plants, whose potential is under-exploited, could contribute to food security, nutrition, health, income generation and environmental service and are good in improving both the quantity and quality of useful products.

The volatile nature of the world politics and international relations has led to renewed interest in the exploitation of emerging crops. For example the World Trade Organization (WTO) agreements on trade, the Kyoto protocol on environment and the recent unprecedented increase in petroleum prices, have created renewed interest in emerging crops including bio-fuels. This is reflected in world petroleum prices have been triggered to unprecedented levels due to the balkanization of supply of petroleum products and which has made distillation of

fuel oils from hitherto uneconomical biological sources viable, leading to renewed interest in biofuels.

Increased frequency and magnitude of variations in climatic parameters such as global warming, floods, drought, storms and other natural or ecological disasters that have been witnessed in the recent past have caused environmental change posing a serious challenge to the Kenyan agricultural sector. As a consequence agricultural land meant for growing of traditional conventional food crops has shrunk and productivity decreased presenting double pronged challenge to feed the ever increasing population. Thus, alternative new crops that can withstand the calamities provide an opportunity to overcome these challenges and thus the interest in emerging crops.

Traditional and new uses of the crops such as biofuels, pharmaceuticals, nutritional, confectionary and cut-flowers have emerged in the recent past, accompanied by new economic realities such escalation of oil and fertilizer prices with concomitant increase in demand for biofuels and alternative fertilizers. Food prices in the international and domestic markets have not been spared by the meltdown and developments in the international and domestic markets, has renewed interest in the emerging crops among farmers and other stakeholders. However, the emergence of these crops from their natural environment in the past has been hampered by ecological, economic and socio-cultural factors.

Conventional medicine has mostly relied on chemical based pharmaceuticals which on prolonged use have undesirable side effects and create drug-resistant microorganisms. For example, the recent development of resistance by malaria and tuberculosis parasites to the common therapeutic drugs is a case in point. There is thus renewed focus on alternative remedies to the resistance of microorganism to the chemical drugs in emerging crop products.

Processing and refining of foods and food products have promoted consumption of convenient foods that are increasingly deficient in essential nutrients. This has brought about an increase in diet and malnutrition related diseases thus creating awareness and interest in nutrition and health related issues. As a result nutraceuticals (food supplements) especially from emerging crops have gained prominence.

However, adoption of the emerging crops has been slow due to various factors including poor research-extension linkages, lack of agronomic packages, inaccessible markets and inadequate policy framework to support their development.

The ecological consequences of potentially weedy species growing wild from cultivation are a risk often associated with introduction of new crop species. Among the potential emerging crops, species listed elsewhere as weedy, such as *Jatropha curcas* should be thoroughly researched upon to mitigate possible negative impact on natural vegetation should the species escape from cultivation.

This policy gives broad guidelines on the development of the emerging crops subsector and provides the framework for the growth of the industry including the capturing and transitioning of such crops into regular crops. In addition, the policy will be relevant for the domestication of the CBD, The Global Strategy on Invasive Alien Species, The African Pollinator Initiative Plan of Action, the Common African Plant Protection Strategy and the Sanitary and Phytosanitary Agreement of the WTO among the national, regional and international policy framework

## **1.2 Current Situation**

### **1.2.1 Production**

The cultivation of new and emerging crops has generated great interest among various stakeholders and farmers due to their potential economic value. Key among them are jatropha, aloe, artemisia, vanilla and jojoba among others (see Annex I).

However, the hectareage under these crops, their production and productivity is low. These crops are mainly produced by the small-scale farmers. The current source of planting materials of the crops are from farmer to farmer, imported and collected from the wild without due regard to their ability to adaptation to local conditions, resistance to pests and disease and quality. Production technology has generally been lacking owing to the novel nature of the crops and problems associated with adaptation.

The environment under which the emerging crops are grown is ecologically unstable under the current economic socio-cultural set-up. The environmental impact of introduction and/or up-scaling of the emerging crops is not well known or documented.

The Government is putting in place measures to develop and promote emerging crops so as to address food and nutrition insecurity and poverty. The focus has been directed towards development of technical materials, capacity building of extension officers, and development of a strategy for the biodiesel industry. *Jatropha curcas* is the choice crop for feedstock and development of the strategy for conservation and management of commercial Aloe species in Kenya.

### **1.2.2 Research**

Various institutions such as Kenya Agriculture Research Institute, institutions of higher learning, the National Museums of Kenya, the Kenya Wildlife Service, Kenya Forestry Research Institute, Kenya Forest Service and International Centre for Insect Physiology and Ecology are carrying out research on emerging crops. The current research activities include collection of germplasm and adaptation trials. However, current research efforts are disjointed with institutions carrying out individual mandates resulting in duplication and ineffectiveness. The efforts are further marred by absence of a clear policy direction leading to weak research-extension-farmer linkages. There is need to develop production and post-harvest handling technologies on emerging crops.

### **1.2.3 Extension Service Provision**

The major player in extension service provision is the Ministry of Agriculture with a few private organizations and NGOs which have limited technical collaboration among them. Extension provision is not adequate due to inadequate information and capacity among the extension providers. Some of the available extension packages are based on information from other countries and have not been verified and adapted.

### **1.2.4 Processing and Utilization**

Processing is limited due to the low level of production and inappropriate technologies. Product diversity is also limited. Among the processed products includes confectionery, powders, jams, cosmetics, medicines and biofuels that are sold locally and also exported. The processing is mainly done by the private sector who is mainly motivated by making profits and not necessarily on development of the crops.

Utilization of emerging crops produce at farm level conforms to traditional crops due the low development of processing technologies. Utilization is poor due to unfamiliar taste/use preferences of the products. Consumption of raw and semi-processed products is common.

### **1.2.5 Markets and marketing**

Markets are limited and poorly developed due to the limited supply of the commodities, low demand and no set quality standards. Most of these markets are concentrated in the dry lands. The plants are collected and sold locally for

medicinal, cosmetic and subsistence use. The marketing is mainly done locally on individual basis with no organized channels, limited market information with no specific focus on niche markets. There is no benefit to the local communities where they are growing large quantities because of the low profitability. Trade in these crops benefits a few agents (brokers) and exporters leaving out the majority of the players in the value chain. International trade for most emerging crops is unstructured and the exact turnover from it has not been accurately determined.

## **2. POLICY OBJECTIVES**

As outlined in the Vision 2030, and its First Medium Term Plan (2008 - 2012), the Agricultural Sector Development Strategy and the Ministry of Agriculture Strategic Plan 2008 - 2012, the thrust of this policy will focus in contributing towards the envisaged national and sector objectives as follows:

- Enable Kenya to become a regionally and internationally competitive producer of agricultural products.
- Transform agriculture into a high-income, efficient and technologically innovative sector.
- Exploit agricultural potential in ASAL areas and,
- Enhance knowledge and skills of farmers and extension staff.

### **2.1 Broad Objective**

The broad objective of this policy initiative is:

To transform the emerging crops sub sector into a key player in enabling Kenya to become a regionally and internationally competitive provider of agricultural products by transforming the industry, to a high-income, high -efficiency and high-technological innovation farming through exploitation of the full agricultural potential.

### **2.2 Specific Objectives**

The following specific objectives will lead to the realization of the above broad objective:

1. Promote emerging crops as an alternative source of livelihood for rural communities through empowering farmer based associations, encouraging value addition, product diversification and utilisation.
2. Establish and manage a database for capturing and transitioning emerging crops as well as enhance information sharing and exchange.
3. Enhance research capacity to generate appropriate technology through the development and retention of skilled manpower and lobby increased resource allocation.
4. Formulate appropriate legal and institutional framework and guidelines for promotion of Indigenous Technical Knowledge (ITK), innovations, encourage ethics in research including use of Prior Informed Consent (PIC)

and benefits sharing with resource owners and foster protection of Intellectual Property Rights (IPR) as well as limit exploitation of endangered species.

5. Domesticate and assent to international conventions, treaties and agreements on biological resource conservation, utilization and trade and enforce existing national policies and regulations on the same.
6. Establish mechanism to foster institutional and multi-institutional coordination and collaboration in research and information sharing as well as directing the inclusion and prioritisation of emerging crops in research agendas
7. Provide enabling environment for public-private partnerships and information exchange along the value-chain as well as institute incentives for investment.
8. Build necessary capacity for improved technology transfer and adoption along commodity value chain.
9. Build capacity and develop appropriate and harmonised agronomic packages for extension service providers.
10. Develop demand driven products and avail clear/standardized market information.

### **3. CONSTRAINTS AND POLICY INTERVENTIONS**

#### **3.1 Research Constraints**

Emerging crops sub-sector is faced with a number of constraints ranging from research, extension service provision, production, market and marketing and processing.

Research on emerging crops is carried out by various institutions focusing mainly on germplasm collection and adaptive trials. These research efforts are disjointed with institutions carrying out individual mandates, which may result in duplication and ineffectiveness. The research constraints cut across the emerging crop value chain from production to marketing and include limited access/exchange of appropriate germplasm research; germplasm improvement (domestication, selection, breeding and multiplication); mapping for crop suitability for specific agro-ecological zones (AEZs); species characterization and mapping public and private partnerships in research support; and limited development partners.

The specific constraints are highlighted below:

### **3.1.1 Constraints**

#### **A) Limited Access/Exchange of Appropriate Germplasm Research**

Inadequate skilled manpower particularly within the National Agricultural Research Systems (NARS) contributes to improper collection and identification of germplasm. Project oriented collections of endemic and wild species may lead to under-collections of some germplasm with a potential for commercialization. This leads to poor documentation and biopiracy of these species. Biopiracy of some emerging crops through borders contributes to endangerment of these species.

There is lack of coordination and collaboration amongst researchers in NARS, IACS and regional networks which has lead to inefficient use of research funds, poor documentation and secrecy of research findings resulting to duplication of research efforts and inadequate technological packages. Inadequate resources and lack of modern equipment for conservation of genetic resources has lead to genetic erosion.

#### **b) Germplasm Improvement**

This involves domestication, selection, breeding and multiplication. Failure to prioritize emerging crops in research agenda has resulted to limited information on potential crops for improvement and domestication; lack of skilled manpower; poor coordination and collaboration amongst researchers and institutions. International conventions such as UPOV, CITES, CBD and local policies limit access to germplasm of emerging crops.

#### **c) Public and Private Partnerships in Research along the Value-Chain**

Ineffective enabling policy and legal framework to foster public-private partnerships has led to poor political commitment on investment in research on emerging crops that is market driven. Furthermore, lack of incentives to attract private sector funding has led to poor support of research by the private sector.

#### **d) Species Characterization and Mapping for Crop Suitability in Specific Agro-Ecological Zones (AEZs)**

There is limited support given to research activities on characterization and mapping of emerging crops; coupled with inadequate agronomic studies and poor access to existing information. In addition there is inadequate technical capacity for characterization and mapping.

### **3.1.2 Research Policy Interventions**

The Government is committed to address policy concerns in research in the areas of access, exchange and improvement of appropriate germplasm, public-private partnerships along the value-chain, mapping for crop suitability and species characterization.

#### **a) Access and Exchange of Appropriate Germplasm for Researchers**

The constraints identified in access and exchange of appropriate germplasm for researchers will be addressed through:

- (i) Strengthening institutional research on emerging crops through coordination by the Ministry of Research Science and Technology.
- (ii) Availing an up-to-date database on emerging crops research on the web maintained by NCST.
- (iii) Strengthening local, regional and international networking and enhancing coordination to facilitate germplasm exchange, collection, conservation and exchange
- (iv) Fostering continuous sharing and dissemination of research findings and new information through scientific symposia.
- (v) Instituting a reward system through competitive grant to foster multi-institutional collaboration.
- (vi) Intensifying and modernization of surveillance mechanisms on biopiracy.

- (vii) Creating public awareness through education on salient features of emerging crops.
- (viii) Allocating more resources for research on emerging crops to develop skilled personnel capacity, increase remuneration and acquire equipment.

#### **b) Germplasm Improvement**

This involves domestication, selection, breeding and multiplication. Policy Interventions towards germplasm improvement will encompass:

- (i) Inclusion and prioritization of emerging crops in the national research agenda.
- (ii) Enhanced internet connectivity to foster access of information on emerging crops by researchers.
- (iii) Availing an up-to-date database on emerging crops research on the web.
- (iv) Increased subscription to information sources (journals).
- (v) Domestication and enforcement of international conventions (CBD, UPOV, TRIPS); harmonisation of regional sanitary and Phytosanitary standards and incorporation of international conventions on plant genetic materials in the curriculum of tertiary training institutions.
- (vi) Promoting research and development (acquisition, screening, evaluation, selection, bulking) of emerging crops.
- (vii) Promoting multiplication of clean/true-to-type planting material.
- (viii) Enhance access to genetic resources through Prior Informed Consent (PIC) and benefit sharing.
- (ix) Developing mechanisms to promote and acquire Intellectual Property Rights (IPR).
- (x) Establishing mechanism for capturing new emerging crops.
- (xi) Increased inter-ministerial alliance

#### **c) Public-Private Partnerships in Research along the Value-Chain**

The policy intends to institute the following measures to strengthen public-private partnerships:

- (i) Engage stakeholders (private sector, public sector, farmers, CBOs, NGOs, donors) in research priority setting.
- (ii) Create an enabling environment for private sector participation in research and investment on emerging crops through formulation of necessary legal framework.
- (iii) Cultivate trust and sharing of benefits accrued from research.

#### **d) Species Characterization and Mapping**

Mapping for crop and species suitability in specific agro-ecological zones (AEZs) will be improved through:

- (i) Increased support and building capacity for mapping by enlisting local financial institutions to support research.
- (ii) Procurement of GIS/GPS hardware and software for mapping
- (iii) Create awareness and facilitation of avenues for increased access to and exchange of information on crop suitability maps
- (iv) Building capacity for species/variety characterization and mapping.
- (v) Creating centres of excellence.
- (vi) Purchase of rights to access genetic maps for species characterisation.

## **2.2 Production Constraints**

The production of emerging crops is undertaken on relatively small scale. These crops are produced under undeveloped socio-cultural and physical environment that limit their production and productivity. The crops are new meaning and as such their production infrastructure is limited or non-existence. The low hectarage are due to unavailability of planting material and land tenure issues, inadequate knowledge and markets.

The Production of emerging crops is faced by the following constraints;

### **3.2.1 Constraints**

#### **a) Competition between Emerging Crops and Other Food Security Related Enterprises**

The anticipated competition due to land tenure system, and the likely negative effect on food and nutrition security arising from abandoning production of food crops and livestock.

**b) Lack of Awareness of Potential Emerging Crops and Their Value and Benefits.**

Farmers have not been growing many of emerging crops on large scale due to lack of awareness of their value, inadequate production technologies, limited markets and low prices. They consider potential crops just wild plants with little or no commercial value.

**c) Inadequate Supply of Clean Planting Material**

Most of the emerging crops planting materials are available in private nurseries, exchanged between farmers, harvested from the wild or imported, without information on their quality. The supply of planting materials is not sufficient. Protocols for some emerging crops to facilitate rapid plant propagation and multiplication are not available.

**d) Unsustainable Exploitation of Wild Species**

Some emerging crops like aloe are harvested extensively from the wild. These species are threatened through habitat degradation and pressure of harvesting from wild for local use and export. Most of the people doing the actual harvesting are drawn to it due to emergence of new lucrative markets and associated low investment costs.

**3.2.2 Interventions on Production Constraints**

In order to address the above constraints on production, the policy focus will be directed towards increasing the area under these crops by removing bottle-necks that limit their production and productivity. Specifically, the following interventions measures will be implemented:

**a) Appropriate Enterprise Selection and Farmer Empowerment**

Production of emerging crops alongside food crops will be promoted through farmer education and gender empowerment. In order to address land tenure, ownership, use and related land constraints, the Government will encourage proper land use planning and promote farm planning and appropriate enterprise choice to address food and income needs of the farmers through the existing and

new extension programmes. In addition the Government will initiate projects and programmes targeting the promotion of emerging crops.

**b) Develop a Reliable Seed/Planting Materials Supply System**

The government will mandate relevant institutions dealing with supply of seeds/planting materials i.e. KEFRI, KARI, HCDA and KEPHIS to undertake promotion, including registration of seeds/materials supply production centres. In addition networks and exchange of information, including the improvement of a germplasm information exchange system, with key players in research and extension on production of seed/planting materials of emerging crops will be strengthened to ensure increased awareness by industry players on sources of planting materials. To ensure clean planting materials phytosanitary certification will be undertaken.

**c) Manage Sustainable Exploitation of Wild Species**

The government recognises that there are a range of emerging crops some of whose exploitation are guided by international conventions and local regulatory frameworks under the mandate of public institutions. In order to allow for sustainable exploitation, the Government through relevant public institutions will oversee sustainable *in situ* exploitations, taking into consideration the national constitution, of some specific wild species that emerge as crops and whose domestication is wanting.

**3.3 Extension Service Constraints**

There are various extension service providers for emerging crops from private and public sector. The private sector offers extension service on emerging crops of their interest with little intra-sectoral collaboration often leading to duplication of efforts. The extension service provided is not adequate due to limited technical capacity and information amongst extension providers. Most of the available extension packages are based on information obtained from other countries, which may not be easily adapted to the local situation. Technology transfer is limited by the following factors:

**3.3.1 Constraints**

- i. Poor research-extension-farmer linkages leading to poor technology transfer and diffusion
- ii. Inappropriate technical packages for emerging crops.
- iii. Low adoption of emerging crops technologies

- iv. Limited technical capacity on emerging crops by extension service providers.
- v. Inadequate funding of extension activities on emerging crops.
- vi. Economic and social-cultural factors (beliefs, norms, gender) impede technology adoption.
- vii. Inflexibility of development partner funded extension programmes/ approaches that are not in line with local priorities and set development plans.

### **3.3.2 Interventions on Extension Services**

This policy is geared to address duplication of efforts, limited capacity, inadequate information and low adoption through the following interventions:

- (i) Establishment and strengthening offices of the Research, Extension Liaison Officers (RELO) within research and academic institutions.
- (ii) Promotion of multi-sectoral on-farm adaptive trials by researchers, extension service providers and other stakeholders.
- (iii) Promotion of participatory development of appropriate technical packages.
- (iv) Encouragement of public-private partnership on provision of extension service for emerging crops.
- (v) Building capacity of extension staff with modern technologies along the value chain.
- (vi) Promotion and exposure by extension staff on current technologies/packages from more advanced sources (organizations within or other countries)
- (vii) Designation of specific extension staff to become Emerging Crops Officers.

Provide increased funding for extension service providers on emerging crops.

### **3.4 Processing and Utilization**

Processing is limited by the low levels of production of emerging crops in the country. This low level of production in addition to absence of incentives to increase production continues to be a disincentive to investment in processing capacity by prospecting entrepreneurs. Local processing by cottage industries in absence of quality standards and enforcement mechanisms has led poor quality products which have contributed negatively to local utilization and marketing of

emerging crops products in the international markets. Consumer preferences and tastes of conventional products have limited utilization of emerging crops.

### **3.4.1 Constraints**

#### **(i) Inadequate Processing Capacity and High Cost of Processing**

Inadequate processing capacity is brought about constraints like low volumes of production of raw materials, limited technical capacity, limited incentives for private sector investment and expensive and unreliable supply of electricity.

#### **(ii) Low Quality Product Standards**

The industry has not developed technical standards for product quality assurance and safety. This has led to low quality products which has negatively affected utilization and marketing. In addition, inadequate information has lead to low quality products and produce.

#### **(iii) Low Value Addition and Narrow Product Range**

There is limited value addition undertaken for emerging crops which has led to narrow product range thus limiting the diversification and potential usage of emerging crops.

#### **(iv) Limited Utilization of Emerging Crops**

Due to limited knowledge on the various uses, and preferences towards conventional products coupled with lack of information on availability and accruing benefits from usage, the utilization of emerging crops has been relatively low.

### **3.4.2 Interventions on Processing and Utilization**

Processing and utilization of emerging crops are directly influenced by technology, finances and volumes of raw materials, while the quality of the products, their diversification and the extent of value addition determines the level of utilization and hence production. In order to address the constraints associated with processing and utilization of emerging crop products the Government will implement the following measures:

#### **(i) Build Processing Capacity and Reduce the Cost of Processing**

Encourage private /public sector investment in large scale processing of emerging crops through tax incentives and favourable investment climate.

In order to make local processing a viable and economically attractive venture, measures to increase the acreage and productivity of emerging crops will be pursued.

**(ii) Development and Enforcement of Product Standards**

In order to ensure high quality products that will attract broader acceptance and profitable returns both locally and internationally, the Government through the KEBS will develop required product standards where such are absent and ensure conformity to the set standards.

**(iii) Promote Value Addition and Increase Product Range**

The Government will pursue measures geared towards value addition and exploitation of the full potential of the emerging crops to increase the product range. Local initiatives at both cottage and industrial levels on value addition will be supported through specific and ongoing government funding initiatives such as the Youth and Women Development Funds.

**(iv) Improve Level of Utilization Of Emerging Crops**

In order to promote utilization of emerging crops and their products the government will increase awareness on the uses, importance, availability and marketability.

**3.5 Markets and Market Access**

Marketing of emerging crops is highly influenced by infrastructure, poor identification of potential markets and their accessibility and low exploitation of packaging and value addition options. Further, trade on emerging crops in Kenya is at relatively small scale both at the local and for the international market.

**3.5.1 Constraints**

**a) Inadequate Value Addition and Awareness of Potential Markets**

Due to limited value addition and awareness by growers of potential markets there is low trade in emerging crops. There is limited information flow between producers, extension agents and traders. Because of the limited awareness of potential markets and due to inaccessibility of the existing markets, the trade in emerging crops and their products are not well organized and there is undercutting between traders and growers. There is also low product range.

**b) Barriers to Trade in Regional and International Markets.**

Trade barriers associated with particular emerging crops arising from international conventions and treaties, unfavorable trade practices, tariff and none-tariff barriers that limit trade in emerging crops and their products.

**c) Inadequate Market Research and Market Information**

There is inadequate market information exchange system as no or very limited coordinated market research is undertaken. This leads to uncertainties in market.

**3.5.2 Markets and Marketing Interventions**

The markets and marketing of emerging crops are dominated by trade in raw materials. Processing and value addition of products for local and international markets are poorly developed due to inadequate infrastructure and high operation costs. Trade promotion efforts have been directed towards removal of trade barriers and improved packaging in line with market demands. There is need for continuous research on products of emerging crop along the value chains. To address these constraints the following measures will be instituted by the policy.

**a) Promotion of Value Addition and Creation of Awareness of Potential Markets**

Identification and sensitization of players on alternative markets for processed and raw products from emerging crops will be undertaken. Further, the Government will promote diversification of products through processing and value addition and improved packaging in line with market demand. In order to empower the farmer in the market place, grower associations will be promoted.

**b) Removal of Trade Barriers to Facilitate Access to Wider Markets**

Regulations governing trade and utilization of emerging crops will be enforced. Government will examine and review barriers to trade associated with tariffs, non-tariff and other unfavourable trade practices to improve trade in the emerging crops.

**c) Market Research and Information Exchange System**

Market research is important in ensuring continued access to existing and emerging markets and market demand. The Government, through relevant departments and public institutions, will engage private sector partners and

grower institutions in establishing mechanisms to ensure continuous conducting of market research and exchange of information on markets.

### **3.6 Environmental Constraints**

The high potential areas of Kenya cover only 10% of the arable lands. With increase in the population, use of this land has been diverted to production of high value crops and settlement. This leaves the option of emerging crops targeting arid and semi areas (ASALs) that have fragile ecosystems. Measures should be put in place for sustainable production and commercialization of these crops. Experiences shows that emerging crops introduced with appropriate technologies, regulations and standards can help to mitigate most of these environmental problems. This policy will promote investment in environmental friendly farming practices and technologies. The major environmental constraints are as follows:

#### **3.6.1 Constraints**

- (i) Effect of emerging crops on soil ecosystems and water availability such as ground water recharge.
- (ii) Competition with indigenous species (flora and fauna) is not documented.
- (iii) Loss of biodiversity in agro-ecosystem.
- (iv) Introduction of exotic species to the environment is not documented
- (v) Management of effluent (waste/by-products) from processing of emerging crops
- (vi) Demand for emerging crops could increase the demand for more land and therefore increase pressure for deforestation.

#### **3.6.2 Environmental Policy Interventions**

To address the environmental concerns the policy will institute the following intervention measures:

- (i) Undertake environmental impact assessment and audit (EIA) for all projects targeting promotion of emerging crops.
- (ii) Institutionalize measures to commercialize emerging crops while conserving the environment.
- (iii) Promote use of agricultural best practices such as environmentally sustainable harvesting methods and conservation agriculture.



## **4.0 INSTITUTIONAL FRAMEWORK AND FINANCING**

### **4.1 Key Institutions Involved in Emerging Crops**

#### **4.1.1 Ministry of Agriculture**

The Ministry of Agriculture coordinates the implementation of agricultural policies, extension and training, land and crop development and, agribusiness and marketing. While performing its roles emphasis will be put to meet all the strategic activities in the emerging crops policy as stipulated. The Ministry will spearhead coordination of various stakeholders in implementation of outlined policy interventions. The Ministry will prioritize emerging crops as important for food and nutrition security and allocate more resources, provide specialized extension services for development, promotion and facilitation of quality emerging crops produce.

#### **4.1.2 Ministry of Environment, Natural Resources**

The MENR responsibilities environmental policy, environmental impact assessment, catchments area conservation, water conservation. The Kenya Forest Service (KFS) within the MENR will intensify and modernize surveillance mechanisms of emerging tree crops.

#### **4.1.3 Ministry of Finance**

The Ministry of Finance is charged with the responsibility of formulating financial and economic policies. The Ministry derives its mandate from the Constitution of Kenya, Cap VII Sections 99-103 which provides for proper budgetary and expenditure management of Government financial resources. The Ministry will mobilize adequate resources to support Government programmes and activities in the emerging crops sub-sector. The Ministry will collaborate with other sector Ministries in the identification, planning and management of development partner support to ensure that it is targeted to the promotion of emerging crops. This Ministry will create an enabling environment in which the organizations spearheading the promotion of emerging crops can operate effectively and efficiently.

#### **4.1.4 Ministry of Local Government**

The Ministry of Local Government and local authorities will in liaison with the Ministry of Agriculture, the Kenya Bureau of Standards and other stakeholders undertake review of regulations under their respective statutes to promote proper emerging crops marketing standards and their enforcement.

Local Authorities are governed by the Local Authorities Act, Cap, 265. They are involved in the development of markets and market infrastructure for produce in their respective areas of jurisdiction. They are also responsible for collection and

disposal of garbage, provision of sanitary facilities and land allocation for marketing facilities. They collect fees and charges from agricultural produce and they are expected to plough back some of these revenues in the maintenance of rural access roads and in the maintenance and development of new markets. The Local Authorities will undertake the development of market infrastructure and improve rural access roads for improved market access for emerging crops.

#### **4.1.5 National Council for Science and Technology**

The NCST is a statutory institution of the Government of Kenya established in July 1977 by the Science and Technology Act, Cap 250 of the Laws of Kenya. The purpose was and still is to provide machinery for making available to the Government advice upon all matters relating to the scientific and technological activities, and for coordination of research and experimental development together with matters incidental and connected therewith. The NCST will be responsible for coordination of research, update and maintenance of database on emerging crops and strengthening regional networks in germplasm exchange.

#### **4.1.6 Kenya Agricultural Research Institute**

Kenya Agricultural Research Institute is a parastatal established under the Science and Technology Act (Cap 250) with the national mandate to carry out research activities covering agricultural and livestock development through its 22 research centres countrywide. KARI is mandated to carry out research activities covering agriculture and livestock development thus, contributing to national development, through generation of technologies, new knowledge and innovations. KARI provides a range of services to the public including providing an advisory function, technical back-stopping and capacity building to the agricultural sector ministries, farmers and other agencies dealing with agricultural research for development; capacity development of other service providers including extension, NGOs, CBOs and civil society; management of a national gene bank; quality assurance of technologies developed, multiplied and disseminated through the uptake pathways; promotion of commercialisation of its technologies and products and catalysing linkage of farmers to markets; building and sustaining effective linkages and partnerships with local, regional and international research for development organisations; identification and prioritisation of research agenda together with partners; and offering laboratory and consultancy services. KARI will enhance its research capacity to continuously develop and disseminate emerging crops technologies, information and knowledge. It will also, together with its partners, continue to contribute to regional and international public goods on emerging crops.

#### **4.1.7 Kenya Plant Health Inspectorate Services**

KEPHIS was established by the Kenya Plant Health Inspectorate Service Order, 1996 under the State Corporations Act (Cap 446). It is mandated to coordinate all

matters related to quality control of agricultural inputs and produce. In undertaking this, KEPHIS oversees matters of pests and diseases control; quality and levels of toxic residue in plants; administration of plant breeder's Rights; seed certification, regulation of importation of seeds, plants and plant material and phyto-sanitary services. KEPHIS will work closely with research institutions and other stakeholders to ensure progressive increase in levels of emerging crops seed certification. In doing this KEPHIS will support the continuous review of regulations that govern emerging crops for improved availability of quality seed.

#### **4.1.8 Kenya Bureau of Standard**

KEBS is a parastatal established under the Standards Act (Cap 496). Its primary function is to promote standardization in commerce and industry through development of standards, quality control, certification and metrology. It has the mandate of establishing and enforcing quality standards of all products on the Kenyan market whether locally produced or imported. KEBS will continue to develop, review and enforce appropriate emerging crops products standards in liaison with relevant stakeholders.

#### **4.1.9 Kenya Industrial Research and Development Institute**

KIRDI is a parastatal established under the Science and Technology Act (Cap 250). It is mandated to undertake research and development in industrial and allied technologies. It will collaborate with the Ministry of Agriculture and other stakeholders in development and transfer of technologies in the processing of emerging crops.

#### **4.1.10 Universities and Colleges of Agriculture**

The universities and colleges undertaking research on emerging crops are Nairobi, Jomo Kenyatta, Moi, Egerton, Kenyatta University, and Pwani. This also provide courses at degree and diploma levels related to agriculture, horticulture and **environment**.

#### **4.1.11 National Environment Management Authority**

The National Environment Management Authority is mandated by the Environment Management and Co-ordination Act (No. 8 of 1999) to prepare and submit a State of Environment (SoE) Report every year to Parliament. The Report documents environmental issues and potential interventions to be undertaken by various sectors towards enhancing the status and quality of the environment. NEMA will undertake environmental Impact Assessment (EIA) to determine impact of new introductions and up scaling development of emerging crops.

#### **4.1.12 Kenya Forestry Research Institute**

The Kenya Forestry Research Institute was established in 1986 under the Science and Technology Act (Chapter 250) to carry out research in forestry and allied natural resources. The institute has a role to play in influencing policies on forest resource management. KEFRI will embark on agronomic studies of emerging tree crops and build capacity for mapping. It will also create awareness and facilitate avenues for increased access and exchange of information.

#### **4.1.13 National Museums of Kenya**

The East African Herbarium (EAH) within the National Museums of Kenya (NMK) is the principal herbarium in Tropical East Africa and houses the largest collection from the region with over 700,000 specimens. Currently, some 20,000 specimen records are now available in the Herbarium. This Herbarium is accessible to users electronically through a central database. Focus will be on rare species, type collections and specialist datasets for taxonomic, conservation checklists and inventory projects.

#### **4.1.14 Horticultural Crops Development Authority**

Horticultural Crops Development Authority was established under the Agriculture Act (Cap. 318) by promulgation of the Horticultural Crops Development Authority Order, 1967 (Legal Notice No. 229/1967). The HCDA has been playing a pivotal role in the promotion of the horticulture industry. The Authority, working with other stakeholders, has pursued strategies aimed at accelerating development of the horticultural industry in a coordinated nursery manner. The HCDA will be charged with inspection and registration of emerging fruit tree crop nurseries, regulation and control of cultivation, picking, transportation and marketing of emerging crops produce that are horticultural in nature .

#### **4.1.15 Kenya Wildlife Services**

Kenya Wildlife Service was established in 1990. It manages the biodiversity of the country, protecting and conserving the flora and fauna. KWS runs specific programmes to protect Kenyan species and habitats that are in particular danger. They have forest and wetland conservation programmes. KWS will enhance community participation in conservation and preservation of biodiversity that will lead to direct benefits from tourism and guaranteed survival biodiversity and nature for posterity. KWS will promote preservation of rare plant species through controlled harvesting of these rare plants and trees *in situ*. In order to fully satisfy the demand by local communities, KWS will supply seedlings for growing on private lands outside the protected areas.

#### **4.1.16 Other Important Institutions**

This include the Ministries of Culture and National Heritage (MoCNH), Ministry of Cooperative Development (MoCD), Ministry of Roads (MoR), Information and

Communication, Regional Development, Tourism, Transport, Public Health and Sanitation and, Environment and Mineral Resources. Other stakeholders who will play a vital role in the industry include the following; Fresh Produce Exporters Association of Kenya (FPEAK), Pest control Products Board (PCPB), Export Promotion Council (EPC), Emerging Crops Value Chain Development Committee (ECVDC), and local media houses. Financial institutions have continued to provide financial services to the industry. The industry requires such institutions to provide appropriate financial packages that would meet the needs of the various players within the value chain. The sector players will be encouraged to engage the financial institutions in the development of suitable financial packages that meet clients' needs in the sector. The development partners have continued to support the government through various programmes and projects in revitalizing the emerging crops industry. The development partners will engage the relevant Government line Ministries in supporting the development of a vibrant emerging crops industry.

#### **4.2 Proposed Institutional Arrangements**

In addition to the roles played by individual stakeholders, in order to effectively coordinate and support the emerging crops industry growth and development, the Government will establish an Emerging Crops Value Chain Development Committee (ECVCD) with a view to eventually transforming it into a coordinating Secretariat and eventually Emerging Crops Development Board (ECDB). The ECVCD will be chaired by the MoA and comprise of MoLD, MoE, MoT, MENR, NCST, KARI, KEPHIS, NMK, KEFRI, KENFAP, KFS and KWS. This committee will play an advisory role to further the realization of the policy objectives and coordinate transitioning of emerging crops. The ECDB, when eventually formed, will be funded by the GoK, internally generated industry fund and grants from development partners. The Government will further encourage the establishment and strengthening of stakeholder institutions like producers, processors and traders associations and promote constructive partnerships between them for improved industry performance.

## 5.0 IMPLEMENTATION FRAMEWORK

POLICY INTERVENTION	APPROACH	RESPONSIBILITY	TIME FRAME	INDICATORS
<b>1. RESEARCH</b>				
<b>Access and exchange of appropriate germplasm for researchers</b>	<ul style="list-style-type: none"> <li>a. Strengthen institutional research on emerging crops through coordination by the Ministry of Research Science and Technology.</li> <li>b. Avail an up-to-date database on emerging crops research on the web maintained by NCST.</li> <li>c. Strengthen local, regional and international networking and enhance coordination to facilitate germplasm exchange, collection, conservation and exchange</li> <li>d. Foster continuous sharing and dissemination of research findings and new information through scientific symposia.</li> <li>e. Institute a reward system through competitive grant to foster multi-institutional collaboration.</li> <li>f. Intensify and modernize surveillance mechanisms on biopiracy.</li> <li>g. Create public awareness through education on salient features of emerging crops.</li> <li>h. Allocate more resources for research on emerging crops to develop skilled personnel capacity, increase remuneration and acquire equipment.</li> </ul>	MoA, KEFRI, KARI, KWS, KFS, KEPHIS, Bioversity, NCST, KIPI, PBAK	Continuous	<ul style="list-style-type: none"> <li>continuous genetic improvement of emerging crops and generation of new varieties</li> <li>established websites and networks</li> <li>increased skilled manpower</li> </ul>

POLICY INTERVENTION	APPROACH	RESPONSIBILITY	TIME FRAME	INDICATORS
<b>Germplasm improvement (domestication, selection, breeding &amp; multiplication)</b>	<ul style="list-style-type: none"> <li>a. Inclusion and prioritization of emerging crops in the national research agenda.</li> <li>b. Enhanced internet connectivity to foster access of information on emerging crops by researchers.</li> <li>c. Avail an up-to-date database on emerging crops research on the web.</li> <li>d. Increase subscription to information sources (journals).</li> <li>e. Domestication and enforcement of international conventions (CBD, UPOV, TRIPS); harmonisation of regional sanitary and Phytosanitary standards and incorporation of international conventions on plant genetic materials in the curriculum of tertiary training institutions.</li> <li>f. Promote research and development (acquisition, screening, evaluation, selection, bulking) on emerging crops.</li> <li>g. Promote multiplication of clean/true-to-type planting material.</li> <li>h. Enhance access to genetic resources through Prior Informed Consent (PIC) and benefit sharing.</li> <li>i. Develop mechanisms to promote and acquire Intellectual Property Rights (IPR).</li> </ul>	KARI, MoA, NMK, KEPHIS, NCST, KEFRI, KFS, Commission for Higher Education, KIIPI, PBAK	Continuous	<ul style="list-style-type: none"> <li>▪ Identified candidate species for domestication, selection, breeding and multiplication</li> <li>▪ Technical Services outsourced</li> <li>▪ Germplasm exchange arrangements made</li> </ul>

POLICY INTERVENTION	APPROACH	RESPONSIBILITY	TIME FRAME	INDICATORS
	<p>j. Establish mechanism for capturing new emerging crops.</p> <p>k. Increased inter-ministerial alliance</p>			
<p><b>Public-private partnerships in research along the value-chain</b></p>	<p>a. Engage stakeholders (private sector, public sector, farmers, CBOs, NGOs, donors) in research priority setting.</p> <p>b. Create an enabling environment for private sector participation in research and investment on emerging crops through formulation of necessary legal framework.</p> <p>c. Cultivate trust and sharing of benefits accrued from research.</p>	<p>KARI, KEFRI, NMM, KWS, Private Sector Alliance, MoA, MoENR, NCST,</p>	<p>Continuous</p>	<p>Policy/guidelines on partnerships put in place</p> <p>Prioritised research</p> <p>Increased multi-institutional researches</p>

POLICY INTERVENTION	APPROACH	RESPONSIBILITY	TIME FRAME	INDICATORS
<b>Species characterization and mapping for crop suitability in specific agro-ecological zones (AEZs)</b>	a. Increase support and building capacity for mapping by enlisting local financial institutions to support research. b. Procure GIS/GPS hardware and software for mapping c. Create awareness and facilitate avenues for increased access to and exchange of information on crop suitability maps d. Build capacity for species/variety characterization and mapping. e. Create centres of excellence. f. Purchase of rights to access genetic maps for species characterisation.	KARI, NMK, KFS, KEFRI, KEPHIS	Continuous	Skilled manpower in GIS GIS overlays under development/developed Developed centres of excellence
<b>2. PRODUCTION</b>				
<b>Appropriate enterprise selection and farmer empowerment</b>	a. Enhance farmer education and gender empowerment b. Promote farm planning and appropriate enterprise selection c. Promote proper land use in respect to land tenure and ownership d. Initiate projects targeting promotion of emerging crops.	MoA, KWS, NMK, KFS, KEFRI, KARI, EPC	Continuous	Development of emerging crops enterprises Emerging crops grown by the marginalised based on profitability
<b>Develop a reliable seed/planting materials</b>	a. Establish and registration of seed supply production			<ul style="list-style-type: none"> <li>▪ Availability of clean</li> </ul>

POLICY INTERVENTION	APPROACH	RESPONSIBILITY	TIME FRAME	INDICATORS
supply system	centres b. Improvement of germplasm c. Strengthen of information exchange systems d. Develop phytosanitary certification measures	KEPHIS, KARI, HCDA	Within 5 years but improvement of germplasm continuous	seed/planting materials at farmer level ▪ Improved varieties
Manage sustainable exploitation of wild species	Enforce of regulations for exploitation of protected species, advocate sustainable utilization and conservation practices and encourage domestication.	KWS, NMK, KEFRI, KARI	Continuous	▪ Domestication of protected species/varieties ▪ Well managed and conserved wild species
<b>3. EXTENSION</b>				
Improve provision of Extension Service	a. Establish and strengthen offices of the Research, Extension Liaison Officers (RELO) within research and academic institutions. b. Promote multi-sectoral on-farm adaptive trials by researchers, extension service providers and other stakeholders. c. Promote participatory development of appropriate technical packages. d. Enhance public-private partnership in provision of extension service for emerging crops. e. Build capacity of extension staff with modern technologies along the value chain. f. Promote exposure of extension staff on current technologies/packages from more advanced sources (organizations within or from other countries) g. Designate specific extension staff emerging crops officers.	MoA, Private Extension Service Providers, KARI, KIRDI, Higher Learning Institutions	Continuous	▪ Development and dissemination of technical packages for emerging crops  ▪ Officers trained or undergoing training ▪ Deployment of RELOs ▪ On going demonstrations adaptive trials ▪ Levels of funding attracted from development Partners and Government

POLICY INTERVENTION	APPROACH	RESPONSIBILITY	TIME FRAME	INDICATORS
	h. Provide increased funding for extension service providers on emerging crops.			
<b>4. PROCESSING AND UTILISATION</b>				
<b>Build processing capacity and reduce the cost of processing</b>	a. Promote private/public sector investment in cottage and large scale processing b. Increase volume of raw materials	KIRDI, KARI, Universities, KAM, MoA, ASCU, KEPASA, Herbal product processors, KEBS	Continuous	<ul style="list-style-type: none"> <li>▪ Business ventures incubated</li> <li>▪ Processing technologies developed</li> <li>Processing cottages developed</li> </ul>
<b>Development and enforcement of product Standards</b>	a. Develop product standards b. Enforce conformity to the standards	KEBS	3 years	<ul style="list-style-type: none"> <li>▪ Standards developed</li> <li>▪ Enforcement systems in place</li> </ul>
<b>Promote value addition and increase product range</b>	a. Increase product range b. Support value addition	MoA, EPC	Continuous	<ul style="list-style-type: none"> <li>▪ Diversity of products</li> </ul>
<b>Improve level of utilization of emerging crops</b>	Increase awareness on uses, importance, and marketability	MoA, EPC, KENFAP	Continuous	<ul style="list-style-type: none"> <li>▪ Increased marketable products and usage</li> </ul>
<b>5. MARKETING</b>				
<b>Promote value addition and create awareness of potential markets</b>	a. Identify alternative markets for processed and raw products from emerging crops. b. Enhance local and international promotional campaigns to increase market share.	MoA, EPC, MoCD, HCDA, FPEAK, MoT, MoT, MoT&C,	Continuous	Identified markets Grower associations formed Value added products in the markets

POLICY INTERVENTION	APPROACH	RESPONSIBILITY	TIME FRAME	INDICATORS
	<ul style="list-style-type: none"> <li>c. Improve packaging in line with market demands.</li> <li>d. Streamline market outlets, contract farming, and formation of grower associations, cooperatives and societies, collaboration and partnerships.</li> </ul>	KEBS, KEPSA		Increased market share
<b>Remove trade barriers to access wider markets</b>	<ul style="list-style-type: none"> <li>a. Set regulations governing trade and utilisation</li> <li>b. Reduce trade barriers to access wider markets through bilateral and multilateral trade negotiations.</li> </ul>	MoA, MoT, NMK, KWS	Continuous	Increased trade and expanded trading ground  Increased utilisation  Access to wider markets
<b>Market Research and information exchange system</b>	<ul style="list-style-type: none"> <li>a. Continuously conduct market research on produce and products from emerging crops.</li> <li>b. Develop market information exchange system</li> </ul>	MoT, EPC, MoA	Continuous	Market information available
<b>6. ENVIRONMENT</b>				
<b>Assess impact and institute mitigation measures</b>	<ul style="list-style-type: none"> <li>a. Undertake environmental impact assessment (EIA) and audit all projects targeting promotion of emerging crops.</li> <li>b. Institutionalize measures to commercialize emerging crops while conserving the environment.</li> <li>c. Promote use of agricultural best practices such as environmentally sustainable harvesting methods and conservation agriculture.</li> </ul>	NEMA, MoA, KARI, KEFRI, KWS, KFS	Continuous	Environment Impact assessments done  Mitigation measures instituted where necessary  Institutionalised measures to address issues pertaining to emerging crops and impact on the environment developed

## ANNEX

### Annex I: List of Emerging Crops

#### A. Range/scope of emerging crops

CROP	AREA (HA)	ATTRIBUTES	KEY STAKEHOLDERS	REMARKS
<b>1. MEDICINAL/AROMATIC</b>				
i. <i>Artemisia annua</i> L. COMPOSITAE	1995	Medicinal (malaria ACT)	East African Botanicals(EAB), Meru Herbs, Mweiga Conservation Group	Grown by contracted farmers. EAB, Meru Herbs and Mweiga Conservation Group provides seedlings to and buys the crop from the farmers.
ii. <i>Aloe</i> spp. ALOEACEAE	31.5	Medicinal, cosmetic	KWS,NMK,KEFRI,KARI, MOA, Aloe Growers association, Maria Dobbs Nurseries, Gatsby Trust, Kenyatta University, several NGOs & Farmer groups	<ul style="list-style-type: none"> <li>• Mostly found in the wild.</li> <li>• Trading in the spp. require licensing by KWS and/or NMK.</li> <li>• Many nurseries and plantations being established.</li> <li>• Publications available incl. national strategies &amp; regulations</li> <li>• Is an endangered spp. and is in CITES appendix II</li> </ul>
iii. <i>Vanilla planifolia</i> Andr. ORCHIDACEAE	15	Food flavour	MOA, MENR. USAID, UNDP, KARI, VDF, Vanilla Association of Kenya, NGOs &Farmers	Cultivated mainly in Coast, Nyanza and Western provinces
iv. <i>Mondia whiteii</i> Skeels ASCLEPIADACEAE  (Luhya - Omukhombero - Kikuyu - Mühukūra, Luo - ogombo)		<ul style="list-style-type: none"> <li>• Used as an aphrodisiac, appetizer, medicinal, pass time</li> </ul>	KEFRI, NMK, ICIPE	<ul style="list-style-type: none"> <li>• KEFRI has large scale plantations in Kakamega,</li> <li>• Exported</li> </ul>

<p>v. <i>Moringa oleifera</i> Lam. <b>MORINGACEAE</b> (English - Horse-radish tree, Ben oil tree, drumstick tree, Swahili - mrongo, mzunze, Chonyi, Giriama, kambe - muzungwi, Sanya - muzungwa, Tharaka - muguunda, Daasanach - hocholoch)</p>		<p>Vegetable, water purification, fuelwood crop, timber suited for pulp for cellophane &amp; rayon, oilseed (Ben nut, oil of Ben used in artist's paints, salad oil &amp; soap), Medicinal (Leaves used for management of diabetes)</p>	<p>Herbalists , Farmers</p>	<p>Used as a vegetable in the coast and in Meru (Tharaka) where it is largely grown by many farmers mainly for medicinal purposes.</p>
<p>vi. <i>Prunus africana</i> (Hook. f.) Kalkman <b>ROSACEAE</b> (English - Red stinkwood, Kik - Müiri)</p>	<p>150 + acres</p>	<p>Medicinal (prostate cancer)</p>	<p>ICRAF, KEFRI, KFS</p>	<ul style="list-style-type: none"> <li>• Publications available</li> <li>• Is an endangered spp. and is in CITES appendix II. KFS has 150 acres in Kapsabet.</li> </ul>
<p>vii. <i>Catharanthus roseus</i> (L.) G. Don f. <b>APOCYNACEAE</b> (Madagascar Periwinkle)</p>		<p>Medicinal (cancer treatment: prostate, cervical, skin etc.)</p>	<p>Common as a flower garden plant and in landscaping.</p>	<ul style="list-style-type: none"> <li>• Alkaloids found in it (mainly vincristine and its derivatives) are used for the treatment of various cancers including Hodgkin's disease</li> <li>• A farmer growing it in Taita District.</li> <li>• Has international market, especially in the pharmaceutical industry.</li> </ul>
<p>viii. <i>Ocimum kilimanjarica</i> <b>LAMIACEAE</b></p>		<p>For cough treatment</p>	<p>ICIPE</p>	<ul style="list-style-type: none"> <li>• ICIPE has a plantation in Kakamega</li> </ul>
<p>2. OIL CROPS. For this section see review articles in PROTA 14, vegetable oils handbook freely available at (<a href="http://www.prota.org">www.prota.org</a>) and additional information to produce extension materials.</p>				

<p>i. <i>Jatropha curcas</i> L. EUPHORBIACEAE</p>	1025	<ul style="list-style-type: none"> <li>• Biodiesel</li> <li>• With <i>Ricinus communis</i> are the best candidates for biodiesel feedstock</li> <li>• Medicinal</li> <li>• By-products used for biopesticide</li> <li>• Plays a role in soil rehabilitation</li> </ul>	<p>MOA, MOE, KFS, ICRAF, KARI, KEFRI, KEPHIS, JKUAT &amp; UoN, VDF, Green Africa foundation, World Wide Fund for Nature, World Vision, Petroleum Institute of East Africa, COPSO, Jatropha Practitioners Network for East and Southern Africa (JAPNESA), Jatropha Vanilla Foundation, Endelevu</p>	<ul style="list-style-type: none"> <li>• Crop identified for Biodiesel production.</li> <li>• Good for drylands</li> <li>• Can be established on disturbed, marginal or wasteland.</li> <li>• Centre for <i>Jatropha</i> promotion and biodiesel in India (<a href="http://www.jatrophaworld.org">www.jatrophaworld.org</a>) provides information on technologies available for the promotion of <i>Jatropha</i>.</li> </ul>
<p>ii. <i>Simmondsia chinensis</i> C. K. Schneid. SIMMONDSIACEAE (Jojoba)</p>	8	<ul style="list-style-type: none"> <li>• Source of jojoba oils used in cosmetics</li> <li>• Biofuel</li> <li>• Plays a role in soil rehabilitation.</li> </ul>	<p>MOA, KARI &amp; Farmers</p>	<p>A plant tolerant of arid sites and the foliage important for browse.</p> <p>KARI Njoro is carrying out research work in Taveta</p>
<p>iii. <i>Elaeis guineensis</i> Jacq. ARECACEAE (English - Oil palm, guinea oil palm, Swahili - mchikichi, mjenga, Digo - mchikichi, Pokomo - mchanga, Sanya - metsengwa, Taveta - mposi)</p>	222	<ul style="list-style-type: none"> <li>• Vegetable oil.</li> <li>• Palm kernel oil used in cosmetics.</li> <li>• Used in traditional wine production</li> <li>• biodiesel</li> </ul>	<p>MOA, KARI, UON, KIRDI, JKUAT, Umoja Industries</p>	<ul style="list-style-type: none"> <li>• In cultivation, pre-germinated seeds introduced in Western and Coast provinces.</li> <li>• Indigenous species.</li> <li>• Technologies for oil extraction, processing and local value addition available in Ghana, Nigeria, Burkina Faso &amp; Mali. Appropriate technologies developed in India where all oil extraction and processing machinery are available</li> </ul>

<p>iv. <i>Ricinus communis</i> L.  <b>EUPHORBIACEAE</b>  (English - Castor oil plant,  Kikuyu - mbariki, Kamba - mbaiki, Kisii -</p>		<ul style="list-style-type: none"> <li>• Medicinal and industrial oil. Oils are ingredients in cosmetics and pharmaceuticals.</li> <li>• Source of ricinoleic acid.</li> <li>• Plays a role in soil rehabilitation.</li> </ul>	KARI conducting research.	<ul style="list-style-type: none"> <li>• Grows wild.</li> <li>• Planted by some farmers in ASALS for small scale processing.</li> <li>• Can be established on disturbed, marginal or wastelands.</li> </ul>
<p>v. <i>Pelargonium</i> spp  <b>GERANIACEAE</b>  ('Geraniums' of greenhouse,  geranium of house plant)</p>		Cultivated ornamental, source of mawah oil and geranium oil, which is an essential oil, Medicinal	Individual Farmers	Closely related to <i>Geranium</i> L. but differing in that they have irregular flowers
<p>vi. <i>Vernonia galamensis</i> Less.  <b>COMPOSITAE</b></p>		Seed oil for plastics, coatings (better than solvent based paints)	KARI Gene bank, KIRDI	Oil can be used to make wax.
<p>vii. <i>Vernonia amygdalina</i>  Del.  <b>COMPOSITAE</b>  (Vernonia)</p>		Used in medicine, insecticidal		.
<p>viii. <i>Brassica napus</i> L.  <b>BRASSICACEAE</b>  (Rapeseed ( Mustard))</p>		Edible oil/biodiesel	KARI	
<p>ix. <i>Croton megalocarpus</i>  Hutch.  <b>EUPHORBIACEAE</b>  (<i>Croton</i>)</p>		Biodiesel	NGOs, Farmers, KARI,	Potential for biodiesel
<p>x. <i>Brassica carinata</i> A. Br.  <b>BRASSICACEAE</b>  (English - Ethiopian cabbage,  Ethiopian mustard, Kis. - chinkongonyira, Maragoli -</p>		<ul style="list-style-type: none"> <li>• Indigenous leafy Vegetable,</li> <li>• vegetable oil from seeds is used as a lubricant and industrial</li> </ul>	JKUAT, Farmers	Used in inter-cropping, crop rotation and agroforestry systems

likabichi Iya manyoni, Luo - Kandhira, Mijikenda - Kanzira- sukuma				
<b>3. FOOD CROPS</b>				
<b>(a) Vegetables</b>				
<b>i. Mushroom</b>		Vegetable, some medicinal	NMK, MOA, (GTZ, PSDA) , KARI, Farmers., JKUAT,	Wild species of the miombo woodlands have been collected and their uses documented by NMK.  -Need to commercialize indigenous spp.  MOA and stakeholders are promoting.
<b>ii. <i>Urtica massaica</i> Mildbr.</b> <b>URTICACEAE</b> <b>(English - Stinging nettle,</b> <b>Kikuyu - thabai)</b>		Vegetable, medicinal dried leaves ground and used as a tea for diabetes.	KARI, NMK has analysed for food value	Very high potential for commercialization
<b>iii. <i>Telfairia pedata</i> Hook.</b> <b>iv. <i>Telfairia occidentalis</i></b> <b>Hook. f.</b> <b>CUCURBITACEAE</b> <b>(English - Oyster nut, Fluted</b> <b>Pumpkin, Swahili - mkweme,</b> <b>Taita - mkungu)</b>		<ul style="list-style-type: none"> <li>•Fruit used as vegetable though other reports show it as bitter and causes headache.</li> <li>•Leaves of <i>T. occidentalis</i> used as vegetable in Equatorial Guinea</li> <li>•Oil crop Oil used in soap and candle making and also reported used in cooking</li> <li>•Seeds cherished by nursing mothers in Tanzania and used by Washambaa and</li> </ul>	ICRAF?	<ul style="list-style-type: none"> <li>• Very high potential,</li> <li>• Documented in PROTA 14</li> </ul>

		<p>Chagga women after bath to increase lactation</p> <ul style="list-style-type: none"> <li>• Oil used in medicine (for stomach troubles and rheumatism)</li> <li>• Seeds eaten raw or roasted, also used in confectionery in place of almonds (India)</li> </ul>		
v. <i>Amaranthus</i> spp. AMARANTHACEAE Grain amaranths		<p>Highly nutritious flour, seeds can be popped and eaten.</p> <p>Leaves a vegetable</p>	MOA, NGOs, KARI, African Amaranth	Promotion by stakeholders on going
(b) Pulses				
i. <i>Mucuna pruriens</i> (L.) DC. LEGUMINOSAE (Bournvita bean)		Bean used in making a beverage, plant used in green manure and as fodder	JKUAT, MOLD, KARI, Farmers	
ii. <i>Vigna subterranea</i> (L.) Verdc. LEGUMINOSAE (English - Bambara groundnut, Earthnut, Baffin pea, Swahili, Sanya - njugu mawe, Giriama - dzugu mawe, Kambe - tendegwa, Kisii - chinsugu, Isukha, Maragoli, Kisa, Wanga - tsibande, Tiriki - zibande, Tachoni, Buk. - Chimbande, Luo - bande		Consumed as food	KARI, Bioversity International, MOA	<p>An important cultural crop of the Luhya people.</p> <p>Book on crop published by IPGRI.</p>
(c) Cereals				
i. <i>Dactyloctenium aegyptium</i>		Grain used for flour sometimes mixed	Farmers	Found in Turkana , Baringo,

<p>(L.) Willd.  ii. <i>Dactyloctenium giganteum</i>  B. S. Fischer &amp; Schweick  <b>POACEAE</b>  (English - crow-foot grass  Swahili - kimbugimbugi,  Borana - maasai, makwala,  magala, Dassanach - bunite,  Kamba - ukuku, Kikuyu -  mukinda, nyaragita, Maasai -  embokwe, empokui, enkampa,  porori aja, Mbeere - iguko,  gingara, gitiko, Pokot, -  mokono, kumokon, Samburu -  laparaan, ntalanwen,  hidowensii, Somali - ausdenan,  ensile, jarba, hidow, Taita -  kisambara, Turkana -  ekauduudu, emekwi)</p>		<p>with sorghum flour</p>		<p>etc  - High potential for  commercialization in ASALS  - Research required</p>
<p>iii. <i>Eragrostis tef</i> Trotter  <b>POACEAE</b>  (English - Teff, Borana, Gabra  - tafi)</p>		<p>Flour is used to make injera, a  fermented food of the Ethiopians, the  Oromo group of people incl. Borana and  Somali.</p>	<p>NMK documented spp.</p>	<ul style="list-style-type: none"> <li>• Distribution mainly in  Marsabit and Moyale.</li> <li>• Potential for promotion in  focal areas.</li> <li>• Introduced KARI stations for  experimental purposes  (Katamani, Kitale, Muguga)</li> </ul>
<p>(d) Fruits</p>				
<p>i. <i>Psidium guajava</i> L.  <b>MYRTACEAE</b></p>		<p>-Used as Fresh fruit and in the making  of juice, jam, flavorings,</p>	<p>KARI,</p>	<p>- Grows wild  - Development along value</p>

(English - Guava, Swahili - mapera)		- leaves are medicinal. -It is a fruit with the highest level of vitamin C		chain done by KARI. -Is an invasive spp.
ii. <i>Sclerocarya birrea</i> Hochst. ANACARDIACEAE (English - Marula, Cider tree, Swahili - mng'ong'o, mungango, Borana - didisa, Chonyi, Giriama - mfula, mfula, Ilchamus - Imang'uai, Kamba - muuw'a, Luo - ong'ong'o, olemo, mang'u, Maasai - olmang'uai, Marakwet - arol, Sabaot - kotelalam, Teso - ekajikai, Tugen - tololokwo, Turkana - ekajiket)		Edible fruit, and is used in making of wine , biscuits, liquor,	KEFRI, ICRAF, NMK	-Grows wild in Kenya -Very high potential for exploitation Amarula liquor from Marula tree is imported from South Africa and Marulam from Malawi
iii. <i>Rubus</i> spp. ROSACEAE (Swahili - mtoje, Embu, Kikuyu - ndare, Kamba - ndae, Kipsigis - tangaimamiet, Luhya - bukararambi, Maasai - engaiyagut, Marakwet - momoon, Pokot - monmonwo, Taita - ndandai, Tugen - momonwo, mowonwo, Kisii - chinkenene)		<ul style="list-style-type: none"> <li>• Medicinal-high in antioxidants</li> <li>• Used to make jam , juice, tea</li> </ul>	KARI	<ul style="list-style-type: none"> <li>• Grows wild</li> <li>• High potential for domestication and commercialization</li> </ul>
iv. <i>Physalis peruviana</i> L.		Jam, juices, fresh, medicinal	None	<ul style="list-style-type: none"> <li>•Grows wild</li> <li>•High potential for</li> </ul>

<p><b>SOLANACEAE</b></p> <p>(English - Cape Gooseberry, <b>Kikuyu</b> - nathi, <b>Luhya</b> - chimbunwe, <b>Kisii</b> - chinsobosobo, <b>Luo</b> - nyakonglo, nyatonglo, otonglo, <b>Kamba</b> - ngavu, <b>Maasai</b> - olnasi, <b>Somali</b> - tabaako)</p>				<p>domestication and commercialization</p> <ul style="list-style-type: none"> <li>• Some farmers reported to be growing it in Kajiado.</li> </ul>
<p>v. <i>Vitex doniana</i> Sweet</p> <p><b>LAMIACEAE</b></p> <p>(English - African plum, Black plum, <b>Swahili</b>, <b>Chonyi</b>, <b>Kambe</b> - Mfudu, - <b>Kikuyu</b> - Muhuru, <b>Kipsigis</b> - muelwet, <b>Kisii</b> - mutahuru, <b>Bukusu</b> - kumufutu, <b>Tachoni</b> - omufutu, <b>Luo</b> - ojuelo, oyuelo, <b>Mbeere</b> - muburu, <b>Pokot</b> - tirkirwo, <b>Sabaot</b> - bulgelwa, pulgelwet, <b>Teso</b> - ewelo, ekarukei)</p>		<ul style="list-style-type: none"> <li>• Consumed as Fresh fruit</li> <li>• Can be used in making jam</li> <li>• Hard wood, used for poles and timber</li> </ul>		<ul style="list-style-type: none"> <li>• Is indigenous and grows wild.</li> <li>• Dry land fruit, very sweet and high yielding</li> </ul>
<p>vi. <i>Vitex payos</i> (Lour.) Merr.</p> <p><b>LAMIACEAE</b></p> <p>(English - Black plum, <b>Swahili</b>, <b>Giriama</b> - mfudu, <b>Chonyi</b>, <b>Kambe</b> - mfudu unga -, <b>Mbeere</b>, <b>Embu</b> - muburu, <b>Kamba</b> - Kimuu).</p>		<ul style="list-style-type: none"> <li>• Consumed as Fresh fruit</li> <li>• Can be used in making jam</li> <li>• Hard wood, used for poles and timber</li> </ul>		<ul style="list-style-type: none"> <li>• Is indigenous and grows wild.</li> <li>• Dry land fruit, very sweet and high yielding.</li> </ul>

<p>vii. <i>Averrhoa carambola</i> L.  <b>OXALIDACEAE</b>  (Star fruit , carambola)</p>		Eaten fresh, cooked and ripe, Juice from fruit used to remove stains from hands, clothes and weapons	Farmers, KARI	Used in all sorts of forms in other parts of the world. Grown in Kilifi near the dairy farm.
<p>viii. <i>Punica granatum</i> L.  <b>LYTHRACEAE</b>  (pomegranate)</p>		Juice, medicinal(heart diseases, cancer, Urinogenital infections)	KARI	Characterization, variety selection required.
<p>ix. <i>Casimiroa edulis</i> Llave &amp; Lex  <b>RUTACEAE</b>  (English - White sapote, Mexican aple)</p>		Fruit edible Used in milk shakes, icecream etc. in Mexico	KEFRI	Research needed to improve the keeping quality of the fruit
<p>Jack Fruit (information to be availed)</p>				
<p>(e) Root crops</p>				
<p>i. <i>Dioscorea minutiflora</i> Engl.  <b>DIOSCOREACEAE</b>  (English - Yam, Swahili - kiazikiuu, Kikuyu, Embu, Meru - gikwa, Kamba - kikwa, Buk., Tachoni - litolotolo, Maragoli - kihama, Sebei - musapchet, Sabaot - musapchet, mucukwet)</p>		Tuber cooked or roasted	KARI, East African Herbarim (NMK)	<ul style="list-style-type: none"> <li>• Now a rare crop mainly maintained by elderly women.</li> <li>• Powdery and sweet, does not soften on cooking.</li> <li>• Sold in local market, it is the most expensive root crop in most markets where it is found.</li> <li>• Rich in fibre, Calcium and Phosphorus</li> </ul>
<p>(f) Others</p>				

<p>i. <i>Hibiscus sabdariffa</i> L. <b>MALVACEAE</b> (Roselle)</p>		<ul style="list-style-type: none"> <li>• Fleshy red calyx used in drinks, jellies</li> <li>• leaves used like spinach</li> </ul>	Meru Herbs, Kakamega	Grown in Meru by farmers subcontracted by Meru Herbs. There is a factory owned by Meru Herbs company that processes the calyx for export. The dried packaged calyx is sold locally and exported
<p>ii. <i>Centella asiatica</i> <b>UMBELLIFERAE</b></p>		<ul style="list-style-type: none"> <li>• Medicinal, for skin ointments to promote healing, treat leprosy and a depressant of CNS</li> </ul>	Meru Herbs	Grown in Meru by farmers subcontracted by Meru Herbs
<p>iii. <i>Chamaemelum nobile</i> <b>COMPOSITAE</b> (Chamomile)</p>		<ul style="list-style-type: none"> <li>• For teas</li> </ul>	Meru Herbs	Grown in Murang'a and Meru. In Meru, farmers are subcontracted by Meru Herbs. Sold locally and exported, currently fetching a lot of money for the farmers
<p>iv. <i>Tylosema fassoglense</i> (Schweinf.) Torre and Hillc. <b>CEASALPINACEAE</b>  (Kamba - Ivole, Buk. - kumuchayu, chingayu, Tachoni - chingaayu, Maragoli - imbasa, Luo - ombasa, Maasai - esinkarua, Somali - bassac, Samburu - dalamboi)</p>		<ul style="list-style-type: none"> <li>• Seeds eaten,</li> <li>• young pods eaten raw,</li> <li>• dry ground seeds used as a coffee substitute,</li> <li>• tuber used in traditional medicine,</li> <li>• fruits used as a pot scrubber,</li> <li>• stems used as rope,</li> <li>• plant important as cattle and goat fodder.</li> <li>• The plant is currently been promoted for management of HIV</li> </ul>		<ul style="list-style-type: none"> <li>• Pieces of tuber are sold in local markets.</li> <li>• Promotion work and trials going on in Kakamega with the help of Sungu plot promoter Dr. Odote (Herbalist).</li> <li>• It is the main ingredient in sungu plot medicine.</li> </ul>
<p>v. <i>Osyris lanceolata</i> Hochst. &amp; Steud</p>		<ul style="list-style-type: none"> <li>• All parts used for the extraction of an oil used in cosmetic and Pharmaceutical industry</li> </ul>	KEFRI, KWS. NMK	<ul style="list-style-type: none"> <li>• Currently under threat from international trade and NMK and KWS pushing for its</li> </ul>

<b>SANTALACEAE</b>  (English - East African Sandalwood, Mbeere, Kikuyu - Mutera na Ukav(b)i)				inclusion in the CITES appendix II list
vi. <i>Bixa ollerana</i> L. <b>BIXACEAE</b>  (Bixa)		<ul style="list-style-type: none"> <li>• Important food colour</li> <li>• Dyestuff used in fabric soaps and other skin products</li> <li>• Used to produce anatto (an insect repellent)</li> </ul>	There was a Cottage industry at the coast that has since closed, KARI	<ul style="list-style-type: none"> <li>• The food colour is good because it has no taste and important since there is a ban on use of synthetic colours in foods</li> </ul>
vii. <i>Stevia rebaudiana</i> (Bertoni) Bertoni  <b>COMPOSITAE</b>		Used for sweetening drinks	Being grown in Kericho	<p>Upto 300 times as sweet as sucrose</p> <p>Propagated by root - cutting (seeds difficult)</p>
<b>4. FIBRE CROPS</b>				
i. <i>Hibiscus cannabinus</i> L. <b>MALVACEAE</b>  (Kenaf)		Used for fibre, paper and mulch	KARI,	<ul style="list-style-type: none"> <li>- Fibre like jute,</li> <li>- Seed oil used for illumination</li> <li>- KARI has all technical information on the crop</li> <li>- Not yet commercialized.</li> </ul>
ii. <i>Corchorus</i> spp. <b>TILIACEAE</b>  (English - Jute, bush okra, Swahili - mulenda, Luhya - murere, Luo - apoth, Kisii - omotere, Turkana - namale, lojeel, emarot, abungu,		<ul style="list-style-type: none"> <li>- Cordage for sackings, twine and paper manufacture.</li> <li>- vegetable</li> </ul>	KARI,	KARI has collections. Research yet to commence.

<p><b>Chonyi</b> - chikoshu, vombo,  <b>Digo</b> - mlenda, bombo,  mwatsaka wa bara, <b>Giriama</b> -  kikosho, <b>Kipsigis</b> - laiyo-nebo-  soin, <b>Marakwet</b> - karkar, <b>Pokot</b>  - chepkarkarian,  namapatontoluo, <b>Tugen</b> -  ntereryan (<b>kibingor</b>), <b>Samburu</b>  - leperia)</p>				
<p>iii. <i>Girardinia diversiflora</i>  <b>URTICACEAE</b>  (Kikuyu - thabai wa ng'ombe)</p>		<p>- Paper, fibre, fertilizer/green manure,  - Bark fibre made into cloth, ropes and,  bow strings</p>	Egerton Univ., Farmers	- Is in the same family with stinging nettle,
<p>iv. <i>Morus alba</i> L.  <b>MORACEAE</b>  (Mulberry)</p>		<p>Silk production - food for silkworm.  Plant used for coughs, colds and sore eyes</p>	MOA, KARI, ICIPE, NGOs	<p>High value commercial.  Expansion of the enterprise needed</p>
<b>5. FLOWERS</b>				
<p>iii. <i>Helichrysum</i> spp.  <b>COMPOSITAE</b>  (Trade name - Everlastings)</p>		Wild everlasting flower.	Flower Industry	<p>Occurs in the cold moorlands of Mt. Kenya, Elgon and Aberdares  -Potential crop for the cut flower industry.</p>
<p>ix. <i>Asclepias physocarpa</i> Schltr.  <b>ASCLEPIADACEAE</b>  (Trade name - Mobydick)</p>		Commercial filler cut flower	KARI, Machakos, Laikipia, Murang'a, Western, Nyanza, Kisumu, Nature Grow, Wilmer Kenya Limited, Garmers, Nyeri	<p>Already domesticated and commercialized but needs expansion  - KARI has made collections,  - more research is needed to solve nematode problems.  (Issues of nutrition)</p>

<p>x. <i>Gloriosa superba</i> L.  xi. <i>Gloriosa minor</i> Rendle  <b>CALCHICACEAE</b>  (English - Devils onion, flame lily, Kikuyu - gitunguru kia ngoma)</p>		<p>- Very beautiful flower</p>	<p>Still in wild. Not yet domesticated but has great potential. Also occurs in abandoned cultivation land</p>	<ul style="list-style-type: none"> <li>• bulb is poisonous, Found in high altitude areas.</li> <li>• has potential in the cut flower industry.</li> <li>• Does not require green house, can be/is planted directly using the bulbs</li> </ul>
<p>ii. <i>Gladiolus watsonoides</i> Baker  <b>IRIDACEAE</b></p>		<p>Beautiful flowers</p>	<p>Still in the wild</p>	<p>High potential for the cut flower industry</p>
<p>iii. <i>Gladiolus callianthus</i> Marais  <b>IRIDACEAE</b></p>		<p>Beautiful scented flowers</p>	<p>Growing in the wild</p>	<p>High potential for the cut flower industry</p>

## **Annex II: Bibliography**

Government of Kenya, (2007). Kenya Vision 2030. Nairobi, Kenya.

Government of Kenya, (2008). First Medium Term Plan, 2008 - 2012. Nairobi, Kenya.

Ministry of Agriculture, (in prep.). Strategic Plan, 2008 - 2012.

Government of Kenya, (in prep.). Agricultural Sector Development Strategy, 2009 - 2020.

Maundu, P. M, Ngugi, G. W, Kabuye C. H. S., (1999). Traditional Food Plants of Kenya. National Museums of Kenya, Nairobi, Kenya.

Mabberley, D. J., (1997). The Plant Book: a portable dictionary of the vascular plants (2nd edition). Cambridge University Press, Cambridge, UK.