THE KENYA CEREALS ENHANCEMENT PROGRAMME - CLIMATE RESILIENT AGRICULTURAL LIVELIHOODS (KCEP - CRAL) WINDOW

Millets Trainer of Trainers Manual

SUPPORTED BY FUNDS FROM EU
APRIL 2021
Disclaimer

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Published by

Kenya Agricultural and Livestock Research Organization
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Citation


The authors of this manual acknowledge the support from European Union (EU) through the International Fund for Agricultural Development (IFAD) and the Kenya Cereals Enhancement Programme (KCEP) of the Ministry of Agriculture, Livestock and Fisheries MoALF in collaboration with the Kenya Agricultural and Livestock Research Organization (KALRO)-KCEP-CRAL, Nairobi, Kenya.
KENYA AGRICULTURAL AND LIVESTOCK RESEARCH ORGANIZATION (KALRO) is one of the partners in the Kenya Cereals Enhancement Programme - Climate Resilient Agricultural Livelihoods Window (KCEP-CRAL) Programme funded by the European Union (EU) and implemented by the International Fund for Agricultural Development (IFAD). KALRO’s participation in this programme is based on proven experience and expertise in agricultural research. Within the programme, KALRO handled the research component, conducted on station and on farm trials, developed farmer recommendations, packaged training materials for extension staff and service providers and conducted the training. The implementation of KCEP-CRAL is in thirteen (13) counties namely Nakuru, Nandi, Trans Nzoia, Kakamega, Bungoma, Kitui, Tharaka-Nithi, Embu, Machakos, Makueni, Taita Taveta, Kwale and Kilifi.

The Programme focuses on the three leading rain-fed cereals (maize, sorghum and millet) and associated pulses (beans, green grams, cowpeas and pigeon peas). The Programme’s overall objective is to contribute to the reduction of rural poverty and food insecurity of smallholder farmers.

Through this manual, KCEP-CRAL will provide a comprehensive guide to extension officers, service providers and lead farmers on how to successfully produce cereals and pulses in Kenya. The manual is a useful training and reference material for extension officers and other stakeholders seeking to enhance the capacity of farmers, increase commercialization for food security and promote gender inclusion and participation along the commodity value chains.

Initial lessons learnt in this project indicate that enhancing the capacity of the extension staff and service providers has improved uptake of new technologies for dry land farming. It has opened up more land for dry land farming through use of conservation agriculture in areas that hitherto were not under agriculture.

Besides easing the pressure on previously arable land, farmers in these areas have been trained to use alternative pest management regimes using Integrated Pest Management and Push pull technologies for persistent pests of economic importance.

On behalf of KALRO, I am grateful to the European Union (EU) for supporting this project through the International Fund for Agricultural Development (IFAD) and the Kenya Cereals Enhancement program (KCEP-CRAL) of the Ministry of Agriculture, Livestock, Fisheries and Cooperatives (MOALF&C). I also appreciate the excellent coordination of the whole process by the KCEP-CRAL Secretariat led by Dr Anthony O. Esilaba, Ministry of Agriculture Livestock, Fisheries and Irrigation and other partners’ staff, scientists in participating centres, Knowledge, Information and Outreach Unit team and secretarial staff. It is my hope and desire that in using this manual, the expectations of all stakeholders will be met.

Eliud K. Kireger, (PhD, OGW)
DIRECTOR GENERAL, KALRO
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PART I

INTRODUCTION
The purpose of this trainer of trainers’ module is to familiarize extension officers, lead farmers and service providers on the millet production practices and empower them with knowledge and skills to train farmers’ trainers. This will enable them to impart knowledge on good agricultural millet production practices to farmers through farmer trainings.

SECTION 1: BACKGROUND

1.1 Value of millets in Kenyan Economy
Millets are a group of grasses mainly found in the arid and semi-arid regions. They produce small seeded grains and are often cultivated as cereals. They include Pearl millet (*Pennisetum glaucum*), Finger millet (*Eleusine coracana*), Proso millet (*Panicum miliaceum*) and Foxtail millet (*Setaria italica*). The popularity of millet fell for some years due to introduction of maize, wheat and rice, but the current unpredictable rainfall patterns accompanied by frequent maize crop failures have led to renewed interest in the production of indigenous, drought tolerant crops. Popularity of millets is once again on the rise with millers demanding more deliveries. Land under millets production in Kenya was 111,271 ha in 2011 with a production of 73,396 tons.

1.2 Contribution of millets for food and nutritional security
Millets play a vital role as a food security crop especially in semi-arid lands of Kenya. They are widely cultivated as human food or animal feed. The grain is used for making floor for the preparation of porridge, flat bread or chapatti. The flour is also used for making wine or beer. The grain is a feed for livestock and chicken. The straw is used for forage and in some areas as brooms, building material and fire wood. Millet is fast becoming a popular baby food as the grains are rich in calcium with a pleasant flavour. The grains are similar in nutrient composition to maize but richer in protein and fibre. In recognition of millets nutrition value and frequent maize crop failures, the Government of Kenya is putting more emphasis on production of millet to mitigate food and nutritional security.

1.3 Millets in Climate Smart resilience
Millets are adapted to too hot and dry conditions, too shallow soils that are poor for successful cultivation of other cereal crops. Millets varieties are drought tolerant and do well under conditions where maize often fails to reach maturity. They have a short growing season, can withstand dry and high-temperatures and yet yield well. In Kenya millet is grown from 0 - 2400 m.a.s.l. Proso millet has one of the lowest water requirements of all cereals. An average annual rainfall of 200 - 450 mm is sufficient for a successful crop.
1.4 Objectives of training

Millets producers face several production constraints including drought stress, soil infertility, poor management practices, disease/pests including bird damage, weeds, postharvest losses and poor marketing structures. The aim of this training module is to provide farmer trainers with knowledge and skills on how to facilitate farmers to mitigate the millet production constraints through the adoption and practice of good climate smart agricultural practices.

1.5 Objectives of the training

To empower the farmers trainers with relevant attitude, knowledge and skill in millet production techniques.

- To refresh and enhance farmer trainer’s with knowledge and new technologies along the millets value chain including variety selection, soil nutrient management, crop management, crop protection, value addition and marketing
- To provide farmer trainers with skills in participatory techniques for effective facilitation of adult learning processes
- To enhance the development of inclusive stakeholder partnership for sustainable up-scaling of millets technologies
SECTION 2: MODULE TRAINING CONTENT

2.1 Orientation of the module

The first part of this manual outlines the orientation and outline of the planned modules which cover millet production practices that include ecological requirements and varietal selection, soil fertility and crop management, pests, diseases & weeds management, harvesting and post-harvest, processing and utilization (value addition) and marketing. The training module contains five modules which are orientated to ensure millet value chain technologies are adopted for increased productivity.

2.2 Module outline

The module outline includes:

- Introduction to the module   context and background to training needs, knowledge and skills gaps being addressed
- Module learning outcomes - what trainees are expected to learn
- Module target group - trainee categories
- Module users - facilitators
- Module duration - minimum number of hours of exposure to materials
- Module summary - sequence of sessions, training methods, materials and duration
- Facilitators’ guideline - detailed sessions, training methods, materials and session guides
- Participant’s handouts - detailed notes and reference materials for trainees.
## Outline of the five millets training modules

<table>
<thead>
<tr>
<th>No</th>
<th>Module Name</th>
<th>Need Addressed</th>
<th>Expected Training Outcomes</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Millets ecological requirements and areas of production</td>
<td>• Agro ecological requirements: altitude, rainfall, soil type, temperature.</td>
<td>• Improved awareness on areas to promote sorghum cultivation</td>
<td>1 hours 40 minutes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Areas of production in Kenya</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Millets crop agronomic and soil fertility management practices</td>
<td>• Pre field operations: Varietal selection (Improved millet varieties), seed selection, treatment &amp; germination test.</td>
<td>• Improved knowledge on crop management technologies and fertility requirements</td>
<td>2 Hours 30 minutes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Pre planting operations: site selection and land preparation</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Soil fertility: manures and chemical fertilizer application</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Planting and crop management: planting, intercropping, weeding, thinning and rogueing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Pests and Diseases management in millets</td>
<td>• Scouting for insects pests and diseases in Millets</td>
<td>• Improved awareness on economic importance of pests and diseases</td>
<td>2 Hours</td>
</tr>
<tr>
<td></td>
<td>Weed management in millets</td>
<td>• Integrated Pest Management (IPM)</td>
<td>• Improved awareness on identification and management of pests and diseases. Improved weed management skills</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Major millets diseases &amp; pests and their control</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Major millets weeds and control methods</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Storage diseases and pests control</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>Module Name</td>
<td>Need Addressed</td>
<td>Expected Training Outcomes</td>
<td>Duration</td>
</tr>
<tr>
<td>-----</td>
<td>------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>4.</td>
<td>Push-pull technology in management of stem borers, striga and fall armyworm in cereals production</td>
<td>• Basics of Push pull Technology expectations&lt;br&gt;• Overview of Push-Push Technology (PPT)&lt;br&gt;• Knowledge for implementation of PPT in millet</td>
<td>• Appreciation of the principles of push-pull technology&lt;br&gt;• Gain knowledge on how to prepare for effective implantation of right format size for PPT among different cereals&lt;br&gt;• Identify the legumes which could repel stem borers and FAW moths from laying eggs on cereal crops&lt;br&gt;• Appreciate the threshold control for specific pests and diseases for agribusiness principles</td>
<td>1 Hour 15 Minutes</td>
</tr>
<tr>
<td>5.</td>
<td>Pearl millet harvesting, post-harvest management, value addition and production gross margins</td>
<td>• Harvesting, drying and packaging techniques&lt;br&gt;• Post-harvest storage technologies&lt;br&gt;• Processing and utilization : Nutritional value and value addition&lt;br&gt;• Gross margins of millet production</td>
<td>• Improved awareness on Grain quality and diseases&lt;br&gt;• Improved awareness on Post-harvest loses and diseases&lt;br&gt;• Improved awareness on alternative sorghum products and diseases&lt;br&gt;• Improved awareness on Sorghum enterprise and business opportunities</td>
<td>2 hours</td>
</tr>
</tbody>
</table>

**Total Duration** 9 hours 25 minutes
SECTION 3: TRAINING DESIGN

3.1 Delivery system

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

3.1.1 Training of farmer facilitators

A core team of master trainers will be constituted to train farmer facilitators in a training of trainer’s (TOT) course. The course will be conducted using this millets training manual. The training course will be attended by selected agricultural extension officers form county wards of the targeted sub counties of each selected county. These extension officers will be farmer facilitators after completing the training course.

3.1.2 Training of farmers

Each of the farmer facilitators will be taxed to train farmer leaders and farmer groups in their respective wards. Each facilitator will assist targeted number of farmers to acquire knowledge and skills in millets production using a developed training manual and other appropriate extension materials.

3.2 Partners and their roles

The partners who will work together in this training will be:

3.2.1 Core Team of Trainers (CTT)

This will be a team of KALRO and Department of Agriculture trainers who will train the farmer facilitators sourced from the County Government Department of Agriculture using this training module. They will also backstop the farmer facilitators during the initial stages of their farmer trainings and take part in the evaluation of the trainings.

3.2.2 County Government Department of Agriculture

This will be the team of farmer facilitators who will train the farmers using the millets production training manual.

3.2.3 Private Sector Service Providers

Inputs suppliers, financial and business development service providers, market players and processors to partner and support promotion of millets.

3.3 Training duration

The facilitators training course has four millet modules and shall take a total of approximately eight hours of training period. Mid-morning tea, afternoon tea and lunch break times are not included in the 10 hours, the trainer will need to have a programme that has breaks.
3.4 Logic of design and flow of session

The logic of design and flow of each module will be as follows:

- Introduction of the module
- Participant’s expectations
- Relation of participants’ expectations with module objectives or learning outcomes
- Exploration of the concept and content, switching to different methods of delivery of the content (group exercise, brainstorming, excursions, plenary discussions, role plays) as the session
- Review and summary of the module massage and its application at the end using participatory approaches such as questions and comments
- Distribution of the participants’ handouts
SECTION 4: FACILITATOR GUIDELINES/NOTES FOR FACILITATOR

4.1 Preparation of training materials

Preparation of training material will include:

- Adequate training materials as required in the training module. These should be prepared before the actual training course period. They will include LCD projections, flip charts, felt pens, manuals, books, videos tapes, laptop and other materials required by the trainer.
- The required stationery which includes name tags, writing materials, paper punch, staplers, box files for participants’ handouts filing and any other necessary stationary.
- Visual aids like field equipment and tools which should be availed and arranged for use when required.
- Adequate copies of participants’ handouts (one per participant) for distribution as may be required.
- Enough copies of the training modules to be distributed at the end of the training course.
- In addition, the core trainer should familiarize themselves and internalize the guidelines provided by this training module early enough.

4.2 Preparation of training venue and sites

The training venue will include the training room and field demonstration sites. The training room should have adequate space for the targeted number of participants while observing Covid-19 protocols. The demonstration sites to be used for practicals should be a walking distance with enough number of plots.

4.3 The trainees

The targeted trainees are Sub County and Ward Agricultural Extension Officers with elaborate training background in agriculture and extension. The facilitator should not lecturer but draw out and build on their knowledge, skills and experience.

4.4 Training programme

The facilitator will require a programme that consists of the actual training modules and the corresponding days and time allocation.
4.5 Training methods

The choice of the methods has been informed by the competency of issues being addressed, time available and experiences of the author of this manual.

In this training module the facilitator can choose to use several methods of non-formal education approaches that are useful for adult learners such as listed in Table 1.

Table 1: Description of Training Methods

<table>
<thead>
<tr>
<th>Training Method</th>
<th>Description of Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sharing and Discussions in Plenary</td>
<td>Use of PowerPoint or flip charts and plenary discussions in situations where knowledge and opinion or consensus is required</td>
</tr>
<tr>
<td>Brainstorming/Problem Solving Exercise</td>
<td>To be considered where skills are an issue requiring sharing and trying</td>
</tr>
<tr>
<td>Small Group and Big Group Discussion</td>
<td>Plenary discussions have been considered as training methods where attitude is an issue</td>
</tr>
<tr>
<td>On-farm practical demonstration and visits</td>
<td>To be considered where hands-on practical skills are acquired through demonstration and sharing</td>
</tr>
</tbody>
</table>

4.6 Planning and guidance for farmer facilitators training Preparation

While planning for this training, the leader of the master trainer’s team should ensure the following:

- **Week Eight** - Recruit and compose a core/master trainer’s team, establish the required sorghum demonstration plots (eight weeks ensures mature sorghum plants) and identify and establish the list of trainees and other participants

- **Week Four** - Send out invitation letters to participants and special guests detailing purpose, venue and programme. Follow up on demonstration sites. Hold a briefing meeting for the master trainers

- **Week Three** - confirm names of trainees, participants and special guests, prepare training materials for facilitators, confirm preparedness of the field sites to be visited and confirm special guests if any

- **Week One** - Confirm training sites preparedness, brief assistants and service providers in the site

- **Day One** - Move training material to the venue, arrange training room furniture, place materials, equipment and stationery on the tables. Arrange for reception of trainees at residence proposed
On the 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 core trainers and participants
- Introduction to the project and training course
- Ground rules

4.7 Evaluation of the training

Time should be allocated on the last day of the training course for evaluation of the training and planning the way forward. This is allocated in the training programme prepared by the core trainer. Two evaluations will be performed as follows:

4.7.1 The individual trainee evaluation

Each trainee will fill evaluation forms which will be collected and analyzed by the core trainers’ team members.

Sample evaluation form

<table>
<thead>
<tr>
<th>Aspect / Module</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Very Useful (5 marks)</td>
</tr>
<tr>
<td>1. Training Methodology</td>
<td></td>
</tr>
<tr>
<td>2. Facilitation Skills</td>
<td></td>
</tr>
<tr>
<td>3. The training Module content</td>
<td></td>
</tr>
<tr>
<td>4. Millets ecological requirements and areas of production</td>
<td></td>
</tr>
<tr>
<td>5. Millets crop agronomic and soil fertility management practices</td>
<td></td>
</tr>
<tr>
<td>6. Pests, Diseases and weed management in millets, millet harvesting, post-harvest management, value addition and marketing</td>
<td></td>
</tr>
<tr>
<td>7. Venue arrangements</td>
<td></td>
</tr>
<tr>
<td>8. Handouts</td>
<td></td>
</tr>
<tr>
<td>9. Tools and practicals</td>
<td></td>
</tr>
</tbody>
</table>
4.7.2 *Trainee’s group evaluation*

The trainees divide themselves into groups then objectively and constructively evaluate the training in absence of the trainer. They then present their evaluation to the trainers.

The master trainers will 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 improvement.

4.8 *Facilitators’ reference materials*

- Pamphlets
- Millets extension manual
- Videos
- Farmer’s handbook
- Other extension materials
PART II: TRAINING MODULES

This part consists of five modules namely:

1. Millet ecological requirements, areas of production and varieties
2. Millet crop agronomic and soil fertility
3. Identification and management of pests, diseases and weeds in millet production
4. Push-pull technology in management of stem borers, striga and fall armyworm in cereal production
5. Millet harvesting, post-harvest management, value addition and production gross margins

Each module comprises of the following components:

- Introduction to the module
- Module learning outcomes
- Module target group
- Module duration
- Module summary
- Facilitators’ guidelines
- Participants’ Handouts (References)
MODULE 1: MILLETS ECOLOGICAL REQUIREMENTS, AREAS OF PRODUCTION AND VARIETIES

1.1 Introduction to the module
This module is designed for training farmer facilitators in ecological requirements, identification of the areas suitable for production and varieties of millets. In Kenya pearl millet is a traditional crop, which is grown in arid and semi-arid regions of Makueni, Machakos, Kitui, Embu, Mbeere, Coast and Kirinyaga. It is grown mainly for subsistence use, but the crop lost favour with farmers when maize became the preferred and staple food crop after its introduction by the white settlers. Finger millet can tolerate drought in the early stages of growth but after the first month it requires a good supply of moisture. Although it is mainly grown in western Kenya, it can widely be grown in areas receiving 900 mm of rainfall annually and from sea level to 2400 m above sea level. Proso and foxtail millets despite having very short growing duration and low moisture requirement, are not widely grown because of very low awareness among farmers. However, due to climate change effects and the desire to stabilize food security in the country, there is now renewed interest in promoting drought-tolerant crops such as millets which are known to be well adapted to harsh environments. There is therefore need for farmer facilitators in the millet target counties to be brought up to date on the ecological requirement for cultivation of millets and their areas of production.

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

- The millet crop, its climatic and ecological requirements described
- The various improved millet varieties and ecological areas suitable for their cultivation identified
- The target areas suited to each variety identified

1.3 Module target group
This module targets county agricultural extension officers, service providers and lead farmers.

1.4 Module duration
The module is estimated to take a minimum of 2 hours.
### 1.5 Module summary

<table>
<thead>
<tr>
<th>Sessions</th>
<th>Training Methods</th>
<th>Training Materials</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Introduction Objectives Expectations</td>
<td>Personal introduction Presentation Plenary</td>
<td>Flip charts PowerPoint Participants’ handouts</td>
<td>30 minutes</td>
</tr>
<tr>
<td>2. Introduction to millet plant and its ecological requirements: (altitude, rainfall, soil type, temperature)</td>
<td>Presentation Discussions</td>
<td>PowerPoint with photos Flip charts Participants’ Handouts</td>
<td>20 minutes</td>
</tr>
<tr>
<td>3. Areas of millet production in Kenya Available millet varieties</td>
<td>Presentation Discussion</td>
<td>PowerPoint, with maps Flip charts Participants’ Handouts</td>
<td>30 minutes</td>
</tr>
<tr>
<td>4. Varietal selection: recommended millet varieties for the target counties</td>
<td>Questions and comments Facilitator’s summary</td>
<td>PowerPoint Flip chart Participants’ Handouts</td>
<td>20 minutes</td>
</tr>
<tr>
<td>5. Module review</td>
<td>Questions and comments Facilitator’s summary</td>
<td>Flip chart Participants’ Handouts</td>
<td>20 minutes</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td>2</td>
</tr>
</tbody>
</table>
### 1.6 Facilitators’ guidelines

#### Millets ecological requirements and areas of production

<table>
<thead>
<tr>
<th>1.6.1 Introduction and levelling of expectations and objectives (30 minutes)</th>
<th>Session Guide</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Introduction (10 minutes)</strong></td>
<td>• Participant handouts</td>
</tr>
<tr>
<td>The facilitator welcomes participants to the module and introduces him/herself by stating his/her profile and experience, The facilitator invites the participants to introduce themselves stating their capacity and roles in agricultural sector</td>
<td>• Programme</td>
</tr>
<tr>
<td><strong>Module Objectives (10 minutes)</strong></td>
<td>• Power point Presentation</td>
</tr>
<tr>
<td><em>(The facilitator presents modules objectives)</em></td>
<td>• Participants’ expectations summarized on flip chart</td>
</tr>
<tr>
<td>By the end of the Module training, the participants should be able to:</td>
<td></td>
</tr>
<tr>
<td>• Describe climatic and ecological requirements of millet crop</td>
<td></td>
</tr>
<tr>
<td>• Identify millet growing areas in Kenya and the various improved millet varieties</td>
<td></td>
</tr>
<tr>
<td>• Identify varieties for the target counties</td>
<td></td>
</tr>
<tr>
<td><strong>Participants expectations (10 minutes)</strong></td>
<td></td>
</tr>
<tr>
<td>The facilitator invites the participants to state their expectations</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1.6.2 Introduction to millet plant and its ecological requirements (20 minutes)</th>
<th>Session Guide</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>(The facilitator should describe the different millets, altitude, rainfall, soil type and temperature requirements using PowerPoint with photos of the millets)</em></td>
<td>• Powerpoint presentation</td>
</tr>
<tr>
<td><strong>Climatic and ecological requirements of millets (10 minutes)</strong></td>
<td>• Participants’ handouts</td>
</tr>
<tr>
<td>Description of pearl, finger, proso and foxtail millets as dryland crops, economical importance and their uses.</td>
<td></td>
</tr>
<tr>
<td>Altitude, rainfall, soil types and temperature range for millet adaptation.</td>
<td></td>
</tr>
<tr>
<td><strong>Discussion (10 minutes)</strong></td>
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</tr>
<tr>
<td>Let the participants recall what they learned and discuss on any issue that may arise.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1.6.3 Millet growing areas and available varieties in Kenya (40 minutes)</th>
<th>Session Guide</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>(The facilitator should be able to guide the participants in identifying the various millet growing areas in Kenya and improved varieties).</em></td>
<td>• Participants’ handouts</td>
</tr>
<tr>
<td><strong>Millet growing areas (10 minutes)</strong></td>
<td>• PowerPoint presentations</td>
</tr>
<tr>
<td>• Ask participants to mention the millet growing areas they know in Kenya</td>
<td></td>
</tr>
<tr>
<td>• Describe in details the suitable growing areas in Kenya</td>
<td></td>
</tr>
</tbody>
</table>
### Improved millet varieties (10 minutes)
- Ask participants to highlight and describe some of the millet varieties they know
- Present power point slides on various millet varieties. The slides should have the photos of each variety, the full description and its uses.

### Field Exercise (30 minutes)
*(Ensure there is an established plot with all the varieties).*
Visit the millet plot with the participants and assist them study and identify the various varieties

### Varietal selection (30 minutes)
**Varieties suited for the target counties (10 minutes)**
Present power point slides highlighting:
- The target counties and the suitable varieties The millet issues/constraints in each county
- The slides should contain characteristics and climate conditions of each target county such as hot dry low land, cold dry highlands, high potential, sub humid and humid

**Discussion (20 minutes)**
- After the presentations allow participants to raise any issues and discuss them

### Module review (20 minutes)
*(The facilitator should be able to lead the participants in reviewing the module)*
Summarize the main points of the training
Together with the participants review the main points about millets ecological requirements and areas of production
- What new things did you learn from this Module?
- What are some of the problems and issues that you have become more aware of ecological requirements, areas of production and improved varieties of millets?
- What other questions do you still have?

### Participants’ Handouts (References)
- KCEP Millet Extension Manual
- Millets brochures and leaflets
- Farmers’ handbook
MODULE 2: MILLETS CROP AGRONOMIC AND SOIL FERTILITY MANAGEMENT PRACTICES

2.1 Introduction to the module

This module is designed for training farmer facilitators who will in turn train farmers in soil fertility management and millets agronomic practices in the changing climate farming environment. Many farmers do not apply fertility on millet crop because they assume the crop does not require fertile soils. Likewise millets are given very low attention when it comes to land allocation, variety seed selection and other agronomic practices. This has led to continuous reduction of millet grain yield. There is therefore need to understand the good soil fertility practices and complementary production technologies that will enhance productivity of millet cultivation. This module will cover varietal selection (improved millet varieties), seed, site selection, land preparation, manures and chemical fertilizer application. It will also cover planting, intercropping, weeding, thinning and rogueing technologies.

2.2 Module learning outcomes

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

- Soil fertility and nutrient requirements in millets identified
- Types, rates, time and methods of manure and fertilizer application necessary for millets described and identified
- The appropriate millet agronomic practices appreciated and described

2.3 Module target group

This module targets agricultural extension service providers based in KCEP - CRAL project target counties.

2.4 Module duration

The module is estimated to take a minimum of 2 hours 30 minutes
### 2.5 Module summary

#### Module 2: Millets crop agronomic and soil fertility management practices

<table>
<thead>
<tr>
<th>Sessions</th>
<th>Training methods</th>
<th>Training materials</th>
<th>Time</th>
</tr>
</thead>
</table>
| 1. Introduction Objectives Expectations | • Personal introduction  
• Presentation  
• Plenary discussion | • Flip charts  
• PowerPoint presentations  
• Participants’ handouts | 30 minutes |
| 2. Pre-field operations: Varietal selection- Improved millets varieties, seed selection, treatment & germination test. | • Presentation  
• Field demonstration on millet varieties and seed selection | • PowerPoint presentations  
• Demonstration plot | 40 minutes |
| 3. Pre planting operations:  
- Site selection and land preparation  
- Soil fertility: manures and chemical fertilizer application | • Presentation  
• Discussion | • PowerPoint presentations  
• Flip Chart | 30 minutes |
| 4. Planting and crop management: planting, intercropping, weeding, thinning and rogueing | • Presentation  
• Discussion | • PowerPoint presentations  
• Photos  
• Illustrations  
• Flip Chart | 30 minutes |
| 5. Module review | • Questions and comments  
• Facilitator’s summary | • Flip Chart  
• Participants’ handouts | 20 minutes |

**Total** 2 hours 30 minutes
## 2.6 Facilitators’ guidelines

### Millets crop agronomic and soil fertility management practices

#### 2.6.1 Introduction and levelling of expectations and objectives (30 minutes)

**Introduction (10 minutes)**
*(The facilitator presents module objectives)*

**Module Objectives**

By the end of the module training the participants should be able to:

- Identify soil fertility and nutrient requirements in millets
- Describe and identify types, rates, time and methods of manure and fertilizers necessary for millets
- Appreciate and describe millet agronomic management practices
- Appreciate and describe millet agronomic management practices

#### 1.2 Participants’ expectations (10 minutes)

- The facilitator invites the participants to state their expectations

### 2.6.2 Pre field operations (40 minutes)

**Power point presentation on**

- Improved millets varieties, seed selection, treatment & germination test. (10 minutes)

**Field activity (30 minutes)**

- Identification of pearl, finger and other millets varieties respectively
- Seed selection methods

### 2.6.3 Pre planting operations (30 minutes)

**Presentation on**

- Site selection, land preparation and soil fertility: manures and chemical fertilizer application time and rates per millet type (10 minutes)

**Discussion (20 minutes)**

- After the presentations allow participants to raise any issues and discuss them.
2.6.4  Planting and crop management planting, intercropping, weeding, thinning and rogueing (30 minutes)  

**Session Guide**

**Presentation on**
- Planting, spacing, seed rates, intercropping, rotation, weeding, thinning, rogueing (10 minutes)

**Discussion (20 minutes)**
- After the presentations allow participants to raise any issues and discuss them.

**2.6.5  Module review (20 minutes)**  

*(The facilitator should be able to lead the participants in reviewing the module)*

**Session Guide**

Summarize the main points of the training
Together with the participants review the main points about millets soil fertility and crop management.
- What new things did you learn from this Module?
- What are some of the problems and issues that you have become more aware of?
- What questions do you still have?

**2.7  Participants’ Handouts (References)**

- KCEP Millet Extension Manual
- Millets brochures and leaflets
- Farmer’s handbook
MODULE 3: IDENTIFICATION AND MANAGEMENT OF PEST, DISEASES AND WEEDS IN MILLET PRODUCTION

3.1 Introduction to the module

This module is designed for equipping farmer facilitators who will in turn train farmers in millets pests, diseases and weeds and their management. Pests and diseases in millets are a major problem and lead to heavy yield loss. Most farmers have limited knowledge on how to identify and manage pests, diseases and weeds in millet or do not put any efforts to control millets pests and diseases because of the misconception that they are resilient to pest and diseases. There is also shortage of trained personnel who can correctly create awareness on the importance of millet pests and diseases. There is need to empower farmers on integrated pest management (IPM) and weed management. IPM integrates multiple methods to manage pests, diseases and weeds, using the combination of practices that is most effective for solving the specific issue at hand. This includes cultural, mechanical, biological, chemical practices and technologies.

3.2 Module learning outcomes

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

- Common insect pests, diseases and weeds in millets through scouting methods identified and described
- Management of pests, diseases and weeds using various methods including integrated Pest Management (IPM) enhanced
- Millet storage fungal diseases and their management identified and described

3.3 Module target group

This module targets agricultural extension service providers based at KCEP - CRAL project target counties.

3.4 Module duration

The module is estimated to take a minimum of 2 hours.
### Module summary

#### Module 3: Pests and Diseases management in millets, Weed management in millets

<table>
<thead>
<tr>
<th>Sessions</th>
<th>Training methods</th>
<th>Training materials</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Introduction</td>
<td>• Personal introduction</td>
<td>• Flip charts</td>
<td>30 minutes</td>
</tr>
<tr>
<td>Objectives</td>
<td>• Presentation</td>
<td>• PowerPoint presentation</td>
<td></td>
</tr>
<tr>
<td>Expectations</td>
<td>• Plenary discussion</td>
<td>• Participants’ handouts</td>
<td></td>
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<td></td>
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<tr>
<td>2. Identification:</td>
<td>• Presentation</td>
<td>• Power Point presentations</td>
<td>40 minutes</td>
</tr>
<tr>
<td>• Scouting for insects pests,</td>
<td>• Practical exercise</td>
<td>• Affected/infected millet plant material</td>
<td></td>
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<tr>
<td>weeds and diseases in</td>
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<tr>
<td>millets</td>
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<tr>
<td>• Major millets diseases and</td>
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<tr>
<td>pests and their control</td>
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<td></td>
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<tr>
<td>• Storage diseases and control</td>
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<tr>
<td>3. Integrated Pest Management</td>
<td>• Presentation</td>
<td>• PowerPoint presentations</td>
<td>30 minutes</td>
</tr>
<tr>
<td>(IPM)</td>
<td>• Discussion</td>
<td>• Weed Photos</td>
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<tr>
<td>• Major millets weeds and</td>
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<tr>
<td>management methods</td>
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<tr>
<td>4. Module review</td>
<td>• Questions and comments</td>
<td>• Participants’ handouts</td>
<td>20 minutes</td>
</tr>
<tr>
<td></td>
<td>• Facilitator’s summary</td>
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<tr>
<td><strong>Total</strong></td>
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<td><strong>2 hours</strong></td>
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</tbody>
</table>
### 3.6 Facilitators’ guidelines

#### 3.6.1 Introduction and levelling of expectations and objectives (30 minutes)

The facilitator welcomes participants to the module on and introduces him/herself by stating his/her profile and experience. The facilitator invites the participants to introduce themselves stating their role in the agricultural sector.

**Introduction (10 minutes)**
- The facilitator introduces the module objectives.

**Module Objectives (5 minutes)**
(The facilitator presents modules objectives)
- To identify millet diseases, pests and weeds and their importance
- To be able to control and manage millet diseases, pests and weeds

**Participants’ expectations (10 minutes)**
The facilitator invites the participants to state their expectations at the end of the module.

#### 3.6.2 Overview of maize pest, diseases and weeds (40 minutes)

(The facilitator presents the importance of pest and disease management and key principles of IPDM and scouting procedures in maize crop health management)

**Overview of maize pests, diseases and weeds (Guideline to scouting methods)**
- Common pests and diseases and control (Presentation with photos)

**Scouting for pest diseases and weeds post-harvesting management pest and diseases**
- Purpose of scouting
- Scouting procedures
- Scouting in an effective IPM programme

**Demonstration for Scouting**
- Demonstrate how to do scouting using Z, V, W or zigzag pattern through the field

**Plenary Discussion**
- The facilitator introduces the participants to:
- Key descriptive features for major pests
- Precise, accurate and timely intervention for management of pest
- Physical identification on the infected millets plant materials

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<table>
<thead>
<tr>
<th>Pests and Diseases management in millets, Weed management in millets</th>
<th>Session guide</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>3.6.1 Introduction and levelling of expectations and objectives (30 minutes)</strong></td>
<td>• Participants’ handouts • Programme • Presentation: Module objectives • Participants’ expectations summary</td>
</tr>
<tr>
<td><strong>Introduction (10 minutes)</strong></td>
<td></td>
</tr>
<tr>
<td>• The facilitator introduces the module objectives</td>
<td></td>
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<tr>
<td><strong>Module Objectives (5 minutes)</strong></td>
<td></td>
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<tr>
<td>(The facilitator presents modules objectives)</td>
<td></td>
</tr>
<tr>
<td>• To identify millet diseases, pests and weeds and their importance</td>
<td></td>
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<tr>
<td>• To be able to control and manage millet diseases, pests and weeds</td>
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<tr>
<td><strong>Participants’ expectations (10 minutes)</strong></td>
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</tr>
<tr>
<td>The facilitator invites the participants to state their expectations at the end of the module</td>
<td></td>
</tr>
<tr>
<td><strong>3.6.2 Overview of maize pest, diseases and weeds (40 minutes)</strong></td>
<td>• PowerPoint presentation • Participants’ handouts • Disease and pest infested millet plants</td>
</tr>
<tr>
<td>(The facilitator presents the importance of pest and disease management and key principles of IPDM and scouting procedures in maize crop health management)</td>
<td></td>
</tr>
<tr>
<td><strong>Overview of maize pests, diseases and weeds (Guideline to scouting methods)</strong></td>
<td></td>
</tr>
<tr>
<td>• Common pests and diseases and control (Presentation with photos)</td>
<td></td>
</tr>
<tr>
<td><strong>Scouting for pest diseases and weeds post-harvesting management pest and diseases</strong></td>
<td></td>
</tr>
<tr>
<td>• Purpose of scouting</td>
<td></td>
</tr>
<tr>
<td>• Scouting procedures</td>
<td></td>
</tr>
<tr>
<td>• Scouting in an effective IPM programme</td>
<td></td>
</tr>
<tr>
<td><strong>Demonstration for Scouting</strong></td>
<td></td>
</tr>
<tr>
<td>• Demonstrate how to do scouting using Z, V, W or zigzag pattern through the field</td>
<td></td>
</tr>
<tr>
<td><strong>Plenary Discussion</strong></td>
<td></td>
</tr>
<tr>
<td>• The facilitator introduces the participants to:</td>
<td></td>
</tr>
<tr>
<td>• Key descriptive features for major pests</td>
<td></td>
</tr>
<tr>
<td>• Precise, accurate and timely intervention for management of pest</td>
<td></td>
</tr>
<tr>
<td>• Physical identification on the infected millets plant materials</td>
<td></td>
</tr>
</tbody>
</table>
### 3.6.3 Millet field diseases and their management (20 minutes)

**Session guide**
- Participants’ handouts
- PowerPoint presentations

**The facilitator presents on major millet diseases and identification, symptoms and management of the diseases symptoms**

- Integrated disease management and safe use of crop protection products
- Plenary Discussion
- Feedback of common disease and management for millet
- Participants

### 3.6.4 Identification and management of major millet pests (Arthropods) (25 minutes)

**Session guide**
- PowerPoint presentations
- Participants’ handouts

**The facilitator leads participants in discussing and guiding trainees on the key symptoms/diagnostic features for use in the identification of pests. The facilitator must also give several IPDM options for the management of each pest discussed and highlight the importance of safe use of pesticides in the management of pests.**

**Major pests of millet, their identifications, symptoms and management**

- Integrated pest management and safe use of crop protection products

**Group exercises**

- Infested plant samples will be used as visual specimens and trainees will be required to identify these pests in millet
- Plenary Discussion
- Feedback of common pests and management for millet.
- Summarize the exercise and give recommendations.

### 3.6.5 Identification and management of major weeds affection millet (1 hour)

**Session guide**
- PowerPoint presentations
- Participants’ handouts

**The facilitator presents the key diagnostic features for use in the identification of weeds and leads in discussing and guiding the participants. The facilitator must also give several IPDM options for the management of each weed discussed and highlight the importance of safe use of pesticides in the management of weeds.**

**Major weeds of millet, their identifications, symptoms and management**

- Integrated pest management and safe use of crop protection products

**Plenary Discussion**

- Feedback of common pests and management for millet
### Field visit (Demonstration Site)
- The facilitator will lead the learners to demonstration plot for diseases, pests and weeds collection
- Participants collect infected or infested parts of plants
- The learners are grouped into groups of five for pest, disease and weed identification.
- The learners are required to propose probable control measures for the identified pest, disease and weed.
- Suggest available control methods.
- The facilitator should then lead the participants to brainstorm and select the IPDM components they would adopt for the farms.

### 3.6.6 Postharvest losses and management in millet production (20 minutes)

*The facilitator presents on postharvest losses and management in millet production and leads in discussing and guiding the participants on the options available for stemming the losses. The facilitator must also give several IPDM options for the management of each pest*
- Drying and packaging
- Storage pests and their management
- Non Chemical control of storage pests

### 3.6.7 Module review (20 minutes)

Together with the participants review the summary of the main points about millet diseases, pests and weed management
- What new things did you learn from this Module?
- What are some of the problems and issues that you have become more aware of?
- What questions do you still have?

### 3.7 Participants’ Handouts (References)
- KCEP Millet Extension Manual
- Millet brochures and leaflets
- Farmers’ handbook
MODULE 4: PUSH-PULL TECHNOLOGY IN MANAGEMENT OF STEM BORBERS, STRIGA AND FALL ARMYWORM IN CEREALS PRODUCTION

4.1 Introduction

This module is about the Push-Pull Technology (PPT) strategy for controlling agricultural pests by using repellant “push” plants and trap “pull” plants. Cereal crops like maize, sorghum and millet are often infested by stem borers and recently by fall armyworm (FAW). Grasses planted around the perimeter of the cereal crop attract and trap the stem borers or FAW pest, whereas leguminous plants like Desmodium, Clitoria, Dolichos planted between the rows of the cereal crop repel the pest and control the parasitic Striga plant. The target audience includes extension officers and lead farmers of comparative education level, as master trainers to other cereal producers for increased surplus for higher farm incomes and better livelihood.

4.2 Module learning outcomes

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

- Practices that are important in PPT strategy identified
- The right time for establishing companion crops identified
- The right configuration in the cropping layout and format sizes for each cereal crop identified

4.3 Module target group

The target group is extension officers at county level, as well as young and old farmer entrepreneurs selecting sorghum, maize or millets as crop enterprise in any of regions where the target crop has potential and comparative advantage towards improved livelihood of farmers.

4.4 Module duration

The period for taking the master trainers through the module is about one hour. If the question and answer sessions from the trainees is included it will take 2 hours and 45 minutes.
### 4.5 Module summary

**Push-pull technology in cereals production**

<table>
<thead>
<tr>
<th>Sessions</th>
<th>Training methods</th>
<th>Training materials</th>
<th>Time</th>
</tr>
</thead>
</table>
| 1. Introduction to the module, leveling expectations | • Discussion  
• Presentation | • Flip charts, felt pens | 10 minutes |
| 2. Overview of Push-Push Technology (PPT) | • Presentations  
• Brainstorming | • Flip charts, felt pens  
• PowerPoint images of pests and diseases | 20 minutes |
| 3. PPT in millet | • Presentation  
• Discussion | • Flip charts, felt pens  
• Companion crops  
• Fertilizers, manure | 35 minutes |
| 4. Module review | • Overall review on the required knowledge to implement PPT | • Flip charts | 25 minutes |

**Total** | **2hrs 45mins**
### 4.6 Facilitators’ guidelines

<table>
<thead>
<tr>
<th>4.6.1 Welcoming, introductions, leveling expectations (10 minutes)</th>
<th>Session Guide</th>
</tr>
</thead>
</table>
| *(The facilitator welcomes participants to the module of PPT and companion crops in field establishment and management, and introduce him/her by stating his/her profile and experience of working with farmers)* | • Participants’ handouts  
• Participants’ expectations summary  
• PowerPoint presentation |

The facilitator invites the participants to introduce and state their expectation for the training module and set out the ground rules.

**Module Objectives**
The facilitator introduces the module objectives

**Module Objectives**
By the end of the module training participants should be able to:
1. Identify field practices that are important in PPT strategy
2. Map the right time for companion crops establishment
3. Identify the ideal configuration in the cropping layout, format sizes for each cereal crop

<table>
<thead>
<tr>
<th>4.6.2 Overview of Push-Push Technology (PPT) (20 minutes)</th>
<th>Session Guide</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>(The facilitator leads the participants in discussing PPT concept. He/she reminds them of the benefit and challenges of PPT in cereal production systems)</em></td>
<td>• Plenary discussion</td>
</tr>
</tbody>
</table>

Plenary Discussion
Refer the participants/trainees to the challenges in stem borer, Striga and FAW control, by use of chemicals and non target biological agents.

<table>
<thead>
<tr>
<th>4.6.3 PPT in millet for control of stem borer, Striga and FAW (35 minutes)</th>
<th>Session Guide</th>
</tr>
</thead>
</table>
| *(The facilitator should be able to help the participants to understand necessary information required as well as the factors to consider when planning for PPT format/configuration in millet agro ecosystem)*.  
• Companion crops establishment, fertiliser use, weeding procedure  
• Management of cereal enterprise, repellent (push) and attractant (pull) plants in the agro ecosystems  
• Monitoring tools for the pest on millet crop | • PowerPoint presentation  
• Plenary discussion |

<table>
<thead>
<tr>
<th>4.6.4 Module review</th>
<th>Session Guide</th>
</tr>
</thead>
</table>
| General discussion guided by the master trainer, a recap of the training, and inviting all to say what has been learnt by the various participants. Take survey on what has been learnt in the exercise of training, pointing out which areas need more information. | • Participants’ handouts  
• Summary of the main points from the module |

### 4.7 Participants Handouts
- KCEP Millet Extension Manual
- Farmers’ handbook
- Millet brochures and leaflets
MODULE 5: PEARL MILLET HARVESTING, POST-HARVEST MANAGEMENT, VALUE ADDITION AND PRODUCTION GROSS MARGINS

5.1 Introduction to the module

This module is designed for training farmer facilitators in skills for millets harvesting and post-harvest handling to reduce the yield losses that are associated with these two activities. Low grain quality and high food losses are attributed to improper handling during harvesting and storage that leads to increase in moisture levels, biological spoilage, and insect, bird and rodent damage. Farmer facilitators should be equipped with management strategies for harvesting and postharvest losses, to enable them support farmers with information in securing high returns from investments, through adoption of improved on-farm and grain storage handling practices. This module will also update farmer facilitators with millet value addition skills and recipes for various sorghum products. Millets have very high nutritive value compared to other cereal grains. However, these are not realized due to low knowledge of various recipes of value added products for home consumption and small scale businesses. Most millet farmers do not consider cultivation of millets for commercial purposes yet they are the most priced grains. There is need to sensitize farmers on the gross margins of the millets production to enable them to understand the commercial value.

5.2 Module learning outcomes

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

- Appropriate harvesting and post-harvest storage techniques for quality grain identified
- Processing and utilization techniques described and identified
- Millets gross margins explained and discussed

5.3 Module target group

This module targets agricultural extension service providers based at KCEP - CRAL project target counties.

5.4 Module duration

The Module is estimated to take a minimum of 2 hours.
### 5.5 Module summary

<table>
<thead>
<tr>
<th>Sessions</th>
<th>Training methods</th>
<th>Training materials</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Introduction Objectives Expectations</td>
<td>• Personal introduction, Presentation and discussion</td>
<td>• Flip charts • PowerPoint • Participants’ handouts</td>
<td>30 minutes</td>
</tr>
<tr>
<td>2. Harvesting, drying and packaging techniques</td>
<td>• Presentation • Discussion</td>
<td>• PowerPoint presentation • Diagrams • Flip Chart • Participants’ Handouts</td>
<td>35 minutes</td>
</tr>
<tr>
<td>3. Post-harvest storage technologies</td>
<td>• Presentation • Discussion</td>
<td>• PowerPoint presentation • Diagrams/photos • Millet manual and recipes</td>
<td>35 minutes</td>
</tr>
<tr>
<td>4. Processing and utilization Nutritional value and value addition products • Marketing</td>
<td>• Presentation • Discussion</td>
<td>• PowerPoint presentation • Diagrams/photos • Millet manual and recipes</td>
<td>35 minutes</td>
</tr>
<tr>
<td>5. Module review</td>
<td>• Questions and comments • Facilitator’s summary</td>
<td>• Participants’ handouts</td>
<td>20 minutes</td>
</tr>
</tbody>
</table>

**Total** 2 hours
### 5.6 Facilitators’ guidelines

<table>
<thead>
<tr>
<th>Pearl millet harvesting, post-harvest management and value addition</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>5.6.7 Introduction and levelling of expectations and objectives (30 minutes)</strong></td>
<td>Session guide</td>
</tr>
<tr>
<td><strong>Introduction (10 minutes)</strong></td>
<td></td>
</tr>
<tr>
<td>The facilitator welcomes participants to the module on and introduces him/herself by stating his/her profile and experience. The facilitator invites the participants to introduce themselves stating their role in the agricultural sector</td>
<td></td>
</tr>
<tr>
<td><strong>Participants expectations (10 minutes)</strong></td>
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</tr>
<tr>
<td>The facilitator invites the participants to state their expectations of the training module</td>
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<tr>
<td><strong>Module Objectives (10 minutes)</strong></td>
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<tr>
<td><em>(The facilitator presents modules objectives)</em></td>
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<tr>
<td>By the end of the module training, the participants should be able to:</td>
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<tr>
<td>• Identify appropriate millet harvesting and post harvesting skills for reduced losses</td>
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<tr>
<td>• Describe and identify millet value addition skills and enlighten them on production costs to enhance consumption and commercialization of millets</td>
<td></td>
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<tr>
<td>• Describe and explain millets gross margins</td>
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<table>
<thead>
<tr>
<th><strong>5.6.2 Millet harvesting, drying and packaging techniques. Post-harvest storage technologies (35 minutes)</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Guidelines on harvesting to packaging (10 minutes)</strong></td>
<td>Session guide</td>
</tr>
<tr>
<td>Guide lines on cutting, drying, threshing, winnowing, testing for moisture content and packaging</td>
<td></td>
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<tr>
<td><strong>Discussion (20 minutes)</strong></td>
<td></td>
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<tr>
<td>Let the participants recall what they learned and discuss on any issue that may arise.</td>
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</tbody>
</table>

- Participant handouts
- Programme
- Presentation: Module objectives
- Participants’ expectations summary
- PowerPoint presentation
- Participants’ handouts
### 5.6.3 Post-harvest storage technologies (25 minutes) - Gross margins of millet production (25 minutes)

**Guidelines on post harvesting storage (5 minutes)**

Presentation with photos or diagrams on storage structures, storage methods, storage pests and diseases (10 minutes)

Discussion (20 minutes)

Let the participants recall what they learned and discuss on any issue that may arise.

**Session guide**

- Participants’ handouts
- Recipe and cookbooks
- PowerPoint presentation

### 5.6.4 Value addition, processing and utilization (60 minutes)

**Value addition (15 minutes)**

- Present power point slides highlighting the different millet recipes and products
- Present the millet collective production and marketing methods for small scale farmers
- Present millets gross margins

**Plenary**

Divide participants into groups and let them come up with value addition and marketing models and identify opportunities for millet commercialization and present their findings.

**Discussion (20 minutes)**

After the presentations discuss and have a way forward to wrap up the session.

**Session guide**

- Participants’ handouts
- PowerPoint presentation
- Group work and presentations

### 5.6.3 Module review (20 minutes)

Together with the participants review the summary of the main points about harvesting, post-harvest and value addition. What new things did you learn from this Module?

- What are some of the problems and issues that you have become more aware of?
- What questions do you still have?

**Session guide**

- The last participants’ handouts
- Summary of the main points from the Module

### 5.7 Participants’ Handouts (References)

- KCEP Millet Extension Manual
- Millet brochures and leaflets
- Farmers’ handbook
KCEP-CRAL Extension Manuals are well-written and up-to-date publications with basic information that Extension Officers and service providers need in each value chain. The comprehensive manuals cover all areas of the value chain.

Available extension manuals cover basic cereals (maize, millet and sorghum), pulses (beans, cow peas, pigeon peas and green grams), soil Climate Smart Agriculture and Farming as a Business as listed:

1. Common Dry Bean Trainer of Trainer’s Manual
2. Cow Pea Trainer of Trainer’s Manual
4. Pigeon Pea Trainer of Trainer’s Manual
5. Maize Trainer of Trainer’s Manual
7. Sorghum Trainer of Trainer’s Manual
8. Climate Smart Agriculture Trainer of Trainer’s Manual
10. Soil Fertility Trainer of Trainer’s Manual
11. Farm-Level Agricultural Resilience and Adaptation to Climate Change Trainer of Trainer’s Manual