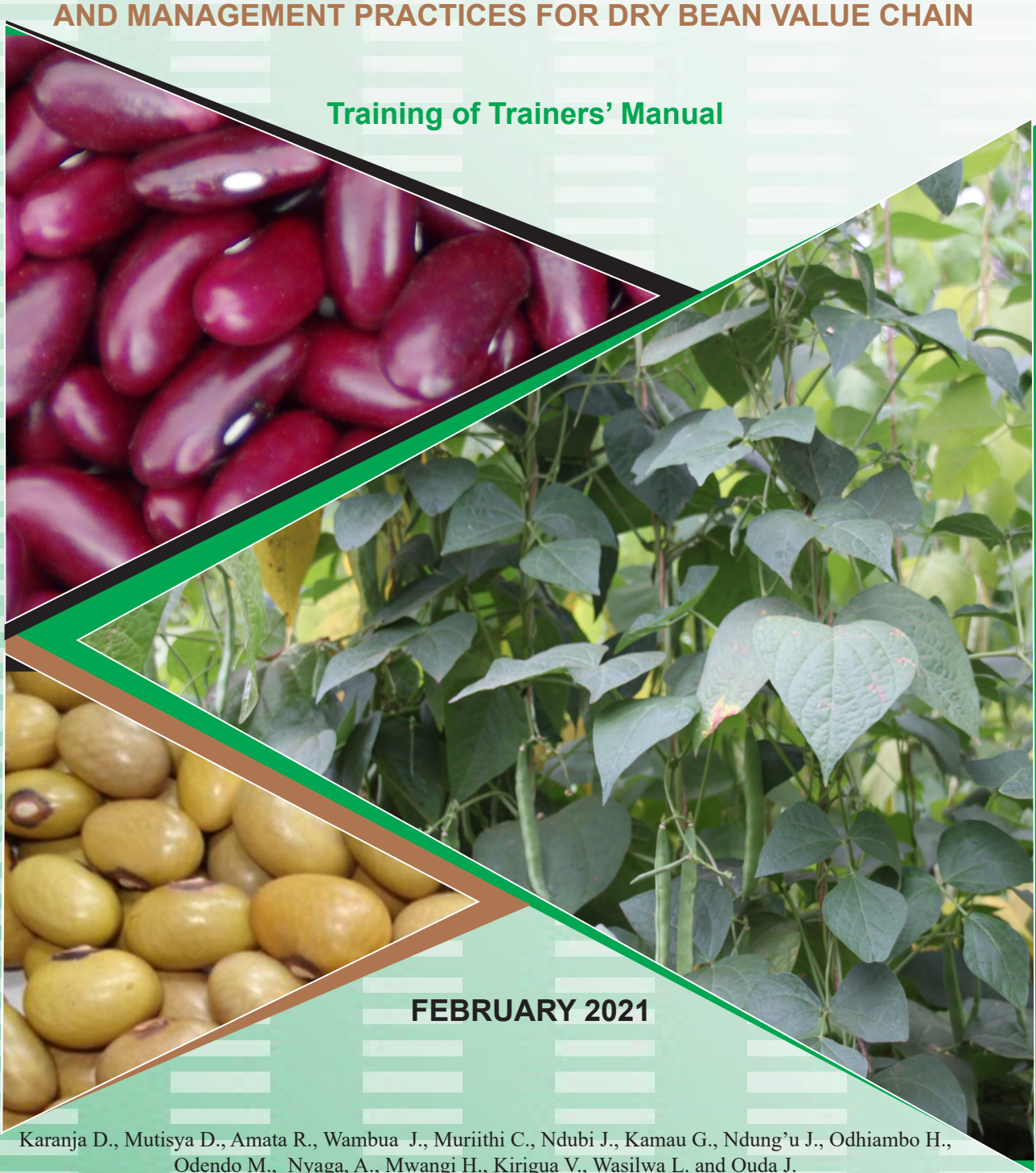
KCSAP
Kenya Climate Smart Agriculture Project

KALRO
Kenya Agricultural & Livestock Research Organization

CLIMATE SMART AGRICULTURE TECHNOLOGIES, INNOVATIONS AND MANAGEMENT PRACTICES FOR DRY BEAN VALUE CHAIN

Training of Trainers' Manual



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FOREWORD

Kenya Climate-Smart Agriculture Project (KCSAP) tasked the Kenya Agricultural and Livestock Research Organization (KALRO) with the implementation of the project's Component 2 on 'Strengthening Climate-Smart Agricultural Research and Seed Systems'. The component activities are geared towards the development, validation, adoption and delivery of context specific climate smart agriculture (CSA) technologies, innovation and management practices (TIMPS). The other responsibility is development of sustainable seed production and distribution systems for priority value chains to enhance availability and access to improved seeds, animal breeds and fingerlings by target beneficiaries. This will be supported under Component 1 namely 'Up scaling Climate-Smart Agricultural Practices'. Against this background, KALRO and her NARS partners have developed, validated and availed CSA TIMPS for dissemination and adoption. The TIMPS have further been unpacked during the development of Training of Trainers (ToT) Manuals for use in training public and private extension service providers and lead farmers. The ToT Manuals are instructional guides to be used for teaching and learning step-by-step procedures of implementing CSA innovations for each of the 19 value chains being addressed. The training content is drawn from the CSA TIMPS that support respective value chains.

The contents are arranged in progressive modules supported by extensive information from research and background data drawn from the TIMPS. Their relevance is based on the needs teased out of the value chains and the project objectives. The ToT Manuals training design takes into consideration the delivery system, the partners and their roles, the duration of training and logical flow of the sessions. Similar content requiring similar delivery systems are grouped together while the roles of the partners are tapped in the training and planning of the training sessions. The Manual is divided into modules, which have a uniform outline that ensures every aspect of the TIMPs are fully covered in way that the trainees can absorb and relate to. Various delivery methods are deployed and where possible demonstrations and practical work are incorporated to enable the trainees learn by participating in the actual field activities. Furthermore, to ensure that the training across various groups is standardized, trainers' guidelines, detailed descriptions of the trainees, program, training methods and a training evaluation have been provided in the manual. Adhering to these guidelines, therefore, enables possibility to replicate the training in several locations without loss of details regardless of whether conducted by different trainers.

It is highly advised that the ToT Manuals should be used in conjunction with the respective value chains' TIMPs documents and facts sheets in order to provide valuable resource for both public and private extension service providers. The use of this Manual is expected to enable achievement of the envisaged 'Triple Wins' of increased productivity, enhanced resilience and reduction of greenhouse gases emissions.

I am greatly indebted to the value chain leaders and all those who participated in the preparation of the Manual, which is expected to herald a new way of delivering training content in a changing agricultural environment.

Eliud K Kireger, PhD, OGW
Director General, KALRO

PREFACE

The Kenya Climate-Smart Agriculture Project (KCSAP) is a Government of Kenya project with support from both the World Bank and the government. The project is for a five years and implemented in 24 counties, mainly in the arid and semi-arid lands (ASALs), at a approximate cost of KSh. 25 billion. The project development objective (PDO) is "to increase agricultural productivity and build resilience to climate change risks in the targeted smallholder farming and pastoral communities, and in the event of an Eligible Crisis or Emergency, to provide immediate and effective response." This objective is to be achieved through the implementation of five key components, which are 1) Up scaling Climate-Smart Agricultural Practices, 2) Strengthening Climate-Smart Agricultural Research and Seed Systems, 3) Supporting Agro-weather, Market, Climate, and Advisory Services, 4) Project Coordination and Management and 5) Contingency Emergency Response.

Component 1 involves facilitating the empowering of farmers and communities to adopt technologies, innovations and management practices (TIMPs) to achieve the Climate Smart Agriculture (CSA) triple-wins of; increased productivity, enhanced resilience (adaptation), and reduced Greenhouse gas (GHG) emissions (mitigation). Component 2 is tasked with the responsibility of providing the TIMPs. Therefore, it supports the development, validation, and adoption of context specific CSA TIMPS to target beneficiaries under Components 1 and 3 as well as development of sustainable seed production and distribution systems.

To catalyze uptake of TIMPs, Kenya Agricultural & Livestock Research Organization (KALRO) in conjunction with partners in the National Agricultural Research Systems (NARS) and Consultative Group for International Agricultural Research (CGIAR) compiled inventories of TIMPs for the prioritized value chains. The crop-based value chains are 19 and include roots and tubers (cassava, potato), pulses (dry beans, green gram, pigeon peas, garden peas), vegetables (tomato, onion, indigenous vegetables, kale), cereals (sorghum, millet, teff, maize) nuts (cashew nut), fruits (banana, mango, water melon) and fibre (cotton). Those that are animal production based are five (5) and include apiculture, indigenous chicken (meat and eggs), dairy (cattle and camel), red meat (cattle, sheep and goats) and aquaculture. Also, there are three (3) cross cutting themes on pastures and fodder, natural resource management, and animal health. The TIMPs were categorized into those ready for upscaling and those requiring validation. Furthermore, gaps that required further research and development of TIMPS were identified. Training of Trainers' (ToT) manuals focusing on TIMPs that are ready for upscaling for each of the value chains were subsequently developed to form the basis of training county extension staff, service providers and lead farmers. Those trained are in turn expected to cascade the training to beneficiaries in the targeted smallholder farming, agro-pastoral and pastoral communities in the 24 project counties of Marsabit, Isiolo, Tana River, Garissa, Wajir, Mandera, West Pokot, Baringo, Laikipia, Machakos, Nyeri, Tharaka Nithi, Lamu, Taita Taveta, Kajiado, Busia, Siaya, Nyandarua, Bomet, Kericho, Kakamega, Uasin Gishu, Elgeyo Marakwet and Kisumu.

KALRO having the mandate of implementing the activities under Component 2 has been instrumental in using its information resources and those of partners and collaborators to come up with the inventories of TIMPs and corresponding ToT Manuals. The use of these information

resources coupled with the accompanying training and the contribution of the other project components, will go a long way in enabling the KCSAP to meet its development objective.

The National Project Coordination Unit is grateful to all who participated in the development and production of this Training of Trainers Manual for dry beans value chain. It is my hope that counties and other users will put this resource to good use as they transform and reorient their agricultural systems to make them more productive and resilient while minimizing GHG emissions under the new realities of a changing climate.

Francis Muthami
National Project Coordinator
Kenya Climate-Smart Agriculture Project

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LIST OF ABBREVIATIONS

ASALs	Arid and Semi-Arid Lands
B	Boron
CA	Conservation Agriculture
Ca	Calcium
CAN	Calcium Ammonium Nitrate
Cl	Chlorine
COPMAS	Community Production and Marketing System
CTT	Core Team of Trainers
Cu	Copper
DAP	Di Ammonium Nitrate
EABL	East African Breweries Limited
ET	Evapotranspiration
Fe	Iron
GAP	Good Agronomic Practices
IDM	Integrated Disease Management
IPM	Integrated Pest Management
IWM	Integrated Weed Management
K	Potassium
KALRO	Kenya Agricultural and Livestock Research Organization
KARI	Kenya Agricultural Research Institute
KCSAP	Kenya Climate Smart Agriculture Project
Kg	Kilogram
LF	Lead Farmers
Mg	Magnesium
Mo	Molybdenum
N	Nitrogen
NPK	Nitrogen Phosphorus Potassium
P	Phosphorus
S	Sulphur
TOTs	Training of Trainers
TIMPs	Technologies Innovation and Management Practices
Zn	Zinc

INTRODUCTION

About this manual

This training of Trainers' Manual consists of two parts; namely Part I and Part II. Part I comprises notes for the facilitators while Part II is made up of the training modules in the value chain.

PART I

This part consists of four sections including the Background of the dry bean value chain, Content of the Training, Training Design and Facilitators Guidelines.

SECTION 1: BACKGROUND

1.1 The Role of Dry Bean Value Chain in the Kenyan Economy

Dry bean (*Phaseolus vulgaris)* (L.) is cultivated as a major food crop in the country, where rainfall amounts range from 600-1800mm per year. The crop is grown widely at various altitudes of up to 2500 metres above sea level (MASL) with rainfall from 600 mm. Some varieties have been found to give up to 0.5 t/ acre. Dry bean is a staple pulse in most households and is mainly cultivated by small-scale farmers western, eastern, central and coast regions. These areas are home to over 65 percent of Kenya's population as well as more than 26 percent of livestock where crop fodder is fed to animals. The crop is grown in an area of over 500,000 ha. Dry bean constraints include pests and diseases, soil fertility and reduced moisture in some regions and various unstable climate crisis.

In recent years, the Kenya Agricultural Research Institute (KARI), and now Kenya Agricultural and Livestock Research Organisation (KALRO), and other collaborating institutions have developed climate smart varieties together with adaptable agronomic Technologies, Innovations and Management Practices (TIMPs) which would increase crop production for food-nutritional security and higher earnings.

1.2 The Role of Dry Bean in Food and Nutrition Security

Most dry bean grains in Kenya is consumed by rural population. Some dry bean grain could be processed into various consumable products. In some cases bean flour could be pre-prepared for stew while other products of pre-cooked conditions value add the grain. With right market sourcing, farmers' income could be increased three-fold. As part of Kenya government's "Big 4" Agenda, value added products initiative aims to contribute towards food security, improve nutrition and increase employment opportunities through flour blending based on under-utilised high value foods by 2030. Dry bean products consumption will increase locally with the possibility of getting to export status in the coming years.

1.3 Dry bean crop as a Climate Smart Innovation

In the past two decades, dry bean production has been assumed to belong to the most arable land masses consisting only 20% of food production regions of the Rift Valley and Central Kenya. Today, new dry bean varieties and production techniques have been developed for areas considered marginal, therefore increasing productivity. Production of dry beans can be enhanced by marching drought tolerant varieties to specific climate smart TIMPs adaptable in specific regions.

1.4 Objectives of the Training

The purpose of training is to enhance the capacity of farmer trainers, to provide and promote knowledge and skills to farmers for increased productivity of dry bean, through adoption of appropriate and climate smart agricultural practices. Specifically, the objectives of this training are:

a) Provision of new and relevant knowledge, technologies and skills for dry bean production.
b) Refreshing knowledge and skills of good agricultural practices (GAPs) for dry bean production including climate adaptations, variety selection, soil nutrient management, soil water conservation techniques, control of diseases and pests, post-harvest handling, value addition, mechanization, marketing and gender mainstreaming.

c) Imparting knowledge and skills in participatory techniques for effective facilitation of adult learning processes and developing inclusive stakeholder partnership for sustainable up scaling of dry bean technologies.

After the training, the Trainer of Trainers' (TOTs) as facilitators will train lead farmers (LF) in various aspects of dry bean value chain. The training will involve providing the LF with techniques in participatory preparation, mobilization, planning, implementation, monitoring and evaluation of training sessions. The lead farmers and county extension personnel will thereafter up-scale the adoption of GAPs through farmer groups in their villages and those in the neighbourhood.

SECTION 2: TRAINING CONTENT

2.1 Orientation of the Modules

The training content is organized in 14 modules that are targeted and orientated to ensure the technology and innovation management practices (TIMPs) are adopted to improve productivity through improved dry bean value chain competitiveness in a market driven production. The purpose of these modules is to enhance the knowledge and capacities of trainers in understanding and disseminating the climate-smart dry bean practices to the intended beneficiaries, who are primarily farmers.

2.2 Modules Outline

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

- Introduction to the module – context and background to training needs as well as knowledge and skills gaps being addressed.
- Module learning outcomes – what trainees are expected to learn in each module
- Module target group - trainee categories.
- Module users –facilitators, master trainers
- Module duration –minimum number of hours of training and exposure to materials
- Module summary –sequence of sessions, training methods, materials and duration
- Facilitators' guidelines –detailed sessions, training methods, materials and session guides
- Participant's hand-outs – detailed notes and reference materials for trainees.

The outline of the 13 dry bean modules is presented in Table 1 below.

Table 1: Summary of 13 module outlines for the Dry Bean value chain

No.	Module Name	Need Addressed	Expected Training Outcomes	Duration
1	Climate change and climate smart agriculture	The impact of climate crisis to Dry Bean production The climate smart technologies for Dry Bean value chain	Master trainers made aware of the potential impact of climate change on Dry Bean production Master trainers updated on climate smart techniques for Dry Bean	4 hours
2	Farmer Field Business school (FFBS) approach	Skills/technologies for production, processing and marketing	Improved technologies/ innovations and agronomic practices for Dry Bean availed	4 hours 30 minutes

3	Good Agricultural Practices (GAP) and Food Safety Management System (FSMS) - Hazard Analysis Critical Control Points (HACCP) Plan	Determine presence of hazardous solids, organisms and pollutants pathogens	Techniques for determining pollutants in food material explored for and adopted in dry bean value chain	6 hrs 30 min
4	Dry Bean production niche and climate requirements	Mapping areas that are suitable for Dry Bean production	Dry Bean niche in the respective counties identified and published	4 hours
5	Dry Bean variety selection	Awareness on improved varieties	New improved varieties promoted	4 hours
6	Dry Bean seed systems	Knowledge of both formal and informal seed systems operations.	The formal and informal seed supply systems explained and appreciated	4 hours 30 minutes
7	Dry Bean climate smart agronomics practices	Options for innovating increased Dry Bean production	Both water and input manipulations analysed along benefits and promoted	4 hours
8	Integrated soil and water management practices for Dry Bean production	Soil water and fertility enhancing techniques availed.	All techniques analysed for possible benefits and promoted	5 hours
9	Dry Bean Crop Health	All major pests (invertebrate and vertebrate) and diseases organisms control mechanisms availed to the master trainers.	Options for reducing of yield loss of Dry Bean by the major pests and diseases identified and promoted for adoption	5 hours
10	Dry Bean harvesting and Post- harvest management	Storage technologies to reduce losses in quantity and quality	Proper harvesting techniques and storage facilities, identified and promoted	3 hours

11	Dry Bean value addition	Value addition dry Bean products, for human and animal feeds	Value addition and Dry Bean products identified for the farming communities and business entities Opportunities Identified and Prioritized	6 hours 30 minutes
12	Mechanization of Dry Bean production activities	Adaptation of mechanized operations of Dry Bean from crop establishment, crop management to post-harvest	Options of mechanization for increased yield availed to farmer groups.	4 hours
13	Dry Bean business and Marketing	Review what business options are available in Dry Bean	Reduce drudgery on the farm Type of aggregations by farmers availed for considerations. Contract farming	4 hours
14	Dry Bean Cross cutting issues (i) Innovation Platforms (ii) Gender mainstreaming and social inclusion (iii) Policy	Articulate how VMGs can draw benefits from Dry Bean value chain Options of employment opportunities in Dry Bean production Sites for information profiled at the county levels	Opportunities for marginalized groups identified and gains made Farmers get access to more information on Dry Bean production	12 hours
Total Duration				**71 hours 30mins**

SECTION 3: TRAINING DESIGN

3.1 Delivery System

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

1. **Establishment of a team of facilitators**
   a) A Core Team of Trainers (CTT) for training farmer master trainers (service providers) as facilitators of a TOT course. This is done using this manual and modules contained therein.
   b) Each of the Master trainers will facilitate farmers to acquire knowledge and skills in facilitating Farmer-led Field and Business Schools through practical demonstrations.

2. **Up - scaling**
   This will be done by selecting lead farmers (LF) to be trained in facilitation to reach out many other farmers in the regions of production.

3.2 Partners and their roles

The partners envisioned in this training plan are:

1. **Core Team of Trainers** – Facilitators drawn from KALRO and State Department of Agriculture to facilitate initial training of Master Trainers in a TOTs course. They are also to provide mentorship to master trainers during the first year of their farmer trainings. They should also be available in the evaluations and trainings.
2. **County Government Department of Agriculture** –Master trainers and their supervisors referred to as County Coordination Teams (CCT) who will take the role of trainers, mentors and coordinators at sub county level. They will assist FFBS's form partnership with stakeholders for sustainability. They should also participate in formation of information platforms and support lead farmers (LF's) form their network.
3. **Private Sector Service Providers** – inputs suppliers, financial and business development service providers, market players and processors to partner and support promotion of Dry Bean.

3.3. Training duration

The ToT course for Master Trainers for the 14 modules in the Dry Bean value chain shall take a total of six days of training period. Programes and timetables will be developed and will cater for this.

3.4 Logic Design

The logic of design and flow of each module is that the facilitator, paying attention to the proposed methods and sessions guidelines, shall: (1) Introduce the module; (2) Draw out the participants'' expectations; (3) Relate participants' expectations with module objectives or learning outcomes; (4) Explore the concept and content, switching to different methods of delivery of the content (group exercise, brainstorming, excursions, plenary discussions, role plays) as the session progresses; (5) Review the module at the end using participatory approaches where one participant reads one summary message and its application; and, (6) Distribute the participants' handouts.

SECTION 4: FACILITATOR GUIDELINES

4.1. Preparation of Training Materials

The training materials suggested require adequate preparations and should be available before the actual training dates. In addition:

1. The facilitators should familiarize themselves and internalize the guidelines provided by this manual early enough.
2. The stationery required should be available within the training institution 3 days before the training. These include name tags, writing materials, paper punch and medium size box files for participants' hand-outs filling.
3. Flip charts and good quality felt pens could be used interchangeably with LCD projections.
4. Visual aids like field equipment and tools should also be arranged in time before start of sessions.
5. There should be adequate copies of participants' hand-outs (one per participant) to be distributed at the end of each session or as may be suitable.
6. Copies of the modules are distributed at the end of each module.

4.2. Preparation of training venues and sites

The training venue will include the training room and field demonstration sites

1. **Training Room** – should have adequate space for 30 participants
2. **Demonstration Site** – ideally should be a 5-minute walking distance with at least 5 distinct plots for demonstration.

4.3. The trainees

The target trainees are agriculture extension officers with elaborate training background in agriculture and extension. The facilitator should not lecture but draw out and build on their knowledge, skills and experiences that they shall bring in. As a golden rule, do not lecture them but facilitate and listen and let them feel like equals to each other and the CTT team members.

4.4. Training Program

The facilitator will require a program that consists of the actual training modules and the corresponding days and time allocation **(Annex 1).**

4.5. Training Methods

The training methods proposed for each session are suitable for adult learners and appropriate for addressing knowledge, skills and attitudes of the participants. The choice of the methods has been informed by the competency issues being addressed, time available and experiences of the author of this manual. Depending on time available, the facilitator can modify these training methods, but as a golden rule no presentation by the facilitator should take more than 30 minutes continuously; but should be separated by the other participatory training methods. Table 2 present a list of available training methods.

Table 2: Description of Training Methods

Training Method	Description of Method
Plenary presentations	Use of power point or flip charts and plenary discussions in situations where knowledge and opinion or consensus is required
Group exercises, buzz groups, visits and demonstrations	To be considered where skills are an issue requiring sharing and trying
Case studies	To be used where there is need to view a problem objectively and allow free exchange of ideas
Role plays and problem-solving exercises	Plenary discussions have been considered as training methods where attitude is an issue
On-farm practical demonstration	To be considered where hand-on practical skills are acquired through sharing and demonstration

4.6. Planning Schedules and Guidelines for TOT Preparation

While planning for this training, the CTT leader should ensure that the activities in Table 3 are done before the training.

Table 3: Duration of activities to be done before Training

Duration To Training	Activities To Be Done
Three months	At least 5 Dry Bean demonstration plots planted (staggered)
Six weeks	Recruit Master Trainers, compose CTT.
Four weeks	Send out invitation letters to participants and special guests detailing purpose, venue and program. Follow up on demonstration sites. Brief CTT members
Two weeks	Confirm names of participants; reproduce training materials for facilitators and package, confirm preparedness of the field sites to be visited. Hold briefing of CTT members to finalize training plan. Confirm special guests if any
Four days	Confirm training sites preparedness, prepare sitting arrangements and stationery, and brief assistants
One day	Arrange training room furniture, place materials, equipment and stationery on the tables. Arrange for reception of trainees at residence proposed

On first day	Arrange for reception of trainees at the training venue. Ensure climate setting is done before the course is officially opened. This includes: • Registration • Welcoming to venue by host • Elaborate introduction of CTT and participants • Introduction to the project and training course • Ground rules • Groups formation

4.7. Evaluation of the Training

Half a day has been allocated for planning for way forward and evaluation of the TOT on the last day of the training. This is as presented in the program in Section 4.4.
The evaluation strategy should take two directions with the first being the individual trainees filling evaluation forms without conferring or refereeing to each other. The evaluation forms are then collected and analysed by the CTT members.

Table 4: Individual Sample Evaluation Form

	Aspect / Module	**Rating**		
		Very useful (3 marks)	**Useful (2 marks)**	**Of limited use (1 mark)**
1	Climate change and climate smart agriculture			
2	Farmer Field Business school (FFBS) approach			
3	Good Agricultural Practices (GAP) and Food Safety Management System (FSMS)			
4	Dry Bean production niche and climate requirements			
5	Dry Bean variety selection			
6	Dry Bean seed systems			
7	Dry Bean climate smart agronomic practices			
8	Integrated soil and water management practices for Dry Bean			
9	Dry Bean Crop Health			
10	Dry Bean harvesting and Post- harvest management			

11	Dry Bean value addition			
12	Mechanization of Dry Bean production activities			
13	Dry Bean business and Marketing			
14	Dry Bean Cross cutting issues (iv) Innovation Platforms (v) Gender mainstreaming and social inclusion (vi) Policy			

The second direction for evaluation is trainee's **group evaluation**. They retreat to one room and elect a chair and a secretary. Ask them to objectively and constructively evaluate the training in about 45 minutes in the absence of the CTT members. They then present their evaluation to the CTT members and as they present, the CTT members should only give points of clarification, if any misunderstanding occurred, but not try to be defensive. The CTT members then use the two evaluation results to write a report highlighting aspects that went on well and can be replicated, challenges that were encountered, and opportunities for future ToT's improvement. This one does not need a guided template but the trainees should be allowed to use their own way to present their evaluation points.

4.8. Facilitator Reference Materials

4.8.1. List of Publications

Dry Bean reference material will consist of the following:

a) Dry Bean production manuals/ guides
b) Pamphlets/brochures
c) Factsheets on specific TIMPs
d) Journal articles

The detailed list of all publications is summarized in **Annex 2**

4.8.2 Guide on the use of the reference information

The trainers will be advised to issue to trainee hand-outs after each module. These will help them recap on what they learned even after they have left the training.
The list of all individual publications will be stored and made available as electronic copies – mainly PDFs. The service providers are strongly advised to keep these electronic copies on a memory stick, CD or portable hard drive, so that trainees can easily access and if necessary print any of them out at a local cyber café.

PART II: DRY BEAN TRAINING MODULES

This part presents the content of **14 modules** of training namely: Climate change and climate smart agriculture, Farmer Field Business school (FFBS) approach, Dry Bean production niche and climate requirements, Good Agricultural Practices (GAP) and Food Safety Management System (FSMS), Dry Bean variety selection, Dry Bean seed systems, Dry Bean climate smart agronomics practices, Integrated soil and water management practices for Dry Bean, Dry Bean Crop Health, Dry Bean harvesting and Post-harvest management, Dry Bean value addition, Mechanization of Dry Bean production activities, Dry Bean business and Marketing, and Dry Bean Cross cutting issues (Innovation Platforms, Policy, gender mainstreaming and social inclusion).

All the modules will be divided into the following:

1. Introduction to the module
2. Module learning outcomes
3. Module target group
4. Module users
5. Module duration
6. Module summary
7. Facilitators' guidelines
8. Participants' hand-outs

MODULE 1

CLIMATE CHANGE AND CLIMATE SMART AGRICULTURE

1.1 Introduction to the Module

The impact of climate change and variability in agriculture, food systems and food security is a serious concern. Kenya's agricultural production systems is highly impacted due to the low adaptive capacity and the high exposure to climate related risks. The major agricultural activities are prone to risks and uncertainties of nature, which is affected by climate change either in intensity, scope or frequency. Climate change is expected to modify risks, vulnerabilities and the conditions that shape the resilience of agriculture systems as well as introducing new uncertainties. Adoption of climate smart agriculture (CSA) through application of tools and technologies and effective communications of weather information reduces the negative impacts of climate change and enhances access to food security in a changing environment. Thus, there is need to mainstream suitable climate resilient technologies, innovations and management practices (TIMPs) to increase productivity, resilience to climatic shocks and mitigate the causes of climate change.

1.2. Module Learning Outcomes

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

1. The concept of climate change and variability discussed and explained
2. Knowledge on the impacts of climate change and variability on agriculture and food security shared
3. Concept of Climate smart agriculture (CSA) shared and explained
4. Future climate scenarios and how to manage, projected and appreciated

1.3. Module Target Group

These module targets agricultural extension service providers dealing directly with farmer groups at community level or community facilitators.

1.4. Module Users

This module is intended for use by master trainers who are members of the Core Team of Trainers (CTT) and Lead Farmers in the Dry Bean value chain target Counties. The facilitator using this module should thoroughly familiarize themselves with the participants' handouts notes (training materials).

1.5. Module Duration

The Module is estimated to take about 4 hours.

1.6. Module Summary

Module 1. Climate Change and Climate Smart Agriculture in Dry Bean value chain			
Sessions	**Training Methods**	**Training Materials**	**Time**
1.6.1. Introduction to climate change and variability	• Plenary Presentation • Case study videos • Plenary discussions	• Projector • Laptop • Videos • Flip charts • Participants' Hand-outs	1 hour
1.6.2. Impacts of climate change and variability on agriculture and food security	• Plenary Presentation • Case study videos • Plenary discussions	• Projector • Laptop • Videos • Flip charts • Hand-outs	1 hour
1.6.3. Concept of Climate smart agriculture (CSA) in Dry Bean	• Plenary Presentation • Case study videos • Plenary discussions	• Projector • Laptop • Videos • Flip charts • Hand-outs	1 hour
1.6.4. Projected future climate scenarios affecting Dry Bean and how to manage	• Plenary Presentation • Case study videos • Plenary discussions	• Projector • Laptop • Flip charts • Hand-outs	40 minutes
1.6.5. Module review	• Participants' questions and comments • Facilitator's summary	• Module review	20minutes
TOTAL			**4 hours**

1.7 Facilitators Guidelines

Module 1. Climate Change and Climate Smart Agriculture in Dry Bean value chain	
1.7.1. Introduction and Levelling Expectations (1 hour)	**Session Guide**
(The facilitator introduces the trainees to this module and present the module objectives **Trainees' expectation (30 minutes)** *The facilitator organises the trainees into groups to record their expectations.* **Module Objectives (30 minutes)** *(The facilitator presents modules objectives on power point)* By the end of the training module the trainee should be able to: • Explain climate change and adaptations. • Define 'climate smart agriculture'. • Describe and explain available climate smart crop management practices in Dry Bean production. • Project and explain the benefits of selected climate smart crop management practices in Dry Bean production.	• PowerPoint presentation • Distribute Participants' Hand-outs on Module Objectives and expectations.

1.7.2. Introduction to Climate Change and Climate Variability (1 hour)	Session guide
(*The facilitator proceeds to introduce the module basics* **Plenary Presentation** • Basic terminologies used in the module (weather, climate, variability, adaptation, coping) • Climate change and climate variability • The causes of climate change • Climate risks impacting agriculture • Proposed adaptation measures	• PowerPoint presentation • Plenary Discussion • Participants' Hand-outs
1.7.3. Concept of Climate Smart Agriculture (CSA) (1 hour)	**Session Guide**
(The facilitator presents to the trainees the principles underpinning CSA and the link to deliverable of project objectives) **Plenary Presentation (45 Minutes)** • Definition of the CSA approach and their characteristics • The three pillars of CSA (productivity, Adaptation and Mitigation • Why CSA is needed **Plenary Discussion (15 Minutes)** Discussions on the CSA concept	• PowerPoint presentation • Participants' Hand-outs • Plenary discussion.
1.7.4. Projected Future Scenarios that will Impact Productivity (40 minutes)	**Session Guide**
(The facilitator presents and leads the trainees in discussing future climatic projections focusing on rainfall and temperature which directly impacts on crop yields). **Powerpoint Presentation and Plenary discussion (20 minutes)** • What are the long term rainfall and temperature projections as impacted by climate change? • Project impacts on food production and needed adaptation measures especially for Dry Bean. **Video presentation (20 Minutes)** • Short Video on showing projections of rainfall and temperature	• PowerPoint Presentation • Video presentation • Plenary Discussion
1.7.5. Module Review (20 minutes)	**Session Guide**
(The facilitator leads the trainees in summarizing the key points discussed in the module) • Let the trainees recall what they learned and discuss any Issues that may arise.	Plenary discussion

1.8. Participant's Hand-outs

Fact sheets on climate change

References

Esilaba, A.O.*et al*. (2019). KCEP-CRAL Climate Smart Agriculture Extension Manual. Kenya Agricultural and Livestock Research Organization, Nairobi, Kenya

MODULE 2

FARMER FIELD AND BUSINESS SCHOOL (FFBS) APPROACH IN DRY BEANS VALUE CHAIN (VC)

2.1. Introduction to the module

This module is designed for training and exposing trainees to the Farmer Field and Business Schools (FFBS) approach and concepts. In addition, practitioners of FFBS need to have knowledge of this methodology in order to disseminate the various Technologies, Innovations and Management Practices (TIMPs) in dry Beans VC to farmers. The trainees will thereafter facilitate farmers in the Common Interest Groups (CIGs), to learn by doing the available technologies, innovations and management practices (TIMPs) from a common plot of FFBS and then implement what they have learnt to their individual farms in order to meet the KSCAP project objective of increased productivity and building resilience to climate change. Farmer Field and Business Schools also empowers the learners with various skills such as leadership, communication and agri-business. Since the methodology is participatory, it improves the learners' observation skills and creates linkages with other value-chain players, thereby making dry beans VC profitable and sustainable.

2.2. Module Learning Outcomes

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

1. Clear understanding of Farmer Field and Business School approach mapped with teaching and facilitating defined.
2. Necessary practical skills, information and confidence building about their roles to facilitate a participatory learning process identified and explained.
3. Knowledge and analytical skills to design simple experiments for testing and selecting the best option to mitigate the constraints of the Dry Beans value chain mapped identified and explained.
4. Shift from the traditional focus to improving productivity towards farming business facilitated.

2.3. Module Target Group

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

2.4. Module Users

This module is intended for use by Master Trainers who are members of the Core Team of Trainers (CTT) and Lead Farmers in the Bean value chain target Counties. The trainers using this module should thoroughly familiarize themselves with the participants' Hand-outs (training materials).

2.4. Module Duration

The Module is estimated to take a minimum of 7 hours.

2.5 Module Summary

Module 2: Farmer Field and Business School Approach			
Sessions	**Training Methods**	**Training Materials**	**Time**
2.5.1 Introduction, Climate setting, leveling of expectations and objectives.	• Setting norms and group discussions on expectations	Laptop, Flip charts, Mark pens and Projector	1hr
2.5.2 Overview of FFBS key activities	• Plenary Presentations • Plenary discussions	Laptop, Pictorials and projector	1hr
2.5.3 Introduction to Communication and communication skills	• Plenary Presentation • Group discussions	Laptop, Projector, Flip charts felt pens	1 hr
2.5.4 Facilitation and leadership skills	• Plenary Presentation, • Plenary discussions	Laptop, Projector, Flip charts and felt pens	1hr
2.5.5 Organization and management in FFBS	• Plenary Presentation • Plenary discussions	Laptop, Projector, Flip charts and felt pens	1 hr
2.5.6 Developing FFBS Curriculum for the Dry Beans	• Group discussion and presentation • Plenary presentation	Laptop, Projector, Flip charts and felt pens	1 hr 30 minutes
2.5.7 Module review	• Discussions, Conclusions and way forward	Flip charts, laptop and projectors	30 Minutes
TOTAL			**7hrs**

2.6 Trainers Guidelines to FFBS establishment and operations

Module 2: Farmer Field and Business School Approach	
2.6.1 Introduction, climate setting Leveling Expectations and Objectives (1hr)	**Session Guide**
(The facilitator welcomes trainees to the module on FFBS and climate change and introduces him/herself stating his profile and experience of working with farmers and leads in climate setting). **Trainee introduction and climate setting** Introduction of participants, Setting training norms, Formation of FFBS sub groups (Working groups) and trainees to share their expectations **Plenary presentation on module Objectives** *(The facilitator presents modules objective in power point)* By the end of the module the trainee should be able to: • Describe the concepts, characteristics, principles and plans of Farmer Field and Business School (FFBS) as a 'learning by doing approach • Identify main differences between teaching and facilitation • Appreciate how to conduct to conduct Agro Ecosystems Analysis (AESA) on the dry Bean VC production. • Explain how to successfully lay Participatory Technology Development (PTD) in the dry Bean VC TIMPs • Develop FFBS Curriculum for dry Beans VC	• Provide checklist for introduction of trainees to help them build confidence in participation • Summarize and display trainees expectations • Form and assign roles to the Sub groups • Set Norms and nominate leaders • Power point presentation on the Objectives of the FFBS training module
2.6.2 Overview of FFBS key activities (1hr)	**Session guide**

Plenary presentation The facilitator takes the trainees through the main concepts and pillars of FFBS which includes: • Definition of FFBS • Participatory technology development (PTD) for dry Beans value chain TIMPS • Agro ecosystems Analysis (AESA) of dry Beans VC • Concept of what is this what is that • FFBS principle of Integrated production and pest management (IPPM) • FFBS Business concept and opportunities in dry Beans value chain	• Power point presentation
2.6.3 Introduction to Communication and Communication skills (1hr)	**Session guide**
Group exercise to gage the understanding of trainees on: • Definition of Communication • Communication channels, • Barriers to effective communication • How to effectively communicate **Plenary presentation** • Communication and communication skills	• Group exercise • Powerpoint Presentation • Participants' Handouts
1.1.4 Facilitation and leadership skills (1hr)	**Session guide**
Plenary presentation • Definition of Facilitation, facilitator and effective facilitator. • Qualities of a good facilitator. • Golden rules of facilitation. • Roles and responsibilities of FFBS Facilitators. • Difference between facilitation and teaching • Definition of leadership • Elements of leadership • Types of leadership • Characteristics of a good leader	• Power point presentation • Participants' Handouts
2.6.5 Organization and Management in FFBS (1 hr)	**Session guide**

Plenary presentation on FFBS implementation framework in the FFBS steps; • Ground working • Training of Facilitators • Establishing PTDs at the FFBS • Season long FFBS sessions • Evaluation of PTDs • Field days • Graduation • Establishment of Lead FFBS • Follow ups.	• Power point presentation • Participants' Hand-outs
2.6.6 Developing FFBS Curriculum for dry Beans production (1hr 30minutes)	**Session guide**
Plenary presentations Steps of Participatory technology development on dry Beans production • Identify the major constraints to increased yields of dry Beans production • Ranking of constraints in order from highest to the lowest • Identify list of TIMPS to address the highest ranking constraints • Rank the TIMPS in order from the most preferred • Develop PTD on the most preferred TIMP • Decide on the parameters for AESA • Develop FFBS curriculum using crop growth stages in Beans production **Group exercises** • Constraint identification and ranking • TIMPs options identification and ranking • Identification of the growth stages of the VC crop and development of FFBS training curriculum	• Group exercises • Powerpoint Presentation • Hand-outs
2.6.7 Module review (30 minutes)	**Session guide**
• Participants Questions and answers • Facilitators Summary • Guideline on FFBS dry bean action plan (Group discussion)	• Powerpoint presentation • Group Discussion ,

2.8 Participants' Hand-outs

- Factsheet on FFBS
- Factsheet on AESA

MODULE 3

GOOD AGRICULTURAL PRACTICES (GAPs) AND FOOD SAFETY MANAGEMENT SYSTEMS (FSMS)

3.1. Introduction to the module

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

Good Agricultural Practices (GAPs) are based on the principals of risk prevention, risk analysis, sustainable agriculture by means of Integrated Pest and Disease Management (IPDM) and Integrated Crop Management (ICM) to continuously improve farming systems. The food sector is faced with declining food safety, reduced food quality, requirements for sustainable farming practices and negative environmental impact from agricultural activities. Worker safety and health issues together with traceability requirements have become a major concern to consumers who require assurance of their safety while buying food from the markets. Good Agricultural Practices are of utmost importance in protecting consumer health by ensuring safety throughout the food chain. It is imperative to operate not only from the table but also upstream to include suppliers of inputs such as fertilizers, propagation materials, and crop protection agro-chemicals and all value chain players including providers of logistics and farm equipment. Good Agricultural Practices are therefore constitute a certification system for agriculture, specifying procedures that must be implemented to produce and supply food that is safe for consumers and wholesome, using sustainable methods.

Food safety, an essential condition for food quality, is based on the absence or occurrence of hazards that may create risks to human and animal health, within acceptable limits. Hazards are a common occurrence along food value chains that lack effective control measures. Hazards may be inherent in the seed due to 'bad' agronomic practices or introduced from other sources as food moves along the supply chain from the farm to fork continuum. Consequently, food safety risks such as food-borne diseases occur frequently thereby adding an extra burden of medication to the consumers.

Today, there is an increasing public concern on the negative environmental and health impacts of agro-chemicals (pesticides, growth regulators and mineral fertilisers) used in crop production as well as microbial pathogens and their toxins. It has therefore become necessary to control the occurrence of the hazards through the implementation of an effective Food Safety Management Systems (FSMS) through Hazard Analysis Critical Control Points (HACCP). Hazard Analysis Critical Control Points is a seven step management system which provides the framework for monitoring the total food chain to reduce the risk of foodborne illness and consequently death. The system is designed to identify and control potential problems before they occur.

3.2. Module Learning Outcomes

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

1. Clear Understanding of GAP's on matters of food safety and quality enhanced along the dry bean value chain

2. Utilisation of resources (water, soil, manure, fertilizers, and other inputs) while optimising environmental protection and conservation.
3. Worker safety and health within the dry bean production system enhanced
4. Traceability in food safety and quality mapped and implemented
5. Need for legal safe food production as a moral market requirement explained
6. Risks /hazards of food safety along the dry bean production chain identified
7. Critical control point (CCPs) at different levels of dry bean production mapped and determined
8. Preventive and corrective measures for the control of hazards identified and defined

3.3. Module Target Group

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

3.4. Module Users

This module is intended for use by Master Trainers who are members of the Core Team of Trainers (CTT) and Lead Farmers in the crops value chain target Counties. The facilitator using this module should thoroughly familiarize themselves with the Participants' Hand outs (training materials).

3.5. Module Duration

The Module is estimated to take a minimum of 8 hours 30 minutes

3.6 Module Summary

Module 3. Good Agricultural Practices (GAPs) and Food Safety Management Systems (FSMS)			
Sessions	**Training Methods**	**Training Materials**	**Time**
3.6.1 Introduction, objectives and levelling of expectations	• Groups to bring out expectations • Plenary Presentation	• Module objectives • Marker pens, flip chats • Projector, • Laptop,	1 hour
3.6.2 Understanding what is GAP and its application in the crop value chains	• Plenary Presentations • Group work • Plenary	• Flip charts • Marker pens • Projector • Laptop, • Pictorials/video clips	30 Minutes

3.6.3 Discussion of what factors to consider when selecting a site for agricultural activities through Risk assessment	• Group Work • Farm visit within training site • Group presentations	• Flip charts • Marker pens • Projector • Laptop, • Pictorials/video clips • Data sheets	1 hour
3.6.4 Review of GAP requirements for audit and types of protocols possible	• Group work • Plenary Presentations • Mock Audit	• Data forms • Flip charts • Marker pens • Projector • Laptop, • Pictorials/video clips • Data sheets	1 hour
3.6.5 Safe use of Pesticides and calibration of sprayers and nozzles	• Group work on nozzles and rate of discharge • Safety guidelines	• Pictorials/video clips • Knapsacks • Measuring Cylinders • Tape measure • Nozzles • Empty clean Pesticide containers	1 hr 30 minutes
3.6.6 Understanding of food safety management system in dry bean value chains	• Brain storming • Plenary presentation • Group discussions	• Flip charts • Marker pens • Projector • Laptop, • Pictorials/video clips	30 minutes
3.6.7 Determination of food safety risk/hazards in dry bean value chains (hazard analysis)	• Plenary Presentation • Group discussions	• Projector • Laptop • Flip charts • Marker pens • Participants' hand-outs	30 minutes
3.6.8 Determination of critical control points (CCP) in dry bean value chain	• Plenary Presentation • Group discussions	• Projector • Laptop, • Flip charts • Marker pens	1 hour

3.6.9 Prevention and corrective measures for CCP in dry bean value chain	• Plenary Presentation • Group discussions	• Flip charts • Marker pens • Power point projector • Laptop • Pictorials/video clips	1 hour
3.6.10 Module review	• Participants' questions and comments • Facilitator's summary	• Participants' hand-outs • Module review	1 hour
TOTAL			**8 hours 30 minutes**

3.7 Facilitator Guidelines to Good Agricultural Practices

3.7.1 Introduction and Levelling Expectations (30 Minutes)	**Session Guide**
The facilitator welcomes trainees to the sub-module on GAPs and introduces him/herself stating profile and experience of working with farmers. **Trainees' introductions and expectations (30 minutes)** The facilitator invites the trainees to state their expectations after brain storming in their respective county groups **Module Objectives (30 minutes)** The facilitator presents module's objectives in power point. By the end of the module the trainee should be able to: • Appreciate GAP's on matters of food safety and quality along the dry bean value chain. • Optimise utilisation of resources (water, soil, manure, fertilizers, and other inputs), environmental protection and conservation. • Enhance worker safety and health within the dry bean production system. • Map and implement traceability in food safety and quality along the dry bean value chain.	• Summarize trainees' "Expectations" on a flipchart and make displays • • Power Point presentation
3.7.2 Understanding what is GAP and its application in the crop value chains	**Session Guide**
Facilitator leads discussions on understanding of GAPs and its relevance to actors in the Dry Beans value chain **Plenary Presentation** • Understanding GAP in the context of Dry beans production • Explain the role of GAPs in safe and sustainable food production system for growers and consumers. • Understanding GAPs as the key to high commodity market destinations	• Power Point presentation • Participants hand-outs • Group exercises

3.7.3 Discussion of what factors to consider when selecting a site for agricultural activities through Risk assessment	**Session Guide**
Facilitator guides discussions on the key determinants of site suitability for agricultural activities. **Plenary discussion** • Factors to be considered in an agricultural site selection • (Site history, Slope of land, type of soil versus crop, water sources and physical quality, soil and water analysis) • The Need for documentation in a farm assurance system • Types of Mandatory farm records • General guidelines to Conservation Agriculture	• Power Point presentation • Participants hand-outs • Plenary discussion
3.7.4 Review of GAP requirements for audit and types of protocols possible	**Session Guide**
(The facilitator leads the trainees in summarizing the key points discussed in the module) **Plenary presentation** • Methods and procedures required at on-farm level to obtain GAP certification in dry beans production. • Good soil management practices (appropriate crop rotations, manure application) • Careful management of water resources and efficient use of water for rain-fed crop production via irrigation. • Selection of crop types and varieties to meet local consumer needs. • Adoption of IPM practices to minimize the potential impact of pest control actions on workers, food, and environmental and health safety. • Minimizing contamination at Harvest, On-farm Processing and Storage.	• Power Point presentation • Participants hand-outs
3.7.5 Introduction to Site Selection (1 hour)	**Session Guide**
The facilitator introduces the various factors involved in site selection through Pictorials/video clips PPT's and farm walk **Plenary Presentation** • Factors to be considered in an agricultural site selection • (Site history, Slope of land, type of soil versus crop, water sources and physical quality, soil and water analysis) • The Need for documentation in a farm assurance system • Types of Mandatory farm records • General guidelines to Conservation Agriculture	• PowerPoint presentation • Participants hand-outs
3.7.6 GAP checklists and Audit (1 hour)	**Session Guide**

Facilitator guides the trainees on self-assessment (Internal audit and corrective measures for non-compliance) **Plenary Presentation** • Need for mandatory records in GAPs • Internal Audit procedures • Practical on Mock Audits • Interpretation of audit reports • Compliance and Corrective action **Group Exercise** • Groups audit a farm or a process within the training site • Present audit results and verdict and Corrective action	• PowerPoint presentation • Global GAP Checklists • Participants hand outs • Group Exercise
3.7.7 Safe use of Pesticides and calibration of sprayers and nozzles (1 hour 30 minutes)	**Session Guide**
The facilitator organizes the groups to identify level of knowledge on pesticide use and safety. *Determination of less hazardous pesticides, fungicides and herbicides, quantities to apply and respective PHIs* **Plenary presentation** • Formation of groups for practical activities • Guided Knapsack calibration • Different types of nozzles and their uses • Pesticide safety **Group Exercise** • Practical session on how to handle different types of pesticides, fungicides and herbicides together with their calibrations	• PowerPoint presentation • Pesticide containers • Knapsack sprayers • Nozzles • • Participants hand-outs • Group Exercise
3.7.8 Understanding Food Safety (30 minutes)	
The facilitator should be able to introduce food safety system by defining it and sharing its benefits with the trainees). Power points **Plenary Presentation** • Overview of Food safety management systems • Why food safety is important in crops production systems • Risks to human/animal health due to chemical, biological and physical hazards exposure • Legal and market requirements for food safety practice • Food safety practices that reduce risks/hazards • Use of HACCP tool/system for monitoring crop production	• List the responses on flip chart • PowerPoint presentation • Participants hand outs
3.7.9 Determination of food safety risks/hazards (30 minutes)	

Facilitator should guide discussions on the steps of identification of food safety hazards FSMS **Plenary Presentation** • Explain the concept of risk identification (Hazard analysis) • Listing the types of hazards that cause illness or death • Determine factors influencing likely occurrence/severity of hazards identified • List hazards alongside the possible control measures • Explain the concept in a flow diagram **Group Exercise** • Groups to identify major risk/hazards at points of crop production for Dry Beans • Produce flow diagrams for each crop	• PowerPoint presentation • Participants hand outs • Group Exercise
3.7.10 Determination of critical control points (CCP) in crop value chains (1 hour)	
The facilitator introduces the topic on determination of critical control points (CCP) **Plenary presentation** • Why is it important to determine CCP in production chain (preventing, eliminating or reducing risks) • How to monitor and measure the CCP (point, step or procedure) • How to document the CCP • How to establish critical limits (from standards/ guideline) for each CCP **Group Exercise** Groups to identify and establish critical control points and critical limits for Dry Beans.	• PowerPoint presentation • Participants handouts • Group Exercise
3.7.11 Prevention and corrective measures for CCP in crop value chains (1 hour)	**Session Guide**

The facilitator introduces the topic on prevention and control of possible hazards **Plenary presentation** • Establishment of corrective actions against CCP • Establish verification procedures for CCP • Establish record-keeping and documentation procedures • How to develop HACCP plan and Food safety kit **Group Exercise** Groups to identify and establish corrective actions and verification procedures for Dry Beans.	• Power Point presentation • Participants hand-outs • Group exercises
3.7.12 Module Review (30 minutes)	**Session Guide**
(The facilitator leads the trainees in summarizing the key points discussed in the module)	Plenary discussion

3.8.Participants' Hand-outs

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

References

1. Hazard Analysis Critical Control Point Principles and Application Guidelines (2018). National Advisory Committee on Hazards Criteria for Foods.
2. Global GAP cartoon Manual
3. Global GAP Version V

MODULE 4

DRY BEAN PRODUCTION NICHES AND CLIMATIC REQUIREMENTS

4.1 Introduction

This module exposes service providers, lead farmers and facilitators to the different types of production ecological conditions (altitudes, soils, AEZs and climate) suitable for Dry Bean production. Dry Beans are mainly grown by smallholder farmers under rain-fed conditions. The crop is either grown as a mono crop or is intercropped with cereal crops including maize, sorghum and millet. The production systems are guided by the size of the farm and purpose (e.g., for market or contract farming where farmers produce for seed companies) and the market demand. There is need for the knowledge on the production niches and climatic conditions for increased productivity of the crop.

4.2 Module Learning outcomes

By the end of the module the following shall be the outcomes:

1. Importance of Dry Beans in Kenya's economy understood and appreciated
2. Knowledge on altitudes and soil types/characteristics for bean production enhanced
3. Climatic conditions (temperatures, rainfall and humidity) required for bean production understood and applied
4. Specific county agro-ecological zones for bean production explained and understood

4.3 Module Target Group

This module is intended for public agricultural extension providers in the bean value chain target counties and service providers.

4.4 Module users

This module is intended for use by master trainers who are members of the Core Team of Trainers (CTT) and Lead Farmers in the bean value chain target counties. The facilitator using this module should thoroughly familiarize themselves with the participant's hand-outs (training materials).

4.5 Module Duration

The Module is estimated to take a minimum of 5 hours.

4.6 Module Summary

Module 3: Bean production niches and climatic requirements			
Sessions	**Training methods**	**Training materials**	**Time**
3.6.1 Introductions and climate setting	▪ Presenter introductions ▪ Self-introduction of trainees (incl. individual involvement in beans value chain ▪ Plenary discussion	▪ Flips charts ▪ Felt pens ▪ Laptop for power point Presentation	30 minutes
3.6.2 Objectives and expectations	▪ Presentations (guide on group work) ▪ County group exercise (trainees enlist expectations) ▪ Plenary discussions to share expectations	▪ Flips charts ▪ Felt pens ▪ Laptop for power point Presentation	30 minutes
3.6.3 Importance of beans in Kenya's economy	▪ Presentations ▪ Plenary discussions	▪ Flips charts ▪ Felt pens ▪ Laptop for power point Hand-outs Training notes)	1 hour
3.6.4 Bean production ecological/climatic requirements for optimal yields	▪ Presentations ▪ Plenary discussions	▪ Flips charts ▪ Felt pens ▪ Laptop for power point presentations ▪ Hand-outs (training notes)	1 hour
3.6.5 Bean production Agro-ecological zones (AEZs)- average yields, and constraints in the target Counties	▪ Group work to identify bean production pockets in their sub-Counties/Counties ▪ Presentations ▪ Plenary discussions	▪ Flips charts ▪ Felt pens ▪ Laptop for power point presentations	1 hour
3.6.6 Bean module review	▪ Discussions/ conclusion and way forward	▪ Flip charts ▪ Laptop for power point presentations	30 Minutes
Total			**4 hours 30 minutes**

4.7 Facilitator's Guidelines

Module 4: Bean production and appropriate climatic requirements	
4.7.1. Introductions and climate setting (30 minutes)	**Session Guide**
(The facilitator welcomes trainees to the module on bean production and appropriate climatic requirements. They are then invited to introduce themselves and state their past or current involvement in bean production along the enterprise value chain.)	• Summarize the facilitator/ trainees involvement in bean value chains
4.7.2. Objectives and expectations (30 minutes)	
The facilitator invites the trainees to state their expectations and thereafter presents module objectives: **Expectations (15 minutes)** The trainees go into groups (e.g. county based) and list expectations. **Objectives (15 minutes)** By the end of the module the trainee should be able to: • To define the importance of bean in Kenya's economy • Indicate and describe altitudes and soil types/characteristics for bean production • Describe climatic conditions (temperatures, rainfall and humidity) required for bean production • Explain specific county agro-ecological zones for bean production	• PowerPoint presentations • Group exercise (listing and presenting expectations). • Expectations lists kept for later reviewing
4.7.3 Importance of beans in Kenya's economy (1 hour)	
Plenary Presentation (45 minutes) • Origin of beans • Why beans in Kenyan households • Key counties producing beans in Kenya • General bean production in Kenya **Facilitator's guided discussions (15 minutes)** Questions/answers/comments	• PowerPoint presentation • Distribute to participants Hand-outs
4.7.4 Bean production ecological/climatic requirements (1 hour)	
Plenary Presentation (45 minutes) • Altitude and Agro-ecological zones • Climatic conditions (Rainfall, Temperatures and humidity) • Soils (soil types, pH, general fertility for Green gram) **Facilitator's guided discussions (15 minutes)** Questions/answers/comments	• Power point presentation • Distribute to participants Hand-outs (training materials)
4.7.5. Bean production AEZs (villages), average yields, and constraints in the target Counties (1 hour)	**Session Guide**

Plenary Presentation (30 Minutes) Facilitator guides in reviewing and discussing suitability map (County by County) **Group work (15 minutes)** Trainees to bring out specific county or sub-county AEZs, land size, yields and constraints to bean production and present in the plenary: • Agro-ecological zones (AEZs) and % area suitable for Green gram • Average land/farm size under bean • Average Bean yield per farm • Constraints to bean production **Discussions/presentations from the groups (15 minutes)** Let the trainees/groups share the group exercise outcomes	• Power point presentations • Group work • Open but facilitator's guided discussions
4.7.6. Module review (1 hour)	**Session Guide**
(The facilitator leads the trainees in reviewing the module) Summary of the main points from the training **(30 minute)** By the end of the module the trainee should be able to: Objectives and expectations (review done on basis of the earlier listed objectives and expectations) • Bean production ecological/climatic requirements, bean production AEZs (villages) average yields, and constraints in the target Counties • Randomly (average of 10 cases), trainees indicate new thing(s) learned from the module. The results are recorded per county presented • Randomly (average of 10 cases) trainees pin-point the way forward issues. **Facilitator's guided discussions (30 minutes)**	• The last participants' Hand-outs/ training materials • Summarize the main points of the module on a flip chart and display

4.8 Participants' Hand-outs

- Bean production Guide [Manual, 2020]
- Bean leaflets [2020]
- Bean fact sheets

MODULE 5

DRY BEAN VARIETY SELECTION

5.1. Introduction to the Module

This module exposes service providers, lead farmers and facilitators to the improved dry bean varieties, their uses and target area of production. The various Dry Bean varieties are released for different ecological areas and different uses. There are varieties for dry low lands, dry cold high lands and semi humid and humid areas. These varieties are also grouped into categories such as canning, pre-cooked among other products for consumption by humans. However, farmers are not able to identify the varieties suited to their regions and their needs. There is therefore need to train farmer trainers in the target counties on the different dry bean varieties, their suitable areas of production and their end uses.

5.2 Learning Outcomes

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

1. The Dry Bean crop described
2. The various improved dry bean varieties, their ecological areas of cultivation and their attributes and uses identified.
3. Appropriate variety for specific regions identified

5.3 Module Target Group

This module targets agricultural extension service providers based at Dry Bean target counties.

5.4. Module users

This module is intended for use by Master Trainers who are members of the Core Team of Trainers (CTT) and Lead Farmers in the Dry Bean value chain target Counties. The facilitator using this module should thoroughly familiarize themselves with the participant's hand-outs (training materials).

5.5 Module Duration

The Module is estimated to take **4 hours**

5.6 Module Summary

Module 5. Dry Bean Variety Selection			
Sessions	**Training Methods**	**Training Materials**	Time
5.6.1. Introduction and Objectives Expectations	Plenary presentation Group discussions and presentation of expectations	• Flip charts • PowerPoint	1 hour

5.6.2. Introduction to various improved Dry Bean varieties, their ecological areas of cultivation and their attributes and uses.	• Group Exercises to identify local Dry Beans • Plenary Presentations • On-farm practical demonstration	• PowerPoint • Flip charts • Manila papers • Mark pens	1 hour 30 minutes
5.6.3 Appropriate variety for specific regions	• Plenary Presentation • Group Exercises	• PowerPoint	1hour
5.6.4.Module review	• Group Exercises • Facilitator's summary	• Participants' hand-outs • Module review • Participants' hand-outs • Dry Bean manual	30 minutes
TOTAL			**4 hours**

5.7. Facilitators Guidelines

Module 5: Dry Bean Variety Selection	
5.7. 1 Introduction and levelling of expectations and objectives (1 hour)	**Session Guide**
Introduction (30 minutes) (*The facilitator welcomes trainees to the module on Dry Bean varieties and introduces himself/herself by stating his/her profile and experience.)* The facilitator invites the trainees to introduce themselves and state their expectations. **Module Objectives (30 minutes)** (The facilitator presents modules objectives) By the end of the module the trainee should be able to: 1. Describe the Dry Bean crop and its climatic and ecological requirements. 2. Identify the various improved Dry Bean varieties their ecological areas of cultivation and their uses. 3. Identify the varieties suited to the counties of interest.	• Summarize trainees' "expectations" and display. • Distribute participants' hand-outs • Module Objectives, Program
5.7.2 Introduction to Dry Bean and the various improved Dry Bean varieties and their uses (30 minutes)	**Session Guide**

(The facilitator should describe the Dry Bean crop, the facilitator should be able to guide the trainees in identifying the various Dry Bean improved varieties and their uses). **Group work (10 minutes)** Ask trainees highlight and describe some of the Dry Bean varieties they know. **Plenary Presentation (20 minutes)** • What is Dry Bean? • Improved Dry Bean varieties. • Categories of Dry Bean varieties for malting and consumption, forage, sweet Dry Bean varieties *Show trainees the photographs of each variety and the full description and its uses.*	• Distribute Participants' hand-outs • • Dry Bean brochures, leaflets and manual
5.7.3 Recommended Dry Bean varieties for the target counties (2 hours)	**Session Guide**
Plenary Presentation **Varieties for the target counties (30 minutes)** • Dry Bean growing regions and the new regions which are being targeted for Dry Bean cultivation in Kenya. • Dry Bean varieties suited for each county • Target county climatic conditions (semi-arid, hot dry low land, cold dry highlands, high potential, sub humid and humid) **Group Exercises (30 minutes)** Trainees discuss and come up with Dry Bean varieties in their count **Group Exercises (1 hour)** *(Ensure there is an established plot of all the varieties or Dry Bean plant samples).* • Visit the Dry Bean plot with the trainees and assist them identify and study the various varieties. • After the field visit facilitate them to recall what they learned and discuss on any issue that may arise. (can also use Dry Bean plant samples for the various varieties)	• Distribute participants' hand-outs. • Dry Bean manual • Brochures • Leaflets
5.7.4 .Module review (30 minutes)	Session Guide

(The facilitator should be able to lead the trainees in reviewing the module) **Group Exercise** Summarize the main points of the training Together with the trainees review the main points about improved Dry Bean varieties • What new things did you learn from this Module? • What are some of the problems and issues that you have become more aware of in Dry Bean varieties? • What questions do you still have about identification of Dry Bean varieties?	• The last Participants' Hand-outs • Summary of the main points from the module.

5.8. Participant's Hand-outs

- Dry Bean production Guides [2017]
- Dry Bean leaflets [2017]

MODULE 6

BEAN SEED SYSTEMS

6.1 Introduction to the Module

Most dry bean farmers either recycle their own seeds, or source seeds from their neighbours, local markets and grain stores. Only a few farmers purchase certified seeds. Prolonged use of farmer-saved seeds significantly reduces yields and undermines the potential of private sector investment in commercial production and marketing of improved certified seeds. This has negatively impacted on the dissemination of improved high-quality seed of dry beans. As agricultural production increasingly becomes commercialized and global food markets become more competitive, farmers need to invest in improved dry bean seed varieties for high yields and sustainable income. This module exposes county extension officers, private service providers, lead farmers and facilitators to the various seed systems and the importance of quality seed in dry bean production. It also covers community seed production and gives direction on how to interface formal and informal seed production to enable farmers venture into commercial production of dry beans.

6.2 Module learning outcomes

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

1. The main dry bean seed systems in Kenya explained and appreciated
2. Knowledge on dry bean seed production in formal and informal seed system enhanced and applied
3. The importance of informal seed system, community seed bulking and its interface with formal seed production for enhanced production of quality grain explained and understood

6.3 Module Target Group and Categories

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

6.4 Module Users

This module is intended for use by master trainers who are members of the Core Team of Trainers (CTT). The facilitator using this module should be well conversant with the participant's hand-outs.

6.5 Module Duration

The Module is estimated to take a minimum of 5 hours and 30 minutes

6.6 Module Summary

Module 6: Bean Seed System			
Sessions	**Training methods**	**Training materials**	**Time**
6.6.1 Introduction, objectives and expectations	• Self-introduction • Presentations • Plenary discussions	• Flips charts • Marker pens • PowerPoint presentation	1 hour
6.6.2 Definition of seed and seed system in Kenya	• Group work • Presentations	• Flips charts • Marker pens • PowerPoint Presentation	1 hour
6.6.3 Formal seed system in Kenya	• Presentations • Discussions	• PowerPoint Presentation • Flips charts • Marker pens	1 hour 30 Minutes
6.6.4 Informal seed system in Kenya	• Presentations • Discussions	• PowerPoint Presentation • Flips charts • Marker pens	1 hours 30 minutes
6.6.5 Module review and discussions	• Group work • Discussions • presentation	• Flips charts	30minutes
Total			**5 hours**

6.7 Facilitator's Guidelines

Module 6: Bean Seed System	
6.7.1. Introduction and levelling of expectations and objectives (1 hour)	**Session Guide**
Introduction (30 minutes) *(The facilitator welcomes trainees to the module on the main dry bean seed systems before inviting trainees to introduce themselves and state their expectations.* **6.7.1. Module Objectives (30 minutes)** *(The facilitator presents modules objectives)* By the end of the module the trainee should be able to: • To Sensitize trainees on dry bean seed systems and its importance in production • To Sensitize trainees on seed production in formal and informal seed system • Understand the Importance of informal seed system, community seed bulking and its interface with formal seed production for enhanced production of quality grain	• Summarize Trainees' "Expectations" and display. • PowerPoint Presentation • Distribute Participants' Hand-outs

6.7.2. Definition of seed and seed system in Kenya (1hour)	Session Guide
Group work and presentations: (30 Minutes) • What is quality seed? **Plenary Presentation (30 Minutes)** • Definition a seed system and characteristics of main seed systems (formal and informal seed system) • Commodity corridors	• Group work • PowerPoint Presentation • Distribute Participants' Hand-outs • Brochures, Leaflets,
6.7.3 Formal seed systems in Kenya (1 hour 30 Minutes)	**Session Guide**
Plenary presentations (1 hour 30 Minutes) • Legal requirements for seed certification • Seed certification process • Post certification activities for enforcing the seed act cap 326 • Post certification activities for seed quality assurance • Seed importation and exportation requirements	• PowerPoint Presentation • Distribute Participants' Hand-outs • Brochures, Leaflets
6.7.4 Informal seed system in Kenya (1 hour 30 Minutes)	**Session Guide**
Plenary presentations: (1 Hour) • Seed multiplication • Dry bean seed standards and commercial production • Informal seed system • Community seed bulking and how is it implemented • Synergies for formal and informal seed systems **Group work and discussions (30 Minutes)** Calculate seed requirements for the county/ward/farmer group and present	• Group work • PowerPoint Presentation • Distribute Participants Hand-outs • Brochures, Leaflets,
6.7.5 Module review (30 minutes)	**Session Guide**
(The facilitator leads the trainees in reviewing the module) Summarize the module together with the trainees and have a recap of the main components in: • Dry bean seed systems and their characteristics • Importance of using certified seed • Informal seed *(Discuss the knowledge acquired and skills learnt from this module with the trainees. What are the observations made by trainees from this module?)*	• The last Participants' Hand-outs • Summarize the main points from the module on a flip chart and display

6.8 Participants' Hand-outs

- Bean production Guide [Manual, 2019] available under KCEP-CRAL
- Bean leaflets [2017]
- Bean fact sheets

MODULE 7

CLIMATE SMART AGRONOMIC PRACTICES FOR DRY BEANS

7.1 Introduction

Low yield of dry beans has resulted from the adoption of poor agronomic practices by dry bean farmers despite the availability of improved crop management practices developed by agricultural researchers. Some of the improved agronomic practices available for these farmers include, timely land preparation, recommended fertilizer types, correct plant spacing, use of rhizobia and biofix for nitrogen fixation, physiological maturity indices and how to improve on harvesting techniques to avoid losses through spillage and shattering of dry bean pods.

Improved varieties bred for higher yield and other superior characteristics such as resilience to climate change may not have any meaningful impact in the lives of both farmers and consumers unless farmers adopt the recommended agronomic options. This calls for the improvement of County extension officers' agronomic skills and knowledge so as to enable them guide farmers through the appropriate implementation of these recommended practices. With proper training, the farmers should be able to embrace all these agronomic packages in order to maximize yields and enhance food security while increasing sustainable income. Consequently, the module targets extension staffs, lead farmers, value chain service providers and facilitators to guide the farmer in adopting these practices for improved quality and quantity of yields.

This module covers various aspects of good agronomic practices. These incudes; the importance of land preparation, recommended fertilizer types, proper plant spacing, use of rhizobia and biofix for nitrogen fixation, physiological maturity indices and how to improve harvesting techniques to avoid losses through spillage and shattering of dry bean pods..

7.2 Module Learning outcomes

By the end of this module, the trainees should:

1. The recommended agronomic practices for dry beans production described and explained
2. Knowledge on specific agronomic practices in dry bean production acquired and applied
3. Input requirements and their right measurements for dry beans production identified
4. Knowledge on the timing of various operations such as inputs application in dry beans production acquired and applied

7.3 Module Target Group and Categories

This module is intended for county agricultural extension staff and service providers in the bean value chain across the target counties

7.4 Module users

This module is intended for use by master trainers who are members of the Core Team of Trainers (CTT). The facilitator using this module should be well conversant with the participant's hand-outs, or any other training materials.

7.5. Module Duration

The module is estimated to take a duration of **5 hours**

7.6 Module Summary

Module 7: Beans agronomic practices			
Sessions	**Training methods**	**Training materials**	**Time**
7.6.1 Introductions and climate setting	• Presenter introductions • Self-introduction of trainees (incl. individual involvement in dry deans • Plenary discussions	• Flips charts • Marker pens • Laptop • Projector	30 minutes
7.6.2 Objectives and expectations	• Presentations (guide on group work) • Group work (trainees enlist expectations) • Plenary discussions to share expectations	• Flips charts • Marker pens • Laptop • Projector	1 hour
7.6.3 Agronomic practices for bean production	• Presentations • Practical work (groups tour nearby farm for possible farm layout) • Plenary discussions resulting from the farm visit	• Flips charts • Marker pens • Laptop • Projector	2 hours
7.6.4 Appropriate inputs and their application rates for optimum yields of dry beans	• Presentations • Group work (trainees enlist inputs and dosage in different counties) • Plenary discussions to share group work results	• Flips charts • Marker pens • Laptop • Projector	1 hour
7.6.5 Module review and discussion	• Discussions/conclusion and way forward	• Flip charts • Marker pens • Laptop • Projector	30 minutes
Total			**5 hours**

7.7 Facilitator's Guidelines

Module 7: Climate smart agronomic practices for dry beans	
7.7.1. Introductions, climate setting (30 minutes)	**Session Guide**
The facilitator welcomes trainees to the module and introduces him/herself. The trainers are then invited to introduce themselves and state their past or current involvement in dry bean production	• Summarize the facilitator/ trainees involvement in Beans value chains
7.7.2 Objectives and expectations (1 hour)	

Objectives (30 minutes) The facilitator presents the module objectives. By the end of the training module, the trainee should: 1. Clearly understand the agronomic practices recommended for dry beans production 2. Describe and explain inputs and their right application rates for dry beans production 3. Provide region-specific advice on agronomic practices for dry beans production 4. Specify the right timing for operations or inputs application in dry beans production **Expectations (30 minutes)** The trainees to form discussion groups and list their expectations from the module.	• PowerPoint presentations • Group exercise (listing and presenting expectations). • Expectations lists kept for later reviewing compliancy
7.7.3. Agronomic practices for dry beans production (2 hour)	
Plenary Presentation (40 minutes) The facilitator presents critical factors on: • Climate smart land preparation • Fertilizer recommendations • Dry bean rhizobium inoculation technologies • Climate smart optimal planting/ (seed rates, plant density) • Physiological maturity indices and harvesting • Innovative legume intercropping system **Discussions (20 minutes)** Questions/answers and comments	• PowerPoint Presentation • Groups discussions • Distribute participants' hand-outs/training materials
7.7.4. Appropriate inputs and their application rates for optimum yield of dry (1 hour)	**Session Guide**
Group work (30 minutes) • The facilitator guides trainees to list and/or present the required inputs for use in dry beans production • The trainees form county groups to provide lists of dry bean inputs and the application rates used by farmers. • The groups present their results in the plenary - opening up for some questions, answers and discussions. **Plenary presentation (30minutes)** The facilitator present PowerPoint presentation on the recommended dry beans inputs (seeds, fertilizers, manures, etc.),their application rates, and time of their application for optimal yields of dry beans	• PowerPoint Presentation • Distribute participants • Groups discussions hand-outs/training materials

7.7.5. Module review (30 minutes)	Session Guide
(The facilitator leads the trainees in reviewing the module) Summary for the main points from the training • Objectives and expectations (review done on the basis of objectives and expectations listed earlier) • Trainees to randomly indicate new sets of skills and knowledge acquired from the module. The results to be recorded and presented per county. • Randomly (average of 10 cases) Trainees to randomly highlight future undertakings in reference to the module.	• The last Participants' Hand-outs/training materials • Summarize the main points of the module on a flip chart and display

7.8. Participants' Hand-outs

1. Beans production Guides [2017]
2. Beans leaflets
3. Brochures on Soil and Water managements

MODULE 8

INTEGRATED SOIL AND WATER MANAGEMENT PRACTICES FOR DRY BEAN PRODUCTION

8.1 Introduction to the module

Poor soil conditions and unreliable availability of moisture in most smallholder dry bean farming systems have been the main causes of low yields. Generally, crop yields have continued to decline over the years due to increased soil acidity, mining of nutrients not supplied in the applied fertilizers and poor soil structure caused by failure to use the available sources of organic matter. Macronutrients [nitrogen (N), phosphorus (P), potassium (K) and Sulphur (S)] and micronutrients [zinc (Zn), Molybdenum (Mo) and Boron (B)] have been identified as deficient in Kenyan soils. Additionally, climate change has accelerated the decline of the agricultural sector performance through limited and unpredictable water availability for the dry bean production systems. Integrated Soil Fertility Management (ISFM), through conservation agriculture offers the best options for improving soil fertility in the advent of climate change adaptation.

Dry beans are mostly cultivated by smallholder farmers with minimal inputs. Drought management technologies to mitigate drought effects in dry bean production are available. However, farmers have not realized the full benefits due to limited integration of the developed Integrated Natural Resource Management (INRM) and sustainable intensification practices in their dry beans production systems.
This module introduces dry bean value chain service providers, lead farmers, public Agriculture extension staffs and facilitators to the importance of integrated soil and water management practices for enhanced bean production.

8.2 Module learning outcomes

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

1. Knowledge on soil composition, the various physical, chemical and biological properties and what constitutes a healthy soil, including soil classification acquired
2. Soil and plant tissue sampling for laboratory analysis, interpretation and utilization of results from accredited laboratories in Kenya discussed and understood
3. Soil fertility and plant nutrition for increased crop productivity (4R Stewardship that includes nutrient source and application rates, timing and placement) understood by the participants
4. Knowledge on soil health and Integrated Soil Fertility Management (ISFM) for climate resilient cropping acquired
5. Knowledge on water harvesting technologies, water quality for dry bean production together with soil and water management acquired
6. Knowledge and skills for identifying temporary or permanent decline in the productive capacity of land and how to solve soil degradation challenges imparted and understood by the participants
7. Awareness on the occurrence of problematic soils and their management increased by the participants

8.3 Module Target Group and Categories

This module is intended for dry bean value chain service providers and County extension agents in the dry beans producing regions.

8.4 Module Users

This module is intended for use by Master Trainers who are members of the Core Team of Trainers (CTT). The facilitators using this module should be well conversant with the participant's hand-outs.

8.5 Module Duration

The Module is estimated to last for a duration of **5 hours.**

8.6 Module Summary

Module 8: Integrated soil and water management practices for dry beans production			
Sessions	**Training methods**	**Training materials**	**Duration**
8.6.1 Introduction, objectives and expectations	-Personal introduction -Presentations -Plenary discussions	-Flip charts -Marker pens -PowerPoint presentation	30 minutes
8.6.2 Soil composition, properties and health,	-Presentations -Practical's on how to conduct soil sampling and analysis	-Flip charts -Marker pens -PowerPoint presentation -Participants' hand-outs	30 minutes
8.6.3 Soil and plant tissue sampling and analysis	-Presentations -Field demonstrations (Conduct soil and plant tissue sampling and analysis)	-Flip charts -Marker pens -PowerPoint presentation -Participants' hand-outs	1 hour
8.6.4. Soil fertility and plant nutrition	Presentations Field demonstrations	-Flip charts -Marker pens -PowerPoint presentation -Participants' hand-outs	30 minutes
8.6.5 Soil health and (ISFM) for climate resilient cropping systems	Presentations Field demonstrations	Flip charts Marker pens PowerPoint presentation Participants' hand-outs	30 minutes
8.6.6 Soil and water management and water harvesting technologies	Presentations Field demonstrations	Flip charts Marker pens PowerPoint presentation Participants' hand-outs	30 minutes

8.6.7 Soil degradation and reclamation	Presentations Field demonstrations	Flip charts Marker pens PowerPoint presentation Participants' hand-outs	30 minutes
8.6.8 Problematic soils and their management	Presentations Field demonstrations	Flip charts Marker pens PowerPoint presentation Participants' hand-outs	30 minutes
8.6.9 Module review and discussion	Discussions	Flip charts	30minutes
Total			**5 hours**

8.7 Facilitator's Guidelines

Module 8: Integrated soil and water management practices for dry bean production	
8.7.1. Introduction, Objectives and Expectations (30 minutes)	**Session Guide**
(The facilitator welcomes trainees to the module on sustainable water and soil fertility management practices for optimal production of dry in moisture stressed conditions. The trainees are then invited to introduce themselves and state their expectations) **Module Objectives (30 minutes)** *(The facilitator presents modules objectives)* By the end of the module the trainee should be able to: • Acquire knowledge on soil composition and what constitutes a healthy soil, including soil classification • Appreciate and discuss soil and plant tissue sampling for laboratory analysis, interpretation and utilization of results from accredited laboratories in Kenya • Appreciate soil fertility and plant nutrition for increased crop productivity (4R Stewardship that includes Right source, Right application rates, Right timing and Right placement) • Acquire knowledge on soil health and Integrated Soil Fertility Management (ISFM) for climate resilient cropping systems • Acquire knowledge on water harvesting technologies, soil and water management • Acquire knowledge and skills for identifying temporary or permanent decline of land productive capacity and provide various solutions to soil degradation Gain awareness on the occurrence of problematic soils and their management increased	• Summarize trainees' "Expectations" and display. • PowerPoint presentation • Distribute participants' hand-outs on Module • Objectives and Training Program

8.7.2. Soil composition, properties and health (30 minutes)	Session Guide
(The facilitator presents on soil composition, properties and health) **Plenary Presentation (20 minutes)** Soil composition, properties and health • Description of soil composition • Description of soil properties • Describe what soil health is all about **Discussion (10Minutes)** Let the trainees recall what they learnt and discuss any issues that may arise	• PowerPoint presentation • Distribute participants' Hand-outs • Brochures, leaflets and manual
8.7.3. Soil and plant tissue sampling and analysis (1 hour)	**Session Guide**
Plenary Presentation (30 minutes) • Overview of the soil sampling methods • Soil analysis results and interpretation • Overview of soil analysis results using available examples • Soil sampling guidelines **Practical exercise on soil sampling (30 minutes)** Demonstration on soil sampling method	• PowerPoint presentation • Distribute participants' hand-outs • Brochures, leaflets and manuals Practical Demonstration
8.7.4. Soil fertility and plant nutrition (30 minutes)	**Session Guide**
Plenary Presentation (20 minutes) • Potential role of different soil management techniques in addressing soil fertility challenges in dry bean smallholder farming systems • Integrated Soil Fertility Management techniques • Soil management guidelines **Discussion (10 Minutes)** Let the trainees recall what they learnt and discuss any issues that may arise.	• PowerPoint presentation • Distribute participants' hand-outs • Brochures, leaflets and manual
8.7.5 Soil health and (ISFM) for climate resilient cropping systems (30 minutes)	**Session Guide**

Plenary Presentation (20 Minutes) • Soil health • Introduce integrated soil fertility management (ISFM) • Soil health and ISFM for a climate resilient cropping system • Manure management, mulching, organic amendments and composting for increased use of organic manure for improving agricultural production • Conservation agriculture as a climate smart agriculture practice • Dry bean intercrops and crop rotation as climate resilient cropping systems **Discussion (10 Minutes)** Let the trainees recall what they learnt and discuss any issues that may arise.	• PowerPoint presentation • Distribute participants' hand-outs • Brochures, leaflets and manual
8.7.6 Soil and water management and water harvesting technologies (30 minutes)	**Session Guide**
Plenary Presentation (20 Minutes) • Principles of soil management for increased dry bean productivity • Methods of tillage systems that conserve water for dry bean use. • Principles of soil fertility management for increased dry bean productivity • Methods of soil fertility management for increased dry bean productivity **Discussion (10 Minutes)** Let the trainees recall what they learnt and discuss any issues that may arise.	**Session Guide** • PowerPoint presentation • Distribute participants' Hand-outs • Brochures, leaflets and manual
8.7.7 Soil degradation and reclamation (30 minutes)	**Session Guide**
Plenary Presentation (20 minutes) • Overview of soil degradation and reclamation. • Reclamation measures of degraded soil • Identification of the causes of soil degradation • Identification of reclamation measures of degraded soil **Discussion (10 Minutes)** Let the trainees recall what they learnt and discuss any issues that may arise.	• **Session Guide** • PowerPoint presentation • Distribute participants hand-outs • Brochures, leaflets and manual
8.7.8 Problematic soils and their management (30 minutes)	**Session Guide**

Plenary Presentation (20 minutes) • Problematic soils and their management • Soils with unsuitable biological properties • Soils with unsuitable chemical properties • Soils with unsuitable physical properties **Discussion (10 Minutes)** Let the trainees recall what they learnt and discuss any issues that may arise.	• PowerPoint presentation • Distribute participants' Hand-outs • Brochures, leaflets and manual
8.7.9. Module review (30 minutes)	**Session Guide**
The facilitator leads the trainees in reviewing the module) Summarize the main points of the training review the main points together with the trainees. Discuss with trainees about new things learnt from this Module. Let them identify some of the problems and any other issues arising from the module.	• The last participants' hand-outs • Summary of the main points from the module on a flip chart and display

8.8. Participants' Hand-outs

- Bean Extension Manual [KCEP-CRAL Manual, 2019]
- Bean Leaflets [KCEP-CRAL Manual, 2019]
- Soil Management Extension Manual [KCEP-CRAL Manual2019]
- Soil Management Leaflets [KCEP-CRAL PAMHPLETS2019}
- OFRA Technical Training Manual

MODULE 9

CROP PROTECTION AND HEALTH MANAGEMENT FOR DRY BEAN

9.1 Introduction to the Module

Various pests, diseases and weeds constrain bean production in Kenya. Losses of 31-71% have been reported due to various pests. Incidences of insect vectors including aphids and whiteflies, which are vectors of virus diseases are on the rise. Options for control will cushion farmer production endeavours especially in the marginalized areas. Synthetic chemicals are predominantly used as a control measure for most pests. There is need to employ human and environmentally safe approaches to pest, disease and weed management so as to increase productivity. Both cultural and chemical management are readily practical to farmers. Similarly, weeds constrain Dry bean production, hence the need to provide necessary control options.

9.2 Module Learning Outcomes

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

1. Steps to identification of major pests and diseases are described and explained
2. Integrated pest and disease management including bird damage control in dry Bean identified and explained
3. Skills and knowledge on safe use of pesticides acquired

9.3 Module Target Group

This module targets agricultural extension service providers and private extension service providers.

9.4 Module Users

The module can be used by Master Trainers and TOTs

9.5 Module Duration

The Module is estimated to take **6 hours.**

9.6 Module Summary

Module 9: Crop Health			
Sessions	**Training methods**	**Training materials**	**Time**
9.6.1 Introduction, objectives and expectations	• Personal introductions • Group work • Presentations • Plenary discussions	• Flips charts • Marker pens • PowerPoint Presentation	30 minutes
9.6.2 Major bean pests that cause economic losses and their control methods; emerging/migratory (locusts and birds) pests. Major weeds in dry bean	• Group work • Presentations • Plenary discussions • Practical's • Group work to bring out major weeds	• Flips charts • Marker pens • PowerPoint presentation • Participants' hand-outs	1 hour
9.6.3 Sustainable Integrated dry bean pest management practices; scouting, post-harvest pests and threshold determination	• Presentations • Plenary discussions • Nearby field visit • Presentation	• Flip charts • Marker pens • PowerPoint presentation • Participants/ hand-outs	30 minutes
9.6.4 Major dry bean diseases that cause economic losses, conditions that favour their development and control methods	• Group work • Presentations • Plenary discussions • Practical	• Flip charts • Marker pens • PowerPoint presentation • Participants' hand-outs	1 hours
9.6.5 Sustainable Integrated dry bean disease management; scouting and threshold determination	• Presentations • Plenary discussions • Field demonstration	• Flip charts • Marker pens • PowerPoint presentation • Participants' hand-outs	1 hour
9.6.6 Integrated weed management	• Presentations • Plenary discussions • Field demonstration	• Flip charts • Marker pens • PowerPoint presentation • Participants' hand-outs	1 hour
9.6.7 Safe use of pesticides and update source for registered pesticides	• Presentations • Practical exercise • Plenary discussions	• PowerPoint presentation • Flip charts • Marker pens • Participants' hand-outs	30 minutes

9.6.8 Module Review	• Discussions/ Recap of module • Take away messages	• Flip charts • Sharing of presentations	30 minutes
Total			**6 hours**

9.7 Facilitator's Guidelines

Module 9: Dry Bean Crop Health **9.7.1. Introduction and levelling of expectations and objectives**	**Session Guide**
Introduction (15 minutes) *(The facilitator welcomes trainees to the module on dry bean crop health. They are then invited to introduce themselves and state their expectations through group work)* **Module Objectives (15 minutes)** *(The facilitator presents modules objectives)* By the end of the module the trainee should be able to: • identify major dry bean pests that cause economic losses • explain and describe sustainable Integrated dry bean pests management (IPM) practices and scouting for threshold determination • Identify the symptoms for specific diseases common in dry bean producing areas • Attain skills in Integrated Disease Management (IDM) of dry bean • Acquire knowledge on safe use of pesticides	• Summarize trainees' "Expectations" and display • PowerPoint presentation • Distribute participants' hand-outs on Module Objectives and Training Program
9.7.2. Major dry bean pests that cause economic losses and their control methods; emerging/migratory pests (1 hour)	**Session Guide**
(The facilitator presents on the commonly known dry bean pests that are of economic importance) **Group work (15 minutes)** • Trainees avail dry bean pest information from their counties **Plenary Presentation (20 minutes)** • Pest names and descriptions • Symptoms of their infestation/type of damage • Data on losses caused by the pests **Practical session (15 minutes)** • Identification of dry bean pests from provided specimens • Practical: show photographs of major weeds **Discussion (10 minutes)** • Let the trainees recall what they learned and discuss any issue that may arise	• PowerPoint presentation • Group Work • Practical Session • Distribute participants' hand-outs • Brochures, leaflets and manual • Printed photos of various pests, brochures

9.7.3. Sustainable Integrated dry bean pest management practices; scouting, post-harvest pests and threshold determination (30 minutes)	Session Guide
Plenary Presentation (20 minutes) • IPM principles; how to implement the components, including cultural, physical, biological and chemical • Critical areas to consider include when scouting • Threshold determination, and detection of weevils at harvest (post-harvest) and when to implement control measures Overview of post-harvest pests in dry beans (bruchids) **Discussion (10 minutes)** • Let the trainees recall what they learned and seek clarification on the principles of sustainable IPM options	• PowerPoint presentation by group representatives on information on scouting for pests • Distribute participants' hand-outs (brochures, • Leaflets and manuals on pest specimens on dry bean
9.7.4. Major dry bean diseases that cause economic losses, conditions that favour their development and their control methods (1 hour)	**Session Guide**
Group work (15 minutes) • Determine dry bean diseases in specific counties **Plenary Presentation (15 Minutes)** • Presentations on dry bean diseases and conditions that favour their development **Practical Exercise (30 Minutes)** • Identification of major disease species causing economic damage based on samples presented	• PowerPoint presentation by representative group leaders • Distribute participants' hand-outs (brochures, leaflets or printed photos of the major diseases • Disease identification guidelines • Printed photos of the major diseases • Practical Exercise
9.7.5. Sustainable Integrated Diseases Management (IDM) ; scouting and threshold determination (1 hour)	**Session Guide**
Plenary Presentation (30 minutes) • Critical areas to consider including scouting and when to implement dry bean disease control measures) • Presentation on Integrated Disease Management (IDM) in dry bean • Overview of bruchid damage and management at post-harvest. **Field Visit (30 minutes)** • Visit nearby field to collect and identify diseased samples	• PowerPoint presentation by facilitator and representative group leaders on information on scouting for diseases • Distribute participants' Hand-outs (brochures, leaflets and manuals) • Disease management guidelines
9.7.6. Integrated weed management (1 hour)	**Session Guide**

Plenary Presentation (30 minutes) • Scouting for weed density in dry bean plots • Determining threshold for control at timely stage of the crop stage • Integrated weed management options implementation **Field Visit (30 minutes)** • Visit nearby field to collect and identify weed samples	• PowerPoint presentation by facilitator and representative group leaders on information on scouting for diseases • Distribute participants' hand-outs (brochures, leaflets and manuals) • Weed management guidelines
9.7.7. Safe use of pesticides and update source for registered pesticides (30 minutes)	**Session Guide**
Practical (10 minutes) • Ways used by farmers in mixing of pesticides/ ITK products; and their consideration on safe use of pesticides **Plenary presentation (20 minutes)** • Presentation on safe use of pesticides • Let the trainees ask questions on any of the covered topical issues and critical areas to share with farmers on safe use of pesticides	• PowerPoint presentation by facilitator and representative group leaders • Demonstration of proper use of knap sack sprayer, protective gear and calibration of pesticides, sourcing for registered pesticide information online: on PCPB website • Distribute participants hand-outs (brochures, leaflets and manuals) • Disease management guidelines
9.7.8. Module review (30 minutes)	**Session Guide**
(The facilitator leads the trainees in reviewing the module) Summarize the main points of the training Together with the trainees review the main points about climatic conditions suitable for dry bean production • Dry bean major pests and their economic losses • Dry bean Integrated Pest Management (IPM) • Dry bean major diseases and their economic losses • Dry bean Integrated Disease Management (IDM) *(Discuss with trainees about new things learnt from this Module. What are some of the issues that need clarification).*	• The last Participants' Hand-outs • Summarize the main points from the module on a flip chart and display

9.8. Participants' hand-outs

- Pest identification and control factsheet
- Disease identification and control factsheet

MODULE 10

POST-HARVEST MANAGEMENT OF DRY BEAN GRAIN

10.1. Introduction to the Module

This module is designed for training facilitators in skills that are useful in adding value to Dry bean after harvesting. Dry bean grains are durable but can easily deteriorate if not handled properly after harvesting, leading to between 20-45 per cent post-harvest losses. If adequate plans have not been made for preservation, farmers will dispose-off what they produce immediately after harvesting reducing incomes and affecting future production plans. There are opportunities in earning more income through proper postharvest management practices. In dry bean producing areas, farmers engage buyers in harvesting dry bean. The buyers then package and cart away the produce ready to market.

Farmers invest very little effort in postharvest management due to a number of reasons. Even where development agencies have supported value adding activities in dry bean, marketing strategies are not in place. The groups do not have the organizational structures to execute their postharvest management strategies if any exist. It is common to find the producer group's executive committee members marketing processed products during exhibitions, field days and shows instead of engaging workers on commission to market their produce.

Where processing facilities have been provided by projects or development agents, rarely are marketing plans and operations and maintenance procedures developed. The groups therefore lack knowledge in organizational development of postharvest activities and also face capacity and infrastructural constrains. This limits post-harvest enterprise development and hence is not sustainable neither can it lead to enterprise growth.

10.2 Module Learning Outcomes

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

1 Knowledge on postharvest practices for beans acquired and applied
2 Knowledge on constraints and opportunities in beans postharvest value chain identified
3 Knowledge on development of postharvest strategies emphasizing on priority opportunities acquired

10.3 Module Target Group

This module targets agricultural extension service providers based at sub county and ward level. It can also be useful for private extension service providers.

10.4 Module Users

This module is intended for use by Master Trainers who are members of the Core Team of Trainers (CTT). The facilitators using this module should thoroughly familiarize themselves with the hand-outs issued to participants.

10.5 Module Duration

The Module is estimated to take 3 hours and 10 minutes

10.6 Module Summary

Module 9. Post-harvest management of beans			
Sessions	**Training Methods**	**Training Materials**	**Time**
10.6. 1. Introduction, Expectations Objectives	• Personal introduction Discussion • Plenary presentation	• Flip charts • PowerPoint	30 minutes
10.6.2. Constraints and opportunities in postharvest handling of beans	• Plenary presentations • Group Exercise	• PowerPoint presantion • Participants' hand-outs	30 minutes
10.6.3. Beans postharvest chain • Multipurpose grain thresher • Solar Bubble Dryer (SBD) • Hermetic Grain Storage and Cocoons techniques • Metal Silos • Bean quality standards	• Group work • Plenary presentation • Practical	• PowerPoint • Participants' hand-outs • Materials for demos (Hermetic bags, Metal silos, grain moisture meters, etc.)	2 hours
10.6.4. Module review	• Facilitator's summary • Group Exercise	• Module review • The module's hand-outs	30 minutes
TOTAL			**3 hours**

10.7 Facilitators guidelines

Module 10. Post-harvest management of Beans	
10.7.1 Introduction and levelling of expectations and objectives (30 minutes).	**Session Guide**
Introduction and Module Objectives (15 minutes) *(The facilitator welcomes trainees to the module on Postharvest Management of Beans and introduces him/herself by stating his/her profile and experience.)* The facilitator presents module's objectives By the end of the module trainees should be able to: • Explain the whole range of postharvest practices for beans, • Explain the constraints and opportunities in beans postharvest value chain • Demonstrate how to develop a postharvest strategy for the priority opportunities emphasizing on suitability and growth. **Expectations (15 minutes)** Assist the trainees to state their expectations based on the objections	• PowerPoint Presentation • Summarize trainees' "Expectations" and display on flip chart/board.

10.7.2 Constraints and opportunities in postharvest handling of beans	Session Guide
(Highlight the bean postharvest value chain– harvesting, drying, threshing, storage, etc.) **Group work (20 minutes)** • Trainees discuss constraints in the postharvest handling of beans, and suggest solutions **Group presentation(10 minutes)** Trainees discuss results of group work in plenary	• PowerPoint Presentation • Participants' Hand-outs
10.7.3 Bean postharvest value chain (30 minutes)	**Session Guide**
(Facilitator uses slides to train) **PowerPoint Presentation (30 minutes)** • Harvesting • Drying for threshing • Checking if drying is appropriate – use of moisture meter, the 'salt method' for grain moisture determination • Threshing • Winnowing • Drying for storage (sun drying on tarpaulins, solar dryers, electric dryers, Solar Bubble Dryer (SBD) • Storage (Hermetic storage, metal silos • Bean quality standards **Group Exercises (10 minutes)** Let the trainees recall what they learned, raise issues on bean postharvest chain and discuss **On-farm practical demonstration (30 minutes)** Demonstrate to trainees: • The modified atmosphere packaging of vegetables • How Dry bean are packed in Ziploc® and Xtend® bags, and Wakati™ technology	• Power point • Hand-outs • Beans manual • Brochures • Leaflets Materials for demos (Hermetic bags, Metal silos, grain moisture meters, etc.)
9.7.4 Training review (30 minutes)	**Session Guide**
(The facilitator should be able to lead the trainees in reviewing the module) **Plenary presentation** Together with the trainees, summarize the main points of the training. **Group Exercise** Together with the trainees review the main points about bean post-harvest handling • What new things did you learn from this Module? • What are some of the problems and issues that you have become more aware of in harvesting and post harvesting? • What questions do you still have about post-harvest handling?	Summary of the main points from the Module.

10.8. Participant's Hand-outs

- Factsheets
- Bean TIMPs manual
- Bean production Guides [2017]
- Bean leaflets
- Brochures 2017

MODULE 11

VALUE ADDITION OF DRY BEAN

11.1. Introduction to the Module

Dry bean utilization at household level is very low due to little knowledge on the various opportunities and recipes for value addition and product diversification for home consumption and small-scale businesses. dry beans are an execellent source of protein (folate, niacin), minerals (manganese magnesium, calcium , potasium , copper, iron , phosphorous, choline, chromium amd mineral silicon) vitamins (A, B1, B2 , B6 C, E, K), omega-3 fatty acids and diety fibre. Generally, dry bean traditional recipes are less appealing to youth and children. Further, these recipes are not nutrient secure since most nutrients are lost from dry beans during preparation. It is therefore envisaged that promotion of value addition technologies and value-added products will not only enhance adoption, production and home consumption, but also improve the livelihoods of smallholder resource-poor farmers through sustainable income generation. This module is therefore designed to equip extension staff at the County level with relevant knowledge on value addition options available for dry beans and skills for training dry bean farmers.

11.2 Module Learning Outcomes

By the end of the module, the trainers should:

1. The role of dry beans in enhancing food and nutrition security understood and appreciated.
2. knowledge on the nutritional composition of dry beans, impact of dry bean consumption on human health, food security and sustainable income acquired and shared.
3. The constraints in value addition and consumption of dry beans, and suggested solutions identified.
4. knowledge on recipes for dry bean value added products acquired and shared.
5. Value addition opportunities in the dry beans value chain identified and prioritized.
6. Knowledge on making bean-based value-added products acquired and applied.

11.3 Module Target Group

This module targets County agricultural extension staff, private extension service providers, home economists and food utilization extension staff.

11.4 Module Users

The facilitators using this module should be well conversant with the participants' hand-outs. This module can be used by Master Trainers who are members of the Core Team of Trainers (CTT).

11.5. Module Duration

The Module is estimated to take a duration of **5 hours, 30 minutes**

11.6. Module Summary

Module 11. Bean value addition			
Sessions	**Training Methods**	**Training Materials**	**Time**
11.6.1. Introduction, Objectives and Expectations	• Plenary Presentation • Plenary discussions	• Flip charts • Projector • Laptop	30 minutes
11.6.2 Role of dry beans as a food and nutrition security crop	• Plenary Presentation • Plenary discussions	• Flip charts • Marker pens • Masking tapes/Flip chart holders	30 minutes
11.6.3. Nutritional composition of dry beans and its role in human health	• Demonstration • Group Exercise	• Beans, bean flours, and other dry bean products	1 hour
11.6.4. Constraints in value addition	• Group exercise • Plenary Presentation	• List of value-added products for dry beans-Checklist for prioritization • Pair wise ranking tool • Flip charts • Marker pens • Masking tapes or flip chart holders	1hour
10.6.5 Bean based value added products Value added bean grain • Pre-cooked bean product (15 min cooking bean meal; chocolate look alike bean snack) • Pre-cooked bean flours • Bean recipes (porridge, samosa, cakes, chapatti, ugali, stews)	• Plenary Presentations • Group discussions	• Beans, bean flours, and other products	2 hours
11.6.6 Module review	• Facilitator's summary • Group Exercises	• Module review • Participants hand-out	30 minutes
TOTAL			**5hours 30 minutes**

11.7. Facilitators Guidelines

Module 11. Dry Bean value addition	
10.7.1 Introduction and levelling of expectations and objectives (30 minutes)	**Session Guide**
Introduction and Module Objectives (5 minutes) *(The facilitator welcomes trainees to the module on value addition of beans.)* The facilitator presents modules objectives. **Module Objectives** By the end of the module the trainee should: • Understand the role of dry bean as a food and nutrition security crop • Have knowledge on nutritional composition of dry beans, impact of consumption on health, food security and income. • Understand the constraints in value addition and consumption of dry beans, and suggested solutions. • Know the recipes for dry bean value added products • Identify and prioritize the value addition opportunities in dry bean value chain • Gain knowledge on making bean-based value added products. **Expectations (15 minutes)** The facilitator should guide the trainees in stating their expectations based on the objectives	• Hand-outs • Program • Note books • pens • Use PowerPoint • Flip charts • Marker pens • Masking tapes/flip chart holders Summarize trainees' "Expectations" and display on flip chart/board.
11.7.2 Role of beans as a food and nutrition security crop	**Session Guide**
Plenary Presentation (30 minutes) PowerPoint presentation highlighting the critical elements: • Micronutrient malnutrition cases in Kenya • Dietary nutrient requirements (focusing on VMGs) **Group Exercises (30 minutes)**	• Use PowerPoint • • Hand-outs • AIV manual • Recipe books • Sample vegetables and other processing ingredients
11.7.3. Constraints in value addition and consumption of beans, and suggested solutions (1 hour 30 minutes)	**Session Guide**
Group work (45 minutes) Groups discuss the constraints in bean value addition and consumption **Plenary presentation (45 minutes)** Overview of constraints in value addition and consumption of beans	Leaf lets PowerPoint presentation manuals

11.7.4 Bean based value added products (1 hour 30 min)	Session Guide
Plenary presentation (30 minutes) • Overview of bean-based value-added products • Meaning of value addition • Requirements for value addition of beans • Bean based value added products; sensory evaluation of the products **Practical exercise (1 hours)** • Demonstration on formulation of bean based products • Practical on sensory evaluation of bean value added products **Group Exercise (30 minutes)** Allow trainees to raise any issues on dry beans value added products ranking and discuss them.	• Hand-outs • Dry beans manual • Brochures • Leaflets The Recipes • Sensory evaluation forms • Assorted value addition equipment and ingredients
11.7.5 Training review (30 minutes)	**Session Guide**
The trainer leads the trainees in reviewing he module Review the main points about dry bean Value addition together with the trainees. • What new things did you learn from this Module? • What are some of the problems and issues that you have become more aware of in dry beans value addition? • What questions do you still have about dry beans value addition?	Summary of the main points from the Module.

11.8. Participants' Hand-outs

- Bean Manual
- Pamphlets, leaflets.
- Recipe books

MODULE 12

MECHANIZATION OF DRY BEAN PRODUCTION ACTIVITIES

12.1 Introduction to the module

Agricultural mechanization supports through enhancing productivity and profitability in agriculture by achieving timeliness of farm operations. It comes along with precision in metering and placement of inputs, reducing susceptibility to input losses, increasing utilization efficiency of costly inputs (seed, chemical, fertilizer, irrigation, water. etc.), reducing unit cost of production, enhancing profitability and competitiveness in the cost of operation. It also benefits conservation of agricultural produce and by-products from qualitative and quantitative damages; enables value addition and establishment of agro processing enterprises for additional income and employment generation from farm produce. Agricultural mechanization is one of the important inputs that has potential to revolutionize Dry Bean farming in Kenya especially when applied to planting, weeding, pest control, harvesting and post-harvest activities.

12.2 Module Learning outcomes

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

- Climate smart tillage options identified and explained
- Calibration of fertilizer and seed rates for planters described and explained
- Use of pest control implements and tools demonstrated
- Harvest timing and yield estimation demonstrated
- Estimation of harvesting losses demonstrated
- Machine and procedure for bean grading demonstrated

12.3. Module Target Group and Categories

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

12.4. Module Users

This module is intended for use by Master Trainers who are members of the Core Team of Trainers (CTT). The facilitators using this module should be well conversant with the contents of hand-outs issued to participants.

12.5. Module Duration

The Module is estimated to take a minimum duration of **4 hours**

12. 6. Module Summary

Module 11. Mechanization of bean production activities			
Sessions	**Training methods**	**Training materials**	**Duration**
12.1.1 Introduction, objectives and expectations	• Personal introductions/ know your audience • plenaryPresentations • Plenary discussions	• Flip charts • Projector • Laptop	30 minutes
12.1.2 Climate smart tillage options	• Presentations • Plenary discussions	• Flip chart • Projector • Laptop • Participants'. hand-outs	30 minutes
12.1.3 Calibration of fertilizer and seed rates for planters	• Plenary Presentations • Plenary discussions	• Flip chart • Projector • Laptop • Participants'. hand-outs	30 minutes
12.1.4 Pest and Weed control equipment and tools usage	• Plenary Presentations • Plenary discussions	• Flip chart • Projector • Laptop • Participants' hand-outs	30 minutes
12.1.5 Harvest timing, yield estimation machines and tools, Estimation of harvesting losses	• Plenary Presentations • Plenary discussions	• Flip chart • Projector • Participants' hand-outs • Practical	1 hour
12.1.6 Machine and procedure for bean grading	• Plenary Presentations • Plenary discussions • Demonstrations	• Flip chart • Projector • Laptop • Participants'. hand-outs • Practical	30 minutes
12.1.7 Module review	• Plenary Presentations	• Flip chart • Projector • Laptop	30 minutes
Total			**4 hours**

12.7 Facilitator's Guidelines

Module 11: Mechanization of bean production activities	
1.1.1 Introduction, Objectives and Expectations (30 minutes)	**Session Guide**
(The facilitator welcomes trainees to the module on Mechanization of bean production. They are then invited to introduce themselves and state their expectations) **Module Objectives (30 minutes)** The facilitator presents module's objectives By the end of the module the trainee should be able to: • Identify and explain various climate smart tillage operations • Describe and explain calibration of fertilizer and seed rate for planters • Demonstrate weed control equipment and tools, usage • Demonstration of estimation of pre-harvest and harvesting losses • Demonstrate machine and procedure for grain grading ***In each case stating approximate prices and availability of machines**	• Summarize trainees' "Expectations" and display. • PowerPoint Presentation • Distribute Participants' Hand-outs on Module Objectives and Training Program
12.7.2. Bean climate smart land preparation tools (30 minutes)	**Session Guide**
(The facilitator presents on Bean climate smart land preparation tools) **Plenary Presentation (20 minutes)** PowerPoint Presentation Highlighting: • Overview of the bean mechanization activities • Climate smart tillage options **Discussion (10 minutes)** Let the trainees recall what they learned and discuss any issue that may arise	• PowerPoint presentation • Distribute participants' hand-outs • Brochures, leaflets and manual • All participants
12.7.3. Bean calibration of fertilizer and seed rate for planters (30 minutes)	**Session Guide**

Plenary Presentation (20 minutes) PowerPoint Presentation Highlighting • Techniques and methods of planter seed and fertilizer rate determination **Discussion (10 Minutes)** Let the trainees recall what they learned and discuss any issue that may arise.	• PowerPoint presentation • Distribute participants' hand-outs • Brochures, leaflets and manual
12.7.4. Bean Chemical implements and tools operations (30 minutes)	**Session Guide**
Plenary Presentation (20 minutes) PowerPoint Presentation Highlighting on: • Techniques and methods of using bean pest control equipment; knap sack and pheromones **Discussion (10 Minutes)** Let the trainees recall what they learnt and discuss any issues that may arise	• PowerPoint presentation • Distribute participants' hand-outs • Brochures, leaflets and manual
12.7.5. Bean harvesting machine operating principles (1 hour)	**Session Guide**
Plenary Presentation (30 minutes) PowerPoint Presentation Highlighting on: • Harvesting machines • Harvest timing and estimation of • Machine harvest yield losses **Discussion (30 Minutes)** Let the trainees recall what they learnt and discuss any issues that may arise	• PowerPoint presentation • Distribute participants' hand-outs • Brochures, leaflets and manual
12.7.6 Machine and procedure for Bean grading (30 minutes)	**Session Guide**
Plenary Presentation (15 minutes) PowerPoint presentation highlighting: • Overview of bean grading machine procedure **Practical exercise (15 minutes)** Demonstrations on management options	• PowerPoint presentation • Distribute participants' hand outs • Brochures, leaflets and manual
12.7.7 Module review (30 minutes)	**Session Guide**

The facilitator leads the trainees in reviewing the module) Summarize the main points of the training and together with the participants review the main points: • Various climate smart tillage operations • Calibration of fertilizer and seed rate for planters • Chemical implements and tools operations • Optimal crop bean harvesting stage and yield estimation • Harvesting machine operating principles • Machine and procedure for bean grain grading *(Discuss with trainees about new things learnt from this Module. What are some of the problems and issues that they have become more aware of in the module?)*	• The last participants' hand-outs • Summarize the main points from the module on a flip chart and display

12.8. Participants' Hand-outs

- KCEP Bean Manual
- Pamphlets, leaflets.

MODULE 13

DRY BEAN BUSINESS AND MARKERT ASSESSMENT

13.1 Introduction

This module is designed to train master trainers in skills that are useful in dry beans farming as a business and marketing in Kenya. Common bean (*Phaseolus vulgaris*) is considered one of the most important legumes and a source of nutrients to many people in Kenya. Beans are an excellent source of protein, minerals and vitamins. It is a staple food crop which rates second after maize. The crop is grown in most regions in Kenya. Common bean is grown by more than three million households, majority of whom are resource-poor small-scale farmers in Kenya.

As consumption of beans continues to rise steadily at a compound growth rate of approximately 19% per annum in response to the increasing population and awareness on their nutritional values, production fluctuates widely. Consequently, it has become increasingly common for Kenya to import beans as domestic demand exceeds production. Markets and marketing of dry beans is a major issue of concern to small scale farmers and other actors in the dry bean value chain in Kenya, particularly inconsistency in supplying sufficient volumes required for trade, seasonal supply and price fluctuations. It is therefore important to equip farmer facilitators with the skills and knowledge on dry bean farming as a business and marketing strategies in order to strengthen the dry bean value chain.

13.2 Module Learning Outcomes

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

1. Business concept and emerging farming business models understood and appreciated
2. Opportunities and challenges associated with dry beans enterprise identified
3. Tools for management of beans production: – Budgeting, entrepreurship, Record keeping, Breaking-even & Gross Margin analysis understood and applied
4. Knowledge on Marketing strategies acquired
5. Details of a Small Farm Business Plan identified

13.3 Module Target Group

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

13.4 Module Users

This module is intended to be used by a Master Trainer who is among the members of the core team trainers. The facilitator using this module should thoroughly familiarize and avail the participants' hand-outs.

13.5 Module Duration

The Module is estimated to take a duration of 2 **hours**

13.6. Module Summary

Module 13. Dry bean Business and Marketing			
Sessions	**Training Methods**	**Training Materials**	**Time**
13.6.1. Levelling of participants' expectations about the module	• Introduction • Plenary Discussion	• Projector • Laptop • Flip charts • Marker pens • Masking tapes/flip chart holders	15 minutes
13.6.2. Module introduction, Objectives and Expectations	• Plenary Presentation • Plenary Discussion	• Projector • Laptop • Flip charts. • Marker pens	10 minutes
13.6.3. Business concept and emerging farming business models Exercise	• Plenary Presentation • Plenary Discussion	• Projector • Laptop • Flip charts, • Marker pens • Masking tapes/flip chart holders • Participants' hand:-outs	20 minutes
13.6.4. Opportunities and challenges associated with beans businesses - SWOT analysis	• Plenary Presentation • Plenary Discussion	• Projector • Laptop • Participants' hand:-outs	20 minutes
13.6.5 Tools for management of beans production: – Budgeting, entrepreurship, Record keeping, Break-even & Gross Margin	• Plenary presentations • Plenary Discussion	• Projector • Laptop • Participants' hand:-outs	15 minutes
13.6.6 Marketing strategies	• Plenary presentations • Plenary Discussion	• Projector • Laptop • Participants' hand:-outs	20 minutes
13.6.7 Small Farm Business Plan:	• Plenary presentations • Plenary Discussion	• Projector • Laptop • Participants' hand:-outs	10 minutes

13.6.8. Training review	• Facilitator's summary: Takeaways	• Module review • Participants Hand:-outs	10 minutes
TOTAL			**2 hours**

13.7 Facilitators Guidelines

Module 13. Dry Beans Business and Marketing	
13.7.1 Levelling participants' expectations about the module (15 minutes)	**Session Guide**
(The facilitator welcomes trainees to the module and introduce him/herself by stating his/her profile and experience.)	• Participants hand:-outs • Program • PowerPoint presetation
13.7.2 Participants expectations	
(The facilitator asks the trainees to state their expectations by listing on a flip chart) **Plenary Discussion**	• Summarize trainees' "Expectations" and display on flip chart/board.
13.7.3 Module introduction, objectives and expectations (10 minutes)	
(The facilitator introduces the module and states the objectives and expectations) By the end of this module, participants are expected to: • Understand the business concept and terminologies • Appreciate emerging farming business models • Be able to identify opportunities and challenges associated with beans businesses - SWOT analysis • Understand the tools for management of beans production: – Budgeting, entrepreurship, Record keeping, Break-even & Gross Margin • Appreciate market research • Understand the marketing strategies • Pulling It All Together: Details of a Small Farm Business Plan	• PowerPoint presentations • Participants handout
13.7.4 Business concept, principles and terminologies (20 minutes)	**Session Guide**

(The facilitator to highlight elements of business concept and emerging farming business models) **Plenary Presentation (5 minutes)** Make presentation on the business concept and emerging farming business models **Group Exercise (15 minutes)** Discuss areas of adjustments in the models	• PowerPoint slides • Participant Hand:-outs • Flipcharts
13.7.5 Opportunities and challenges associated with beans business - SWOT analysis Opportunities and challenges associated with beans businesses - SWOT analysis (20 minutes)	Session Guide
(The facilitator highlights the components of SWOT matrix and their interactions to generate opportunities based on the other components) Plenary Presentation (5 minutes) • S = Strengths • W = Weaknesses • O = Opportunities • T = Threats **Group Exercise (15 minutes)** List the strengths, weaknesses, opportunities and threats in beans farming as a business and marketing	• Participant Hand:-outs • Flip charts • Manila papers • Pelt pens
13.7.6 Tools for management of beans production: – Budgeting, Entrepreneurship, Record keeping, Break-even & Gross Margin (15 minutes)	**Session Guide**
Plenary Presentation (10 minutes) (*The facilitator highlights the importance of the tools in managing beans production as a farm business)* • Enterprise budget • The farmer as an entrepreneur • Common records for beans enterprises • Gross margin analysis (break-even & gross margin) Plenary Discussion (5 minutes)	• Power point presentation • Participant Hand:-outs
13.7.7 Marketing strategies (20 minutes)	**Session Guide**
Plenary Presentation (15 minutes) (*The facilitator highlights the marketing strategies for the beans farm business)* • Market assesment tools • Producer organizations • Contract farming • Online marketing Plenary Discussion (5 minutes)	• Power point presentation • Participant Hand:-outs

13.7.8 Details of a Small Farm Business Plan: Pulling It All Together (10 minutes)	Session Guide
Plenary Presentation (10 minutes) (*The facilitator highlights the components of farm business plan for the beans farm business)* Marketing mix and marketi segmentation. 8 Ps of marketing • Introduction • Product • Marketing strategy • Risks • Business operation plan • Costs • Income • Profit and loss analysis	• Use power point • Hand-outs
13.7.9 Training review (10 minutes)	**Session Guide**
(The facilitator leads the trainees in reviewing the module. Conclude by thanking the trainees) **Plenary Presentation (10 minutes)** Summarize the main points of the training	Summary of the main points from the Module.

13.8. Participant's Handouts

- Dry Beans Business and Marketing factsheets
- Dry Beans production manual

References

1. Tawedzegwa M. (2012). Farming as a family business. Training manual. Zimbabwe agricultural competitiveness program.
2. Wanjala Simon P.O.; Karanja, David; Wambua, Scholastica; Otiep, George; Odhiambo, Collins; and Birachi, Eliud (2018). Marketing Arrangements Used by Small Scale Bean Farmers in Kenya: What Needs to Change for Sustainable Trade Volumes?

MODULE 14

DRY BEANS CROSS-CUTTING ISSUES (AGRICULTURAL INNOVATION PLATFORMS, POLICY, GENDER MAINSTREAMING AND SOCIAL INCLUSION)

This module consists of issues that influence the uptake and up-scaling of TIMPS in the Dry Beans value chain. These issues are Agricultural Innovation Platforms, Gender and social-environmental concerns and Climate smart agricultural policy.

Agricultural Innovation Platforms provide a forum for stakeholders to interact and develop technical, institutional and organizational innovations to solve value chain challenges. Gender and social-environmental concerns are considerations aimed at avoiding inappropriate solutions to value chain challenges. Finally, Climate smart agricultural policy creates awareness on policy formulation and the various regulations that are put in place to facilitate the development of value chains. The method of delivery of each of these cross cutting issues is presented.

SUB-MODULE 14.1: DRY BEANS AGRICULTURAL INNOVATION PLATFORMS

14.1.1 Introduction to the Sub-Module

This module exposes the extension staff, private service providers, lead farmers and facilitators to an innovation systems based configuration of stakeholders called the Agricultural Innovation Platform (AIP). It is an organizational model for stimulating innovation and development and brings actors together in a way that pools together skills and knowledge to address challenges and utilize opportunities. The actors include individuals, private and public sector organizations, policy makers and other value chain stakeholders. These actors are brought together in an innovation platform to seek technical, institutional or organizational solutions to a critical challenge hindering agricultural productivity within a value chain. The Agricultural Innovation Platform facilitates actors to interact, innovate, learn and change with time as they seek a solution to the common challenge. In an innovation platform every actor's contribution is valued and benefits accrue to all in a win-win situation. The AIP is a useful methodology for development, testing and scaling of innovations in the dry beans value chain.

14.1.2 Module learning Outcomes

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

1. The definition of innovations and recommended innovative practices described and understood
2. The attributes of an innovation platform described and understood.
3. Mobilization of stakeholders for initiation, establishment, management and sustenance of an Agricultural Innovation Platform explained and demonstrated
4. The innovation capacity building process of the AIP actors explained and understood

14.1.3 Module Target Group and Categories

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

14.1.4 Module Users

This module is intended for use by master trainers who are members of the Core Team of Trainers (CTT) and lead farmers. The facilitator using this module should thoroughly familiarize themselves with the participants' handouts.

14.1.5 Module Duration

The Module is estimated to take a minimum of **3** hours

14.1.6 Module Summary

Sub-Module 13.1 Agricultural Innovation Platforms (AIP)			
Sessions	**Training methods**	**Training materials**	**Time**
14.1.6.1 Introduction, objectives and expectations	• Personal introductions • Presentations • Plenary discussions	• Flips charts • PowerPoint presentation • Laptop • Projector	20 minutes
14.1.6.2 A definition of innovations and their different types (technical, institutional and organizational)	• Power point Presentations • Flip charts • Plenary discussions	• Flip charts • PowerPoint presentation • Laptop • Projector • Participants Hand outs	10 minutes
14.1.6.3 An overview of attributes of an Agricultural Innovation Platform (The characteristics of an innovation platform)	• Power point Presentations • Plenary discussions	• Flip charts • PowerPoint presentation • Laptop • Projector • Participants Hand outs	45 minutes
14.1.6. 3 Pre-formation stag (Initiation, Establishment, Management and Sustenance)	• Power point presentations • Plenary discussions • Role plays	• Flips charts • PowerPoint presentation • Laptop • Projector • Hand outs • Role plays	45 mins
14.1.6. 3 Case studies of successful bean AIPS	• Power point presentations • Plenary discussions • Role plays	• Flips charts • PowerPoint presentation • Laptop • Projector • Hand outs • Role plays	15 minutes

13.1.6. 3 Benefits and challenges of AIPS	• Power point presentations • Plenary discussions • Role plays	• Flips charts • PowerPoint presentation • Laptop • Projector • Hand outs • Role plays	15 minutes
14.1.6. 4. Module review	• Discussions	• Flip Charts	30 minutes
Total			**3 hours**

14.1.7 Facilitator's Guidelines

Sub Module 14.1 Agricultural Innovation Platform (AIP)	
14.1.7.1. Introduction, levelling of expectations and objectives (30 Minutes)	**Session Guide**
Introduction *The facilitator welcomes trainees to the module and then invites them to introduce themselves and state their expectations*) **Module Objectives** *(The facilitator presents modules objectives and levels out expectations)* By the end of the module the trainee should be able to: • Define innovation process and the innovation products. • Explain characteristics of an innovation platform. • Describe how to initiate and establish Agricultural Innovation Platforms. • Explain how to manage and sustain innovation capacity of actors in Agricultural Innovation Platforms. • Get exposed to successful bean innovation platforms. • Understand benefits and challenges of agricultural innovation platforms.	• Summarize Trainees' "expectations" and display. • PowerPoint Presentation • Module Objectives and Training Program
14.1.7.2. The characteristics of an innovation platform (1hour)	**Session Guide**
The facilitator presents an overview of innovation platforms and their main characteristics **Plenary Presentation (30 minutes)** • Past progression of research and extension models and their shortcomings • Agricultural Innovation Systems perspective • and Agricultural Innovation Platforms model • Comparison of Agricultural Innovation Platforms with social and technical events working through committees with different roles but common goals • Value chain actor linkages and other benefits **Discussion (30 minutes)** Let the trainees recall what they learned and discuss any issues that may arise.	• PowerPoint Presentation • Notes Handouts, • Brochures, information leaflets and manuals

14.1.7.3 Preformation and formation phases of the Dry Beans AIP (1 hour)	Session Guide
Plenary Presentation (50 Minutes) **Initiation or preformation phase** • Engagement or mobilization of stakeholders in the Dry Beans value chain • Visioning process and rules of engagement mediated by an initiator such as an change agent **Establishment** • Assessment of the status of the value chain to clearly identify the compelling agenda or bottleneck - APVC analysis to identify weaknesses in the chains. • Laying out of proper plans to define roles, establish task-based committees, expected milestones and resourcing strategies. **Management** • Keeping stakeholders focused on the vision and upholding values to ensure an inclusive and transparent process. • Neutral facilitation to ensure joint strategy building and action and the coordination of support activities. • Managing emerging experts taking up leading roles and issues as champions. **Sustainability** • Guiding in evolving and identifying fresh issues or challenges • Maintaining capacity acquired to address new issues or challenges in subsequent cycles. **Discussion (10 minutes)** Let the trainees recall what they learned and discuss any issue that may arise.	• PowerPoint Presentation • Distribute Participants Handouts • Brochures, Leaflets, Manuals • Short video clips
14.1.7.4. Module review (30 minutes)	**Session Guide**
(The facilitator leads the trainees in reviewing the module) Summarize the main points of the training and together with the trainees review the main points on: • AIP characteristics and initiation • AIP establishment and management • Sustenance of Dry Beans AIPs Discuss with trainees' new things learnt from this Module. • What are some of the problems and issues that they have become more aware of in the module?	• The last Participants' Handouts • Summarize the main points from the module on a flip chart and display

14.1.8 Reference Materials

14.1.8.1Participants' Handouts

14.1.8.2References

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

SUB-MODULE 14.2: DRY BEANS GENDER, VULNERABLE AND MARGINALIZED GROUPS (VMGs), SOCIO, ENVIRONMENTAL CONCERNS AND COHESION

14.2.1 Introduction to the Sub-Module

Dry beans is a major agro-enterprise and therefore all the gender categories (men, women, youth and vulnerable marginalized groups (VMGs)) are involved in its value chain from production, marketing to consumption. However, women perform most of the crop production activities such as planting, weeding and harvesting while men mostly perform the task of marketing. Despite this huge women's contribution, gender inequalities exist in all areas of the value chains. Some of these gender inequalities include: division of labour, access to and control of resources and decision making within and beyond the household. These inequalities limit women, youth and VMGs access to and benefits from the various Technologies Innovations and Management Practices (TIMPs) at different nodes of the value chain. At the macro-level, effective participation of women and youth in groups and market activities is constrained by their low decision making power, lack of voice and lack of access to financial resources. Gender analysis examines the productive, community and reproductive roles of men and women; access, control and ownership of resources; levels of power relations; differential needs, constraints and opportunities; and impact of these differences (positive/ negative) on lives of men, women, youth and the VMGs.

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

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

14.2.2 Module learning outcomes

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

1. The concept of gender mainstreaming and social inclusion in dry beans value chain understood and appreciated

2. Youth empowerment in dry beans value chain explained and understood
3. Women empowerment in dry beans value chain explained and understood
4. Strategies for inclusion of vulnerable and marginalized groups in dry beans value chain understood and applied
5. Socio-cultural barriers in dry beans value chain explained and understood
6. Knowledge on environmental and social management framework (ESMF) tool enhanced.

14.2.3 Module Target Group

This module is intended for service providers and county public extension agents

14.2.4 Module Users

This module is intended for use by master trainers who are members of the Core Team of Trainers (CTT). This module outlines the learning outcomes, the category of trainees targeted, module summary, and participants' hand-outs. The facilitator using this module should thoroughly familiarize themselves with the participant's hand-outs.

14.2.5 Module Duration

The Module is estimated to take a minimum of 4 hours.

14.2.6 Module Summary

Module 13.2: Gender mainstreaming and social inclusions in the dry beans value chain			
Sessions	Training methods	Training materials	Duration
14.2.6.1 Introduction, expectations and objectives	• Personal introductions • Presentations • Plenary discussions	• Flips charts • Felt pens • PowerPoint Presentation • Laptop • Participants hand-outs	30 Minutes
14.2.6.2 Gender mainstreaming in Dry beans value chain	• PowerPoint Presentations • Group discussions • Plenary discussions	• Flips charts • Felt pens • PowerPoint Presentation • Participants hand-outs	30 minutes
14.2.6.3 Youth empowerment in dry beans value chain	• PowerPoint Presentations • Group discussions • Plenary discussions	• Flips charts • Felt pens • PowerPoint Presentation • Participants hand-outs	30 minutes

14.2.6.4 Women empowerment in dry beans value chain	• PowerPoint Presentations • Group discussions • Plenary discussions	• Flips charts • Felt pens • PowerPoint Presentation • Participants hand-outs	60 minutes
14.2.6.5 Strategies for inclusion of vulnerable and marginalized groups	• PowerPoint Presentations • Group discussions • Plenary discussions	• Flips charts • Felt pens • PowerPoint Presentation • Participants hand-outs	30 minutes
14.2.6.6 Environmental and Social Management Framework	• PowerPoint Presentations • Group discussions • Plenary discussions	• Flips charts • Felt pens • PowerPoint Presentation • Participants hand-outs	30 minutes
14.2.6.7 Module Review	• Plenary discussions	• Flips charts • Felt pens	30 Minutes
Total			**4 hours**

14.2.7 Facilitator's Guidelines

Sub Module 13.2: Gender mainstreaming and social inclusion in Dry beans value	
13.2.7.1 Introduction, Objectives and Expectations (30 Minutes)	**Session Guide**
(The facilitator welcomes trainees to the module on gender mainstreaming and social inclusion in dry beans value chain. They are then invited to introduce themselves and state their expectations) **Module Objectives (30 Minutes)** (The facilitator presents modules objectives) By the end of the module training the trainee must be to:- 1. Understand gender mainstreaming and social inclusion, in dry beans value chain 2. Understand youth empowerment in dry beans value chain 3. Appreciate women empowerment in dry beans value chain 4. Recognize strategies for inclusion of vulnerable and marginalized groups in dry beans value chain 5. Understand the environmental and social management framework (ESMF) tool	• Summarize Trainees "Expectations" and display. • PowerPoint Presentation • Flipcharts • Group exercise • Objectives and Training Program

14.2.7.2 Gender mainstreaming and social inclusion in Dry beans value chain (30 Minutes)	Session Guide
(The facilitator should present and explain what is gender mainstreaming, who does what activity, who has access to what resources etc. and why gender mainstreaming is important in dry beans value chain. **Plenary Presentation (20 minutes)** • Definition of gender • What is gender mainstreaming and why it is important? • Who does what? (gender division of roles in Dry beans value chain) • Who owns what? (access and control of resources & benefits) • Who makes which decisions? • Existing policies in support of gender mainstreaming **Group exercise and discussion (10 Minutes)** Let the trainees recall what they learned and discuss any issue that may arise	• PowerPoint Presentation, Group exercise • Plenary discussions • Distribute Participants Hand-outs • Group exercise • Plenary discussions
14.2.7.3 Youth empowerment in Dry beans value chain s (30 minutes)	**Session Guide**
Plenary Presentation (20 minutes) • Why agriculture is not attractive to youth • Youth's role in the value chain • Strategies to empower youth in dry beans value chain **Group work and Discussion (10 Minute)** Let the trainees recall what they learned and discuss any issue that may arise.	• PowerPoint Presentation • Group exercise • Plenary discussion
14.2.7.4 Women empowerment in dry beans value chain (30 minutes)	**Session Guide**
Plenary Presentation (20 minutes) • Women's role in the value chain • Challenges facing women in the value chain • Strategies for empowering women in the value chain **Plenary discussion (10 minutes)** Let the trainees recall what they learned and discuss any issue that may arise	• PowerPoint Presentation • Distribute participants' hand-outs • • Group exercise • Plenary discussion
14.2.7.5. Strategies for inclusion of vulnerable and marginalized groups in Dry beans value chain (30 minutes)	**Session Guide**

Plenary Presentation (20 hour) • Who are vulnerable and marginalized groups (VMGs) • Why gender inequality exists • Social inclusion and why • Strategies of inclusion of VMG **Plenary Discussion (10 minutes*)*** Let the trainees recall what they learned and discuss any issue that may arise	• PowerPoint Presentation • Group exercise • Plenary discussion
14.2.7.6. Environmental and social management framework (ESMF) (30 minutes)	**Session Guide**
Plenary Presentation (20 minutes) • Objective of ESMF in Dry beans value chain • Environmental and social safeguards of Dry beans • Safeguard policies triggered by the project **Plenary discussion (10 minutes)** Let the trainees recall what they learned and discuss any issue that may arise	• PowerPoint Presentation • Plenary discussion
14.2.7.7. Module review (30 Minutes)	**Session Guide**
The facilitator leads the participants in reviewing the module) Summarize the main points of the training and together with the trainees review the main points: • What is gender mainstreaming and why it is important? • Youth empowerment in Dry beans value chain • Women empowerment in Dry beans value chain • Strategies for inclusion of vulnerable and marginalized groups in Dry beans value chain • Environmental and Social Management Framework of dry beans activities Let the trainees recall what they learned and discuss any issue that may arise.	• Summary of the main points on from the module on a flip chart and display

14.2.8 Participants' Hand outs

Commonwealth secretariat, (2001). Gender Mainstreaming in Agriculture and Rural Development: A Reference Manual for Governments and Other Stakeholders. Marlborough House, London.

14.7.10: Trainee outs.

SUB-MODULE 14:3 CLIMATE-SMART AGRICULTURAL POLICY OPTIONS

14.3. 1 Introduction to the Module

Kenya adopted Vision 2030 in 2007 as a new blue print and roadmap for political, social and economic development of the country in the next two decades. The Vision also identifies Agriculture as the engine of growth through transformation of smallholder and subsistence agriculture to innovatively and commercially oriented agriculture. Kenya promulgated the new constitution in 2010 which proposes two levels of governments (national and county) with defined functions.

Agriculture is one of the devolved governance functions. However, agriculture in Kenya faces many challenges and threats such as climate change, declining agricultural performance, limited high potential agricultural land and over-reliance on rain fed agriculture, limited diversification of Agricultural production, poor and inadequate rural infrastructure, inadequate and declining research in agriculture, agricultural sector financing and related activities and low technical capacity among the actors. Therefore, agricultural policy in Kenya revolves around the main goals of increasing productivity and income growth, especially for smallholders; enhanced food security and equity, emphasis on irrigation to introduce stability in agricultural output, commercialization and intensification of production especially among small scale farmers; appropriate and participatory policy formulation and environmental sustainability. This module introduces the national and county governments, service providers, lead farmers, facilitators and relevant stakeholders in the design and implementation of effective climate-smart-sensitive agricultural policy options to promote the transition to climate-smart agriculture at the smallholder level. The policy context of this module is structured around six topics.

14.3.2 Module Learning Outcomes

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

1. The role of agricultural policy frameworks in Kenya discussed and appreciated
2. Climate-smart agriculture practices, policy options and approaches identified and understood
3. Climate-smart-sensitive policy cycle explained and understood
4. Implementation of the climate-smart-sensitive policy at the county level discussed and shared
5. Financing and Investments for Climate-smart Agriculture discussed and appreciated
6. The need for a Technology Policy explained and understood.

14.3.3 Module Target Group

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

14.3.4 Module Users

This module is intended for use by master trainers who are members of the Core Team of Trainers (CTT). The facilitators using this module should thoroughly familiarize themselves with the required participant's handouts.

14.3.5 Module Duration

The Module is estimated to take a minimum of **5 hours.**

14.3. 6 Module Summary

Module 13.3: Climate-Smart Agricultural Policy Options			
Sessions	**Training methods**	**Training materials**	**Time**
14.3.6.1 Introduction, learning expectations and outcomes	• Personal introductions • Group discussions • Plenary discussions • Presentations	• Flips charts • Felt pens • PowerPoint Presentations	30 Minutes
14.3.6.2 Agricultural Policy Frameworks in Kenya	• Presentations • Practical exercises • Plenary discussions	• Flips charts • Felt pens • PowerPoint Presentations	30 Minutes
14.3.6.3 Climate-smart agriculture practices, policy options and approaches	• Presentations • Practical exercises • Plenary discussions	• Flips charts • Felt pens • PowerPoint Presentations • Participants Handouts	1 hour
14.3.6.4 Climate-smart-sensitive policy cycle	• Presentations • Plenary discussions	• Flips charts • Felt pens • PowerPoint Presentations • Participants Handouts	20 minutes
14.3.6.5 Implementation of the climate-smart-sensitive policy at the county level	• Presentations • Practical exercise • Plenary discussions	• Flips charts • Felt pens • PowerPoint Presentations • Participants Handouts	50 minutes
14.3.6.6 Financing and Investments for Climate-smart Agriculture	• Presentations • Practical exercise • Plenary discussions	• Flips charts • Felt pens • PowerPoint Presentations • Participants Handouts	1 hour
14.3.6.7 Technology Policy	• Presentations • Plenary discussions	• Flips charts • Felt pens • PowerPoint Presentations • Participants Handouts	20 minutes
14.3.6.8 Module Review	Plenary discussion	Flip charts Felt pens	30 minutes

Total			**5 hours**

14.3.7 Facilitator's Guidelines

Sub-Module 14.3: Climate-Smart Agricultural Policy Options	
14.3.7.1 Introduction, Expectations and Outcomes (30 Minutes)	**Session Guide**
(The facilitator welcomes trainees to the module on Climate-Smart Agricultural Policy Options and the importance in Agriculture to undergo a significant transformation in order to meet the related challenges of food security and climate change for enhancing employment opportunities, better incomes and livelihoods. They are then invited to introduce themselves and state their expectations) **Trainees Expectations** *(The facilitator requests the participants to form groups and list their expectations)* **Module Objectives** *(The facilitator presents module learning Objectives)* By the end of this module the trainee should be able to: • Appreciate the role of agricultural policy frameworks in Kenya. • Appreciate climate-smart agriculture practices, options and approaches. • Recognise the stages in climate-smart-sensitive policy cycle. • Understand the phases in the implementation of the climate-smart-sensitive policy at the county level. • Be able to evaluate and select financing and investments options for Climate-smart Agriculture. • Appreciate the need for a technology policy	• Summarize Participants' "Expectations" and display. • PowerPoint Presentation • Distribute Participants Handouts on Module Objectives and Training Program
14.3.7.2 Agricultural Policy Frameworks in Kenya (30 minutes)	

Plenary Presentation (20 minutes) **Presentation highlighting:** • The role of agricultural policy frameworks in Kenya **Practical Exercise (10 minutes)** Facilitator requests the trainees to form groups and identify the gaps between agricultural policy frameworks and the existing agricultural policies	• PowerPoint presentation • Distribute participants' handouts • Group Exercise
14.3.7.3 Climate-smart agriculture practices, policy options and approaches (1 hour)	**Session guide**
***Plenary Presentation* (30 minutes)** • Considerations for climate-smart production systems • Existing systems, practices and methods suitable for climate-smart agriculture • Institutional and policy options • Ensuring farmer organizations for market access • Gendered approach **Practical Exercise and plenary Discussions (30 minutes)** Facilitator requests the trainees to form groups and identify the existing climate-smart agriculture practices and the relevant policy options for implementation.	• PowerPoint presentation • Distribute participants' handouts • Group Exercise
14.3.7.4 Climate-smart-sensitive policy cycle (20 minutes)	**Session Guide**
Plenary Presentation (10 minutes) • Stages in the climate-smart-sensitive policy cycle **Plenary Discussion (10 minutes)**	• PowerPoint presentation Distribute participants' handouts
14.3.7.5 Implementation of the climate-smart-sensitive policy at the county level (50 Minutes)	**Session Guide**
Plenary Presentation (20 minutes) • Phases in the implementation of the climate-smart-sensitive policy at the county level **Practical exercise (30 minutes)** *(The facilitator requests the trainees to form groups and develop a programme showing steps, activities and stakeholders for the implementation of climate-smart policies)*	• PowerPoint presentation • Distribute participants' handouts • Practical Exercise
14.3.7.6 Policy financing and investments for Climate-smart Agriculture (1 hour)	**Session Guide**

Plenary Presentation (30 minutes) • Why financing is needed • Financing gaps • Sources of financing • Financing mechanisms • Connecting action to financing • Types of subsidies to farmers **Group exercises (30 minutes)** *(The facilitator requests the trainees to form groups and identify potential sources of financing, financing mechanisms and connecting action to financing)*	• PowerPoint presentation • Distribute participants' handouts • Practical Exercise
14.3.7.7 Need of Technology Policy (20 minutes)	**Session guide**
Plenary Presentation (10 minutes) • What is a technology policy? • Why do we need technology policy? • Is technology policy inconsistent with a market oriented economy? • Technology policy in Kenya **Plenary Discussions (10 minutes)**	• PowerPoint presentation • Distribute participants' handouts
14.3.7.8 Module review (20 minutes)	**Session guide**
(The facilitator leads the trainees in reviewing the module) • Summarize the main points of the training and together with the trainees review the main points. • Trainees lists the main points leant during the training • Discuss with trainees new things learnt from this Module Ask the trainees what are some of the problems and issues that they have become more aware of in the module	• Q& A session • Recap the main points • Test understanding • Participatory evaluation of the session

14.8 Participants' Handouts

- Hand-out on Agricultural Policies in Kenya
- Dry Beans production manual

References

1. Alila, P.O. & Atieno, R. (2006). A paper for the Future Agricultures Consortium workshop, Institute of Development Studies, 20-22 March 2006. Future Agricultures.
2. Chronic Poverty Advisory Network (2012). Agriculture Policy Guide 2. Meeting the challenge of a new Pro-poor agricultural paradigm: The role of agricultural policies and programmes. www.chronicpovertynetwork.org
3. Chirwa, E.; Dorward, A.; Kathule, R.; Kumwenda, I.; Kydd, J., Poole, N.; Poulton, C. & Stockbridge, M. (undated). Farmer Organization for market access: Principles for policy and practice. Imperial College London. University of Malawi. Agricultural Policy Research Unit. http://www.imperial.ac.uk/agriculturalsciences/research/sections/aebm/projects/

farmerorg.htm

4. Food and Agriculture Organization of the United Nations (2016). The Gender in Agricultural Policies Analysis Tool (GAPo). FAO 2016.
5. Food and Agriculture Organization of the United Nations (FAO) (2010). “Climate-Smart” Agriculture. Policies, Practices and Financing for Food Security, Adaptation and Mitigation.
6. Ha-Joon Chang (2002). African Technology Policy Studies Network (ATPS). Who needs Technology Policy? Published by The African Technology Policy Studies Network, Nairobi, Kenya. ISBN: 9966-916-18-0
7. GoK (2007). Kenya Vision 2030.
8. GoK (2010). Kenya Constitution

ANNEX 1: TRAINING PROGRAM

The training program presented here assumes that the trainees report on Sunday evening as the first day and leave 12 days later on Sunday morning.

Time	Day 0 (Sunday) Travel to Venue	Duration	Remarks / Facilitator
Late Evening	• Arrival of participants and registration – Host • Setting up and prepare training venue and materials – CTT	**2 Hours**	**The training venue and materials are ready for use**
Close of Day 0			
Time	**Day 1 (Monday)**	**Duration**	**Remarks / Facilitator**
8.00am-9.30am	**Session 1: Introduction, objectives & expectations** • Welcome by host and Prayers • Self-introductions –(CTT) • Introduction to KCSAP project • Official opening Ceremony (CEC) • Introduction to the training program (CTT)	10 minutes 20 minutes 20 minutes 20 minutes 20 minutes	The trainees relax and climate set for the ten-day training
9.30 - 10.30 am	Module 1: **Climate Change and Climate Smart Agriculture in Dry beans value chain** **1.1. Introductions and objectives** • Introduction and Levelling of Trainees' • expectations • Presentation of module objectives:	30 minutes 30 minutes	
10.30 - 11.00 am	**Tea Break**	**30 minutes**	
11.00-12.00 pm	**1.2. Introduction to Climate Change and Climate Variability (1 hour)** **Presentations on:** • Basic terminologies used in the module (weather, climate, variability, adaptation, coping) • Climate change, climate variability and causes of climate change • Climate risks impacting agriculture and Proposed adaptation measures	20 minutes 20 minutes 20 minutes	

12.00-01.00 pm	**1.3. Concept of Climate Smart Agriculture (CSA) (1 hour)** **Presentations on:** • Definition of the CSA approach and their characteristics • The three pillars of CSA (productivity, Adaptation and Mitigation) • Why CSA is needed	20 minutes 20 minutes 20 minutes	
1.00 -2.00 pm	**Lunch Break**	**1 Hour**	
2.00 -2.40 pm	**1.4. Selected Future Scenarios that will Impact Productivity (1 hour)** **Video/Power point presentation** • Short Video or PP showing projections of rainfall and temperature projections **Plenary discussion** • Climate projections impacts on food production and needed adaptation measures for Dry beans.	20 minutes 20 minutes	
2.40 -3.00 pm	**1.5. Module Review** Summary of key points in the module	20 minutes	
	End of Module 1		
3.0 -4.00 pm	**Module 2: Farmer Field and Business School Approach** **2.1. Introductions and objectives** • Introduction and Levelling of Trainees' expectations • Presentation of module objectives:	30 minutes 30 minutes	
4.00 -5.00 pm	**2.2 Overview of FFBS key activities** **Presentation on:** • Overview of Farmer Field and Business Schools • Principles of FFBS, Characteristics of FFBS • Dry beans curriculum matrix	30 minutes	
5.00 -6.00 pm	Teat Break	1 Hour	
Close of Day 1			
Time	**Day 2 (Tuesday)**	**Duration**	**Remarks / Facilitator**

8.00-9.00am	Registration for second day participation Recap of day 1 activities	30 minutes 30 minutes	CTT
8.00-9.00am	**Continuation of Module 2** **2.3 Designing an FFBS program** Presentation of the classical steps **Group Exercise** design FFBS and presentation	 30 minutes 30 minutes	
9.00-10.00am	**2.4 Communication skills** **Group work on** • Communication skills	 30 minutes	
10.00 - 10.30 am	**Tea break**	**30 minutes**	
10.30 - 11.00 am	**2.5 Facilitation skills** Presentation on facilitating of Dry beans CIGs	 30 minutes	
11.00 - 11.30 am	**2.6 Organization, management and Leadership of FFBS** **Presentation on:** • FFBS leadership	30 minutes	
11.30 - 12.00 pm	**2.7. Module Review** Review together the main points about FFBS module.	30 minutes	
	End of Module 2		
12.00 -01.00 pm	**Module 3: Dry beans production and appropriate climatic requirements** **3.1. Introductions and objectives** • Introduction and Levelling of Trainees' expectation • Presentation of module objectives:	 30 minutes 30 minutes	
1.00- 2.00 pm	Lunch break	1 hour	All
2.00 -3.00 pm	**3.2 Importance of dry bean dry beans in Kenya's economy** **Presentation** Origin, place of dry beans production as a major crop in Kenya **Facilitator's guided discussion** Questions/answers/comments	 40 minutes 20 minutes	Faciliatator

3.00 -4.00 pm	**3.3 Dry beans production ecological/ climatic requirements (1 hour)** **Presentation on:** • Importance of dry beans, Agro-ecological zones, Climatic conditions , Soils **Facilitator's guided discussion** • Questions/answers/comments	40 minutes 20 minutes	
4.00 - 4.45 pm	**3.4. Dry beans production AEZs (villages), average yields, and constraints in the target Counties** **Group work (30 mins)** Group reviewing and discussing suitability map (County by County), County or sub-county, AEZs, areas suitable , land/farm size under dry beans, yield per farm, Constraints to dry beans production **Discussions/presentations from the groups** Let the trainee groups share the exercise outcomes	30 Minutes 15 Minutes	
4.45 - 5.00 pm	**3.5. Module review** Together discuss and summarize the main points from the module	15 Minutes	
	End of Module 3		
5.00 -6.00 pm	Teat Break	1 Hour	All
Close of day 2			
Time	**Day 3 (Wednesday)**	**Duration**	**Remarks / Facilitator**
8.00-9.00am	Registration for third day participation Recap of day 2 activities	30 minutes 30 minutes	CTT

9.00 – 10.00 am	**Module 4: Dry beans Variety Selection** **4.1. Introduction and levelling of expectations and objectives** • Introduction and Levelling of Trainees' Expectations • Presentation of module objectives	 30 minutes 30 minutes	Facilitator
10.00 - 10.30 pm	Tea break	30 minutes	
10.30 - 11.00 pm	**4.2 Introduction to dry beans and the various improved dry beans varieties and their uses** **Group work** Description of some of the dry beans varieties they know. **Presentation (20 minutes)** Dry bean Improved varieties, variety uses by category	 10 minutes 20 minutes	Facilitator
11.00 – 1.00 pm	**4.3 Recommended dry bean varieties for the target counties** Presentation on Varieties for the target counties **Group Exercises** Trainees discuss and come up with dry beans varieties in their count **Group Exercises** • Dry beans demo visit	 30 minutes 30 minutes 1 hour	
1.00- 2.00 pm	**Lunch break**	**1 hour**	**All**
2.00 - 2.30 pm	**4.4 .Module review** Summary of the main points of the training	30 minutes	Facilitator
	End of Module 4		
2.30 – 3.30 pm	**Module 5. Dry beans Seed System** **5.1. Introduction and levelling of expectations and objectives** • Introduction and Levelling of Trainees' Expectations • Presentation of module objectives	 30 minutes 30 minutes	Facilitator

3.30 - 4.30 pm	**5.2. Definition of seed and seed system in Kenya** **Group work and presentations:** What is quality seed **Presentation** • Seed system and characteristics of main seed systems (formal and informal seed systems) • Commodity corridors	30 minutes 30 minutes	Facilitator
4.30 – 5.30 pm	**5. 3 Formal seed system in Kenya** **Presentations highlighting:** • Formal seed system	30 minutes	Facilitator
5.30 – 6.00 pm	**Tea Break**	30 minutes	All
Close of day 3			
Time	**Day 4(Thursday)**	**Duration**	**Remarks / Facilitator**
8.00-9.00am	Registration for fourth day participation Recap of day 3 activities	30 minutes 30 minutes	CTT
9.00-10.00am	**5.4 Informal seed system in Kenya** **Presentations: (30 Minutes)** Informal seed system **Group work and discussions** • Calculation of seed requirements for the county/ ward/farmer group) and presentation	30 minutes 30 minutes	Facilitator
10.00 -10.30 am	Tea Break	30 minutes	
10.30 – 11.00 am	**5.5. Module review** Summary the main points of the training module	30 minutes	Miriam mutua
	End of Module 5		
11.30 – 12.00 pm	**Module 6: Dry beans climate smart agronomic practices** **6.1. Introductions, climate setting** Facilitator & trainees self-introduction and involvement in dry beans value chains	30 minutes	Facilitatot

12.00 – 1.00 pm	**Objectives and expectations** Presentation of module objectives. Expectations (group work)	 30 minutes 30 minutes	
1.00 -2.00 pm	Lunch Break	1 hour	
2.00 -3.00 pm	**6.3. Agronomic practices for dry beans production (1 hour)** Presentation of all dry beans GAPS Discussions: Questions/answers and comments	 30 minutes 30 minutes	
3.00 -4.00 pm	**6.4. Appropriate inputs for dry beans optimal production and their correct doses** **Group work (30 minutes)** • County groups to provide lists of dry beans inputs and the rates used by farmers. **Presentation** Recommended dry beans inputs (seeds, fertilizers, manures, etc.) and their rates, time	 **30 minutes** 30 minutes	
4.00 -5.00 pm	**6. 5. Module review** Summary the main points of the training module	30 minutes	
5.00 – 5.30 pm	Tea Break	30 minutes	
	End of Module 6		
Close of day 4			

Time	**Day 5 (Friday)**	**Duration**	**Remarks / Facilitator**
8.00-9.00 am	Registration day five participation Recap of day 4 activities	30 minutes 30 minutes	CTT

9.00-10.00 am	**Module 7: Integrated soil and water management practices for dry beans production** **7.1. Introduction, Objectives and Expectations** • Introduction and Levelling of Trainees' Expectations • Presentation of module objectives	30 minutes	
10.00 -10.30 am	**Tea Break**	**30 minutes**	
10.30 – 11.00 am	**7.2. Soil composition, properties and health** **Presentation** • Soil composition, properties and health **Discussion** • Discussion of issues that may arise	20 minutes 10 minutes	
11.00 – 12.00 pm	**7.3. Soil and plant tissue sampling and analysis (1 hours)** **Presentation** • Soil sampling and analysis methods **Practical exercise on soil sampling (30 minutes)** • Demonstration on soil sampling method	30 minutes 30 minutes	
12.00-1.00 pm	Lunch Break	1 hour	
1.00 – 1.30 pm	**7.4. Soil fertility and plant nutrition** **Presentation** • Potential role of different soil managements techniques in addressing soil fertility challenges in dry beans smallholder farming systems **Discussion** • Discussion of issues that may arise	20 minutes 10 minutes	

1.30 – 2.00 pm	**7.5 Soil health and (ISFM) for climate resilient cropping systems** • Presentation of ISFM **Discussion** Discussion of issues that may arise.	20 minutes 10 Minutes	
2.00 – 2.30 pm	**7.6 Soil and water management and water harvesting technologies** **Presentation** • Principles and methods of soil and water management for increased crop productivity • Methods of tillage systems that conserve Discussion • Discussion of issues that may arise.	20 minutes 10 minutes	
2.30 – 3.00 pm	**7.7. Soil degradation and reclamation** **Presentation** • Soil degradation, causes and reclamation measures **Discussion** • Discussion of issues that may arise.	20 minutes 10 minutes	
3.00 – 3.30 pm	**7.8 Problematic soils and their management (1 hour)** **Presentation** • Soils with unsuitable biological, chemical and physical properties and their management **Discussion** • Discussion of issues that may arise	30 minutes 10 minutes	
3.30 – 4.00 pm	**7.9. Module review** Summary of the main points of the training module	30 minutes	
	End of Module 7		
4.30 – 5.00 pm	**Module 8: Crop Health** **8.1. Introduction, Objectives and Expectations** • Introduction and Levelling of Trainees expectations • Presentation of module objectives	30 minutes	

5.00 - 5.30 pm	Tea Break	30 minutes	
Close of day 5			
Time	**Day 6 (Saturday)**	**Duration**	**Remarks / Facilitator**
8.00 - 9.00 am	Registration day six participation Recap of day 5 activities	30 minutes 30 minutes	CTT
9.00 - 10.00 am	**8.2. Major dry beans pests that cause economic losses and their control** **Group work** • Trainees avail dry beans pest information from their counties **Plenary Presentation** • Pests descriptions , damage and crop losses **Practical session** • Identification of dry beans pests from provided specimens • Practical: show photographs of major weeds **Discussion**	 15 minutes 20 Minutes 15 minutes 10 minutes	
10.30 -10.30 am	Tea Break	30 minutes	
10.30 – 11.00am	**8.3. Sustainable Integrated dry beans pests management practices; scouting, post-harvest pests and threshold determination** **Presentation** • IPM principles; • Scouting • post-harvest pests on cereals **Discussion**	 20 minutes 10 minutes	

11.00 – 12.00pm	**8.4. Major dry beans diseases that cause economic losses, conditions that favour their development and their control methods** **Group work (15 minutes)** • Determine dry beans diseases in specific counties **Presentation (15 Minutes)** • dry beans diseases **Practical Exercise (30 Minutes)** • Identification of major disease based on samples presented	15 minutes 15 minutes 30 minutes	
12.00 – 1.00pm	**8.5. Sustainable Integrated Diseases Management (IDM) ; scouting and threshold determination** **Presentation (30 minutes)** • Scouting, control measures • Integrated Disease Management (IDM) • Aflatoxins post-harvest diseases **Field Visit** • Identification of diseases	30 minutes 30 minutes	
1.00 - 2.00 pm	Lunch Break	1 hour	
2.00 - 2.30 pm	**8.6. Safe use of pesticides and update source for registered pesticides** **Practical** • Ways used by farmers in mixing of pesticides • **Presentation** • safe use of pesticides	10 minutes 20 minutes	
2.30 - 3.30 pm	**8.7. Module review** Summary of the main points of the training	30 minutes	
	End of Module 8		

4.00 – 4.30 pm	**Module 9. Dry bean harvesting and post-harvest management** **9. 1** Introduction and levelling of expectations and objectives • Introduction and Levelling of Trainees expectations • Presentation of module objectives	30 minutes	
4.30 – 5.00 pm	**9. 2 Dry bean harvesting and drying to maintain quality(1 hour)** **Presentation** • quality standards for dry beans in Kenya and harvesting and drying **Dissuasion** Issues on harvesting	20 minutes 10 minutes	
5.00 – 5.30 pm	**Tea Break**	**30 minutes**	
Close of day 6			

Time	**Day 7 (Sunday)**	**Duration**	**Remarks / Facilitator**
8.00 – 9.00 am	Registration day seven participation Recap of day 6 activities	30 minutes 30 minutes	CTT
9.00 – 9.30 am	**9.3 Proper Dry beans threshing, cleaning and drying** **Presentation** The processes of threshing dry beans, cleaning and drying **Dissuasion** issues on harvesting	20 minutes 10 minutes	
9.30 – 10.30 am	**9.4 Dry beans grain storage techniques** **Field Trip:** Travel to Egerton Njoro Campus dry beans breeding field **Presentation** Dry beans storage methods **On-farm practical demonstration** • The salt method and moisture meter testing of dry beans grain moisture content • Hermetic bags storage	30 minutes 30 minutes	
10.30 -11.00 am	**Tea Break**	**30 minutes**	

11.00 -11.30 am	**9.5 Training review** Summary of the main points of the training	30 minutes	
	End of Module 9		
12.00 -1.00 pm	**Module 10. Dry beans value addition** **10.1 Introduction and levelling of expectations and objective** **Module Objectives** • What to be covered **Expectations** • trainees expectations based on the objections	30 minutes	
1.30 - 2.00 pm	Lunch Break	1 hour	
2.00 – 3.00 pm	**10. 2 Introduction to recipes for dry beans value added products** **Presentation** • Nutritive value • Dry beans Recipes **Group Exercises** Discuss and raise issues	30 minutes 30 minutes	Facilitator
3.00- 5.00 pm	**10. 3. Making of different dry beans value added products** **Practical's** Groups make the various products using the recipes introduced and analysis	2 hours	
5.00 – 5.30 pm	Tea Break	30 minutes	
Close of day 7			
Time	**Day 8 (Monday)**	**Duration**	**Remarks / Facilitator**
8.00 - 9.00 am	Registration day 8 participation Recap of day 7 activities	30 minutes 30 minutes	CTT

9.00 - 10.00 am	**10.4 Prioritizing opportunities in dry beans value addition** **Group exercise** • pairwise ranking of dry beans recipes according to consumption and market opportunity **Discussion** • Ranked recipes.	30 minutes 30 minutes	
10.00 -10.30 am	Tea Break	30 minutes	
10.30 -12.00 pm	**10.5 Value addition strategy development** **Focused group discussion** • To come up with market strategies for the ranked products. • Presentation of strategies **Presentation** Summary of market strategies for the products	1 hour 30 minutes	
12.00 -12.30 pm	**10.6 Training review** Review the main points about Dry beans Value addition	30 minutes	
	End of Module 10		
1.00 - 2.00 pm	Lunch break	1 hour	All
2.00 – 2.30 pm	**Module 11: Mechanization of dry beans production activities** **11.1 Introduction, Objectives and Expectations** **Module Objectives** • What to be covered **Expectations** • trainees expectations based on the objections	30 minutes	

2.30 – 3.00 pm	**11.2. Dry beans climate smart land preparation tools** **Presentation** • Overview of the dry beans mechanization activities • Climate smart tillage options **Discussion** • discuss any issue that may arise	20 minutes 10 minutes	
3.00 – 3.30 pm	**11.3. Dry beans calibration of fertilizer and seed rate for planters (1 hour)** Presentation: • planter seed and fertilizer rate determination **Discussion (30 Minutes)** • Discuss any issue that may arise.	20 minutes 10 minutes	
3.30 – 4.00 pm	**11. 4. Dry beans Chemical implements and tools operations** **Presentation** : • Dry beans pest control equipment; **Discussion** • discuss any issues that may arise	20 minutes 10 minutes	
4.00 – 5.00 pm	**11.5. Dry beans harvesting machine operating principles** **Presentation** • Harvesting machines, Harvest timing and estimation of Machine harvest yield losses **Discussion** • discuss any issues that may arise	30 minutes 30 minutes	
5.00 – 5.30 pm	Tea Break	30 minutes	
Close of Day 8			
Time	**Day 9 (Tuesday)**	**Duration**	**Remarks / Facilitator**

8.00 - 9.00 am	Registration day 9 participation Recap of day 8 activities	30 minutes 30 minutes	CTT
9.00 – 9.30 am	**Module 11 continued…….** **11.6 Machine and procedure for Dry beans grading** **Presentation** • PowerPoint on dry beans grading machine procedure **Practical exercise** • Demonstrations on management options	 15 minutes 15 minutes	
9.30 -10.00 am	**11.7 Module review** Review the main points about Dry beans mechanization	30 minutes	
	End of Module 11		
10.00 -10.30 am	Tea Break	30 minutes	
10.30 -11.30 am	**Module 12. Dry beans Business and Marketing** **12.1 Introduction and levelling of expectations and objectives (1 hour)** **Expectations (30 minutes)** • Trainees to state their expectations **Objectives (30 minutes)** • Present objectives	 30 minutes 20 minutes	
11.30 -12.00 pm	**12.7.2 Introduction to marketing channels and strategies** **Presentation** • Dry beans markets **Discussion** • issues on markets	 20 minutes 10 minutes	

12.00 -1.30 pm	**12.3 Identification and prioritization of market opportunities in dry beans value chain** **Group exercise and presentations** • Prioritization of markets by pairwise ranking and presentation **Group discussion** • Trainees raise issues and discuss them.	40 minutes 20 minutes	
1.30 - 2.30 pm	Lunch break	1 hour	All
2.30 – 3.30 pm	**12.4 Dry beans Community production, aggregation and marketing models (COPMAS) Presentation** • Introduce community production and marketing system **Group Exercise** • Discussion issues on dry beans community marketing	40 minutes 20 minutes	
3.30 – 4.30 pm	**12.5 Training review** Summary and discussion of the main points of the training	30 minutes	
4.30 – 5.00 pm	**Tea Break**	30 minutes	All
	End of module 12		
Close of day 9			

Time	**Day 10 (Wednesday)**	**Duration**	**Remarks / Facilitator**
8.00 - 9.00 am	Registration day 10 participation Recap of day 9 activities	30 minutes 30 minutes	CTT
9.00 - 9.30 am	**Sub-Module 13.1 Agricultural Innovation Platforms (AIP)** **13.1.1 Introduction, Objectives and Expectations** **Module Objectives** • What to be covered **Expectations** • trainees expectations based on the objections	30 minutes	

9.30 - 10.30 am	**13.1.2. The characteristics of an innovation platform** Presentation Discussion	 30 minutes 30 minutes	
10.30 - 11.00 am	Tea break	30 minutes	All
11.00 - 12.00 pm	**13.1.3 Preformation and formation phases of the Dry beans AIP** **Presentation on:** Initiation or preformation phase, Establishment, Management, Sustainability **Discussion (10 minutes)** On any issues arising	 50 Minutes 10 minutes	
12.00 - 12.30 pm	**13.1.4. Module review** Summary of main points	30 minutes	
	End of sub module 13.1		
1.00 - 2.00 pm	Lunch break	1 hour	All
1.00 - 1.30 pm	**Module 13.2 Gender mainstreaming and social inclusions in the Dry beans value chain** **13.2.1 Introduction, Objectives and Expectations** **Module Objectives** • What to be covered **Expectations** • trainees expectations based on the objections	 30 minutes	
1.30 - 2.00 pm	**13.2.2 Gender mainstreaming and social inclusion in Dry beans value chain (30 minutes** Presentation Gender issues Group exercise and discussion (10 Minutes) Let the trainees recall what they learned and discuss any issue that may arise	 20 minutes 10 minutes	

2.00 - 2.30 pm	**13.2.3 youth empowerment in Dry beans value chain s (1hour)** **PowerPoint presentation** • Strategies to empower youth in Dry beans value chain **Group work and Discussion**	20 minutes 10 minutes	
2.30 - 3.00 pm	**13.2.4 Women empowerment in Dry beans value chain** **PowerPoint presentation** • Strategies to empower women in Dry beans value chain **Group work and Discussion**	20 minutes 10 minutes	
3.00 - 3.30 pm	**13.2.5. Strategies for inclusion of vulnerable and marginalized groups in Dry beans value chain** **PowerPoint presentation** • Strategies to empower VMGs in Dry beans value chain **Group work and Discussion**	20 minutes 10 minutes	
3.30 - 4.00 pm	**13.2.7.6. Environmental and social management framework (ESMF)** **Presentation** • Environmental and socioeconomic impacts of Dry beans value chain activities. **Plenary discussion (10 minutes)**	20 minutes 10 minutes	
4.00 - 4.30 pm	**13.2.7. Module review (30 Minutes)** Plenary summary of the module	30 minutes	
4.30 – 5.00 pm	**Tea Break**	30 minutes	All
	End of module 13.2		
Close of day 10			
Time	**Day 11 (Thursday)**	**Duration**	**Remarks / Facilitator**
8.00 - 9.00 am	Registration day 11 participation Recap of day 10 activities	30 minutes 30 minutes	CTT

9.00 - 9.30 am	**Module 13.3: Climate-Smart Agricultural Policy Options** **13.3.1 Introduction, Objectives and Expectations** **Module Objectives** • What to be covered **Expectations** trainees expectations based on the objections	30 minutes	
9.30 - 10.00 am	**13.3.2 Agricultural Policy Frameworks in Kenya** **Presentation highlighting:** • The role of agricultural policy frameworks in Kenya ***Practical Exercise (10 minutes)*** Identification of gaps	20 minutes 10 minutes	
10.00 - 10.30 am	Tea break	30 minutes	All
10.30 - 11.30 am	**13.3.3 Climate-smart agriculture practices, policy options and approaches** **Presentation highlighting:** • Policy on CSA **Practical Exercise and plenary Discussions** • existing climate-smart agriculture practices and the relevant policy options for implementation	30 minutes 30 minutes	
11.30 - 11.50 am	**13.3.7.4 Climate-smart-sensitive policy cycle** Plenary Presentation Plenary Discussions	10 minutes 10 minutes	

11.50 - 12.40 pm	**13.3.7.5 Implementation of the climate-smart-sensitive policy at the county level** **Plenary Presentation (20 minutes)** • Phases in the implementation of the climate-smart-sensitive policy at the county level **Practical exercise (30 minutes)** Develop a programme showing steps, activities and stakeholders for the implementation of climate-smart policies	20 minutes 30 minutes	
12.40 - 2.00 pm	**Lunch break**	1 hour	All
2.00 - 3.00 pm	**13.3.6 Policy financing and investments for Climate-smart Agriculture** **Presentation (30 minutes)** • Policy financing of CSA **Group exercises (30 minutes)** • identify potential sources of financing, financing mechanisms and connecting action to financing	30 minutes 30 minutes	
3.00 - 3.20 pm	**13.3.7 Need of Technology Policy** **Presentation** • Technology policy **Plenary Discussions**	10 minutes 10 minutes	
3.20 - 3.40 pm	**13.3.8 Module review** Summary of module main points	20 minutes	
	End of module 13.3		
3.40 - 4.00 pm	• Course Evaluation	20 minutes	All
4.00 - 4.30 pm	Announcements Way Forward Closing remarks	30 minutes	CCT
4.30 - 5.00 pm	Tea Break	30 minutes	
Close of day 10			
Time	**Day 12 (Friday)**	**Duration**	**Remarks / Facilitator**
	• Departure to various destinations		All

	Category / Modules	Publication title	Reference types	No Pages	Farmer Category A= New entrant/ Green gram Elite farmer B= Elite Green gram Farmer
1	**Climate change & Smart Agriculture**	Common Dry Bean Extension	Manual	35	**AB**
2	**Farmer Field & Business School**	Khisa Godrick: (2004) Farmer Field School Methodology: Training of Trainers Manual. Sustainet East Africa; (2010) Farmer Field School: A Technical Manual	Field Booklet Field Booklet	42 41	**AB** **AB**
3	**Dry Bean Production Niche**	Grow improved beans for food and income, KARI 2008.	Leaflet	3	**A**
4	**Dry Bean Variety Selection**	Nyota bean: A new high yielding, market preferred and drought tolerant dry bean. KALRO information brochure series 2017/13. Karanja et al 2017.	Leaflet	5	**AB**
5	**Dry Bean Seed System**	Angaza, Maridadi and Faida bean varieties. KALRO information brochure series 2017/15. Karanja et al. 2017 KaranjaK	Leaflet	5	**AB**
6	**Dry Bean Climate Smart Agronomic Practices**	Production of new drought-tolerant and micronutrient rich bush beans. KALRO information brochure series 2017/13. Karanja et al. 2017	Leaflet	3	AB

7	**Integrated Soil & Water Management**	Common Dry Bean Extension	Manual	35	**AB**
8	**Dry Bean Crop Health**	Comparative whitefly vector density and bean disease incidence on local and hybrid varieties in semi-arid Kenya Kamonzo et a.2018. https://www.gsconlinepress.com/journals/	Paper	**7**	**AB**
9	**Dry Bean Harvest & Post Harvest**	Adaptation and dissemination of available technologies for Smallholder's adoption. Macharia et al.2016	**Manual**	**17**	**AB**
10	**Dry Bean Value Addition**	Common Dry Bean Extension	Manual	35	AB
11	**Mechanization of Dry Bean Production**	Spacing and plant population for dry bean harvest mechanization January 2000. Pesquisa Agropecuária Brasileira 35(1):41-46	Paper	6	AB
12	**Dry Bean Business & Marketing**	Enhancing Dry Bean Production and Marketing in Semi-Arid Kenya www.kalro.org/asal-aprp. Karanja et al.2017	Leaflet	4	AB