

# Rural Based Small Scale Seed Production

# The Small Scale Seed Production Training Program



SADC/GTZ Small Scale Seed Project

## GTZ IN BRIEF

The Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH is an international cooperation enterprise for sustainable development with worldwide operations. It provides viable, forward-looking solutions for political, economic, ecological and social development in a globalised world.

GTZ promotes complex reforms and change processes, often working under difficult conditions. Its corporate objective is to improve people's living conditions on a sustainable basis.

The GTZ was founded in 1975 as an enterprise under private law. Its main client is the Federal Ministry for Economic Cooperation and Development (BMZ), but the company also operates on behalf of other German ministries, partner governments and international clients, such as the European Commission, the United Nations or the World Bank as well as on behalf of private enterprises. GTZ works on a public-benefit basis. Any surpluses generated are channelled back into its own international cooperation projects for sustainable development.

The GTZ maintains a presence in its partner countries through its international and local experts and management staff. With many years of experience in developing solutions customised for partner countries' problems, the GTZ develops concepts and implements measures in cooperation with its partners which are tailored to the prevailing conditions. In this, it relies on a combination of sectoral, regional and management skills, alongside with specialised know-how, international management experience and intercultural competence. International cooperation for sustainable development needs new alliances. The GTZ seeks new partnerships in social, economic and cultural areas. It has always cooperated closely with other national and international organisations in development cooperation. In addition – where technically and financially expedient – the GTZ draws on the knowledge of the private consulting sector, independent experts and specialist public institutions in both the Federal Republic of Germany and other countries.

In more than 130 countries of Africa, Asia, Latin America, the Eastern European transition countries and the Newly Independent States (NIS), GTZ has over 10,000 staff. Around 8,500 of these are national personnel. GTZ maintains its own offices in 65 countries. Some 1,000 people are employed at GTZ Head Office in Eschborn near Frankfurt am Main.

# Rural Based Small Scale Seed Production

# The Small Scale Seed Production Training Program

Editor

**O. Neuendorf**

HARARE 2004



SADC/GTZ Small Scale Seed Project

Published by: Project Small Scale Seed Production by Self Help Groups

Printed: Zimbabwe, Harare 2004

Citation: Neuendorf, O. (ed) 2004. Curriculum on Rural Based Small Scale Seed Production. A comprehensive approach to improve quality seed availability for small scale farmers.

Special acknowledgement: Invaluable work was done by Messr. D. Collenberg, Dr. D.M. Lungu and Dr. T.M. Musa to compile the information, advise on the structure of the publication and to write and rewrite some chapters of the publication

Artwork by: Clever Tsingano, Graphic Artist

Design, Layout and Typesetting: Radovan Korda

Cover design: Radovan Korda

ISBN: 0-7974-2959-X

# Contents

Foreword .....	F - 1 – F-	8
Module 1 .....	1 - 1 – 1-	40
Module 2 .....	2 - 1 – 2-	82
Module 3 .....	3 - 1 – 3-	58
Module 4 .....	4 - 1 – 4-	102
Module 5 .....	5 - 1 – 5-	52
Module 6 .....	6 - 1 – 6-	36
Module 7 .....	7 - 1 – 7-	50
Module 8 .....	8 - 1 – 8-	74
Glossary .....	G- 1 – G-	10
Bibliography .....	B - 1 – B-	2

Contents

The Small-Scale Seed Production Training Programme

**Intentionally left blank**

# Foreword

Local seed supply systems are the principal source of seed of the majority of crop seeds in developing countries. In most cases, more than 90 % of seed used by farmers are supplied by the informal sector where farmer saved seed is handed down from mother to daughter. The situation is further characterised by unreliable access to improved varieties and quality seed thereof.

Compared to the formal seed sector where the seed industry produces high yielding hybrids and other high input demanding varieties with a view that no field is to lay fallow due to quality seed shortage.

The SADC/GTZ Project “Promotion of Small Scale Seed Production by Self Help Groups” under the umbrella of SADC Directorate Food, Agriculture and Natural Resources Development (FANR) based in Harare was tasked to develop a strategy on how to overcome seed insecurity in the less commercialised small-scale agriculture sector.

It supported a range of initiatives in the informal seed sector, such as training courses, field days and seed fairs, the collection of baseline information, and studies on aspects of the local seed system and finally the establishment of the SADC Seed Security Network (SSSN)

Initially the project focused on activities in Zimbabwe which later were extended to other SADC countries, such as South Africa, Zambia and Mozambique. In close co-operation with local projects, individual farmers and farmers’ groups pilot seed grower schemes were set up in search for practical solutions to make seeds produced by farmers available according to the demand of the farming community. The objective being to develop and test on the ground with farmers and other stakeholders the viability of suitable methodologies on how to achieve household seed security and consequently leading to an improved food situation.

The wealth of information and experience we gathered during the projects life span compelled us to develop the Curricula for “Rural Based Seed Production”. This unique teaching and training tool when applied in its different forms will hopefully contribute to improve the seed situation in the informal seed sector.

Ortwin Neuendorf  
Project Manager  
Small Scale Seed Project

## Foreword

### The Small-Scale Seed Production Training Programme

#### **Curriculum Development Working Group (CDWG)**

- ❖ Lewis Durango  
Facilitation and Moderation
- ❖ Christopher Nyakanda  
Senior Lecturer Agronomy, Crop Science Department University of Zimbabwe.
- ❖ B.T. Hanyani-Mlambo  
Lecturer, Department of Agricultural Economics and Extension, University of Zimbabwe.

#### **Curriculum Resource Persons**

- ❖ Patience N. Nyakanda (Mrs)  
Principal Research Officer (Crop Breeding), Department of Agricultural Research and Extension, Zimbabwe
- ❖ Takella Shoko (Mrs)  
Principal Agricultural Extension Specialist (Research, Monitoring and Evaluation), Department of Agricultural Research and Extension, Zimbabwe.
- ❖ Patricia Tembani (Mrs)  
Senior Lecturer and Head of Crop Production, Chibero College of Agriculture, Zimbabwe
- ❖ E.D. Zulu (Mr)  
Co-ordinator SADC Regional Seed Security Network
- ❖ T.M. Musa (PhD)  
Principal Consultant Seed Issues
- ❖ D.M. Lungu (Dr.)  
Senior Lecturer Crop Sciences, University of Zambia



## The Small-Scale Seed Production Training Programme

### Introduction

#### 1. General

This introduction has been designed to:

- ❖ Introduce all key stakeholders/clients, trainees, trainers, facilitators and all other interested parties to:
  - ◆ the background and context of this training programme;
  - ◆ the underlying concepts and procedures used to develop the instructional materials;
  - ◆ and other organizational and technical aspects of the training programme.
- ❖ Act as a guide to both trainers/facilitators and trainees on the effective and efficient use of the instructional materials in the creation and implementation of a competency or outcomes-based flexible learner-centred learning environment.
- ❖ Define the meanings assigned to different competency based education and training terminologies used in the design and development of the instructional materials.

Anyone who would like to use these instructional materials should first read and understand all the contents of this chapter.

#### 2. Flexible “Tool Box” Concept

**The Curriculum is designed to:**

1. be used at colleges and universities to increase students competency on how to improve the seed situation in the less commercialised rural agricultural environment;
2. be easily adapted to a field oriented form to train extension staff and farmers in seasonal and in a three years Seed Production Program;
3. be used in calamity situations for ad hoc seed production activities with a view to strengthen farmer saved seed mechanisms in future.

**Tools available to teach and train are:**

- ◆ Curriculum “Rural based small scale seed production”
- ◆ Manual on “Rural based small scale seed production”
- ◆ Model illustrating how to organise a four day Seed Program Workshop
- ◆ Cost calculation spreadsheet (Excel) for a Seed Program

# The Small-Scale Seed Production Training Programme

### Who is the Program for:

The program is offering a strategic and coherent approach on how to improve seed security at household level and beyond for:

- ♦ institutions of higher learning, i.e. agriculture colleges and universities offering a course in Rural Based Seed Production
- ♦ projects in the widest sense supporting seed security programs to improve food availability
- ♦ agricultural extension services
- ♦ seed companies developing small scale out-grower seed schemes
- ♦ consultants proffering their service to prospective customers to run the seed program

### 3. The Curriculum

The design and development of the training programme and all instructional materials is competency – or outcomes-based education and training concepts and procedures which are being developed and piloted through German Agency for Technical Co-operation (GTZ) projects in the world. The major technical reference is the concepts and procedures being developed in GTZ projects Sub-Saharan Africa (Zimbabwe, South Africa, Namibia, Swaziland, Uganda etc.) with which the facilitator and moderator of the curriculum development process is familiar.

These competency – or outcomes based concepts are generally based on the following instructional development and implementation phases which attempt to link training to employment. Occupational/job profiling using DACUM and other methodologies in order to define the skills requirements of an occupation/job in the real world of work.



Using the occupation/job profiles to derive the competences/outcomes (skills, knowledge and attitudes) required by a worker to perform the job.



Basing the development, implementation and evaluation of curricula, training programmes and test instruments.

## The Small-Scale Seed Production Training Programme

The competency-based modular approach used provides flexibility and the use of the instructional materials for different target groups (public, private and NGO extension workers; college and university students etc.)

### 4. Terminology

The following definitions explain the meanings the designers and developers of the training programme attached to the different terminology used in the instructional materials.

#### Module

A module is a stand-alone unit of instruction and learning. In this training programme, each module has a module title which is expressed as an outcome or output terms i.e. it defines in general terms what the trainee will be able to do after completing the module.

The modules are broken down into sub-modules.

#### Purpose

At the beginning of each module there is a purpose statement. The purpose statement is a short paragraph which explains the importance and rationale for the trainees to acquire the competences (skills, knowledge and attitudes) outlined in the module.

The purpose statement outlines the goals and expected impact of taking a target group of trainees through the learning activities and experiences defined in the module.

#### Elements/Outcome

The elements or outcomes outlined in the module refer to the outcomes/results of instruction rather than the process of instruction. The outcomes precisely describe what a trainee should be able to do after going through the learning activities and experiences outlined in the module.

Outcomes are expressed in output and performance terms i.e. starting with an action verb followed by an object which sometimes has a qualifier.

e.g.	Write a	financial	report
	↓	↓	↓
	action verb	qualifier	object
	1 <sup>st</sup> person		
	singular.		

## Foreword

### The Small-Scale Seed Production Training Programme

Outcomes express the competences (skills, knowledge and attitudes) which trainees should be able to demonstrate at the end training.

A sub-module comprises two or more related outcomes.

All further curriculum development work; the development and implementation of the actual instruction; monitoring and evaluation; the assessment and certification of competence are based on the achievement of the pre-determined outcomes.

#### Handouts and transparencies

Handouts and transparencies are learning materials. Learning materials (including handouts and transparencies) are the resources that teachers/instructors and learners use in on and off the job training. They provide detailed information on the content outlined in the curriculum modules.

The handouts and transparencies developed for this training programme are only the basic learning materials required. In competency based education and training there is an on-going opportunity for the development of more and new innovative audio-visual learning materials including interactive computer based training.

In competency based training, learning materials are often designed to promote self paced or self directed learning. Learning materials provide trainees with a structured learning path that they may undertake at their own pace. This creates the opportunity for different trainees to undertake different training or to proceed at different rates in the same learning environment. This has a significant impact on the role of the teacher/instructor – making the teacher/instructor a facilitator rather than a deliverer of learning. It also has the potential to create more trainee centred learning environments and help teachers/instructors make more efficient use of training equipment and facilities.

#### Performance Criteria

For each element/outcomes performance criteria are defined. The performance criteria specify the minimum level of performance required to satisfy an assessor that the trainee has acquired the required competences (skills, knowledge and attitudes). Performance criteria specify the evidence of competent performance. They define “how well” the trainee should demonstrate acquisition of the required psychomotor (skills), cognitive (knowledge) and behavioural (attitudes) competences.

## The Small-Scale Seed Production Training Programme

### Assessment Instruments and Procedures

Assessment instruments are the assessment/test tools used to assess the performance of trainee against the pre-set standards as specified in the elements/outcomes and performance criteria.

Assessment instruments are made up of test items (questions), which a trainee must correctly respond to to demonstrate competence. In this training programme, different assessment instruments are used (objective tests, role plays etc). For cognitive competences (knowledge, theory) objective tests are recommended. Objective tests include multiple choice and matching tests which have high validity i.e. they measure exactly what they are supposed to measure and not anything else.

### Instructor's Manual

The instructor's manual outlines the activities to be performed by the instructor/trainer, the learning materials, media and equipment used to perform each activity and the time taken to perform each activity.

The instructor's manual guides the instructor/trainer in the creation, implementation and evaluation of a conducive and innovative environment which provides trainees with trainee-centred and result-oriented learning experience.

### Trainee Manual

The trainee manual outlines the learning activities to be performed by a trainee, the learning materials, media and equipment used by the trainee to perform these activities, and the time taken to perform each activity.

# Foreword

## The Small-Scale Seed Production Training Programme

### 5. Module's Lay Out

<p><u>Module 1</u> Title, Purpose, Sub modules Sub module 1.1 Element/outcomes 1.1.1</p> <p><u>Instructors manual</u> Sub module 1.1 Elements/outcomes 1.1.1 Activities 1</p> <p><u>Trainee manual</u> Sub module 1.1 Elements/outcomes 1.1.1 Activities 1</p> <p><u>Handout/Notes</u> Element/outcome 1.1.1</p> <p><u>Transparencies</u> Element/outcomes 1.1.1</p> <p><u>Self assessment questions</u></p> <p><u>Answers to self assessment questions</u></p>	<p><u>Module 2</u> Title, Purpose, Sub modules Sub module 2.1 Element/outcomes 2.1.1</p> <p><u>Instructors manual</u> Sub module 2.1 Elements/outcomes 2.1.1 Activities 1</p> <p><u>Trainee manual</u> Sub module 1.1 Elements/outcomes 2.1.1 Activities 1</p> <p><u>Handout/Notes</u> Element/outcome 2.1.1</p> <p><u>Transparencies</u> Element/outcomes 2.1.1</p> <p><u>Self assessment questions</u></p> <p><u>Answers to self assessment questions</u></p>	<p>Continuous</p> <p>Module 3 to 8</p>
---	---	--

## Module 1 Explain seed security and its role in Food Security for Small-Scale Farming systems

Sub-Modules .....	1- 1
Sub-Module 1.1	
Discuss what constitutes seed .....	1- 2
Sub-Module 1.2	
Explain the role of seed in food security .....	1- 2
Sub-Module 1.3	
Analyze Farming System Enterprises and Components, With Particular Reference to Small-scale Farming.....	1- 3
Sub-Module 1.4	
Explain Seed Provision Systems as Function of Farming Systems. ....	1- 3
Sub-Module 1.5	
Assist Farmers in Implementing the Participatory Rapid Farmer Seed Demand Assessment .....	1- 4
Instructor’s Manual .....	1- 5
Sub-Module 1.1	
Discuss what constitutes seed (19 minutes) .....	1- 5
Sub Module 1.2	
Explain the Role of Seed in Food Security (13 minutes) .....	1-16
Sub Module 1.3	
Analyze Farming System Enterprises and Components with Particular Reference to Small-Scale Farming (17 minutes).....	1-17
Sub-Module 1.4	
Explain Seed Provision Systems as a Function of Farming Systems. (37 minutes) .....	1-18
Sub-Module 1.5	
Assist farmers in Implementing the Participatory Rapid Farmer Seed Demand Assessment (42 minutes).....	1-19
Trainee Manual .....	1-11
Sub-Module 1.1	
Discuss what constitutes seed (19 minutes) .....	1-11

## Contents - Module 1

### The Small-Scale Seed Production Training Programme

Sub-Module 1.2	
Explain the role of seed in food security (13 minutes) .....	1-12
Sub-Module 1.3	
Analyze Farming Systems Enterprises and Components, With Particular Reference to Small-scale Farming (17 minutes) .....	1-13
Sub-Module 1.4	
Explain Seed Provision Systems as a Function of Farming Systems (37 minutes) .....	1-14
Sub-Module 1.5	
Assist farmers in implementing the Participatory Rapid Farmer Seed Demand Assessment (42 minutes) .....	1-15
Notes -Handout on Seed security and its role in Food Security for small-scale farming systems .....	1-17
1.1.1 What is seed? .....	1-17
1.2 The role of seed in food security. ....	1-19
1.3 Farming systems enterprise with particular reference to small-scale farming .....	1-20
1.3.1 The basis of a farming systems classification .....	1-20
1.4.1 Seed provision systems in different farming systems. ....	1-22
1.4.2 Challenges to the informal seed provision systems .....	1-25
1.4.3 How can the informal seed provision system be improved? .....	1-26
1.5 Participatory Rapid Farmer Seed Demand Assessment. ...	1-27
Transparency .....	1-29
1.1.1a What is seed? .....	1-29
1.1.1b True seed types .....	1-30
1.1.2 Critical seed structures and their functions .....	1-31
1.2 Role of seed in food security .....	1-32
1.3 Farming system enterprises .....	1-33
1.4.1 Seed provision systems .....	1-34
1.4.2 Limitations of the informal system .....	1-36
1.4.3 How to improve the informal seed provision system .....	1-37
Self Assessment Test .....	1-39
Answer Key to Self Assessment Test .....	1-40



## EXPLAIN SEED SECURITY AND ITS ROLE IN FOOD SECURITY FOR SMALL-SCALE FARMING SYSTEMS

### Purpose

The main purpose of this module is to train extension agents from the public, private and non-governmental organizations working with farmers involved in community based seed production activities. It provides trainees with background technical and socio-economic information on small-scale seed production systems. Trainees should have the competences (skills, knowledge and attitudes) outlined in this module before embarking on any of the other seven (7) modules of the Small-Scale Seed Production Course. However, trainees can be exempted from this module if they provide evidence of possessing the indicated competences.

### Sub-Modules

- 1.1 Discuss what constitutes seed.
- 1.2 Explain the role of seed in food security.
- 1.3 Analyze farming system enterprises and components, with particular reference to small- scale farming.
- 1.4 Explain seed provision systems as a function of farming systems.
- 1.5 Assist farmers in implementing Participatory Rapid Farmer Seed Demand Assessment.

## Module 1

### The Small-Scale Seed Production Training Programme

#### Sub-Module 1.1

##### Discuss what constitutes seed

Element/Outcome	Performance Criteria	Assessment Instruments and Procedures
1.1.1. Define seed	<ul style="list-style-type: none"><li>➤ What constitutes a seed is described including the differences between a seed, grain and a vegetative propagation structure.</li></ul>	Plenary/Group discussion
1.1.2. Describe critical structures for different seed types	<ul style="list-style-type: none"><li>➤ The following parts: seed coat, embryo, seed store, hypocotyl and epicotyl described.</li><li>➤ The implications of the state of the above parts on seed viability explained.</li></ul>	Written completion test.

#### Sub-Module 1.2

##### Explain the role of seed in food security

Element/Outcome	Performance Criteria	Assessment Instruments and Procedures
1.2.1. Define food security	<ul style="list-style-type: none"><li>➤ The importance of food security in the small scale farming sector explained</li></ul>	Plenary/Group discussion
1.2.2. Explain seed security and its influence on food security.	<ul style="list-style-type: none"><li>➤ The description should include the need for the right seed type, at the right time, in adequate quantities and quality.</li><li>➤ The link between food security and availability of seed explained.</li></ul>	Plenary/Group discussion

## The Small-Scale Seed Production Training Programme

**Sub-Module 1.3****Analyze Farming System Enterprises and Components,  
With Particular Reference to Small-scale Farming.**

Element/Outcome	Performance Criteria	Assessment Instruments and Procedures
1.3.1. Describe different types of farming systems	➤ Different farming systems compared, highlighting enterprises and scales.	Group exercise

**Sub-Module 1.4****Explain Seed Provision Systems as Function of Farming Systems.**

Element/Outcome	Performance Criteria	Assessment Instruments and Procedures
1.4.1. Describe the seed provision systems in different farming systems	➤ The two main Seed Provision Systems (formal and informal) and players in each system identified	Group exercise
1.4.2. Outline the common constraints in Small-Scale Seed Provision Systems	➤ The existing problems and causes explained.	Plenary/Group discussion
1.4.3. Choose feasible improvements to existing seed provision systems in small-scale farming.	➤ Identification based on seed type and quantities required, existing seed provision systems, resource endowment of farmers' and feasibility of alternative methods.	Group Report

## Module 1

### The Small-Scale Seed Production Training Programme

#### Sub-Module 1.5

#### Assist Farmers in Implementing the Participatory Rapid Farmer Seed Demand Assessment

Element/Outcome	Performance Criteria	Assessment Instruments and Procedures
1.5.1. Explain Rapid Farmer Seed Demand Assessment.	➤ Rapid Farmer Seed Demand Assessment defined.	Plenary/Group discussion.
1.5.2. Demonstrate an appropriate example of Rapid Farmer Seed Demand Assessment.	➤ A relevant real life example illustrated from handout 1.5	Plenary/Group discussion.
1.5.3. Facilitate farmers to implement Rapid Farmer Seed Demand Assessment.	➤ Participatory Rapid Farmer Seed Demand Assessment procedure demonstrated.	Individual Exercises.

# Module 1

## Instructor's Manual

### Sub-Module 1.1.

#### Discuss what constitutes seed (19 minutes)

##### Elements/Outcomes

1.1.1. Define seed

1.1.2. Describe structures for different seed types.

Activities	Material, Media and Equipment	Time
1. Show Transparency 1.1.1a and 1.1.1b defining seed. Illustrate the meaning of seed and the differences between seed, grain and vegetative propagation structures using samples. Ask trainees to identify the differences between the seed types.	<ul style="list-style-type: none"><li>➤ Transparency 1.1.1a and 1.1.1b</li><li>➤ Seed samples</li></ul>	5 minutes
2. Explain the uses of seed coat, embryo, seed store, hypocotyls and epicotyl using Transparency 1.1.2 and seed samples.	<ul style="list-style-type: none"><li>➤ Transparency 1.1.2, Seed samples</li></ul>	14 minutes

## Module 1

### The Small-Scale Seed Production Training Programme

#### Instructor's Manual

### Sub Module 1.2

#### Explain the Role of Seed in Food Security (13 minutes)

##### Elements/Outcomes

1.2.1 Define food security.

1.2.2 Explain seed security and its influence on food security.

Activity	Material, Media and Equipment	Time
1. Explain food security in small scale farming systems using Transparency 1.2	➤ Transparency 1.2/ Handout	3 minutes
2. Brainstorm on feasible options to achieve food security in small-scale farming, ending with seed security and emphasizing strengths and challenges.	➤ Flipchart, pens	10 minutes

**Sub Module 1.3****Analyze Farming System Enterprises and Components with Particular Reference to Small-Scale Farming (17 minutes)****Elements/Outcomes**

- 1.3.1 Describe the different types of farming systems
- 1.3.2 Facilitate the farmers to rank farming system enterprises and components in small scale farming systems.

Activity	Material, Media and Equipment	Time
1. Show Transparency 1.3 and describe the common farming systems in each of the different agro-ecological zones in your country	➤ Transparency 1.3	4 minutes
2. Place trainees in groups of 5 and ask them to describe different types of farming enterprises and components in agro-ecological zones farmers belong to. Facilitate each group to report on their results.	<ul style="list-style-type: none"> <li>➤ Report</li> <li>➤ Flipchart</li> <li>➤ Pens</li> </ul>	10 minutes
3. Ask key questions to check on participants understanding.	➤ List of key questions	3 minutes

## Module 1

### The Small-Scale Seed Production Training Programme

#### Instructor's Manual

### Sub-Module 1.4

#### Explain Seed Provision Systems as a Function of Farming Systems. (37 minutes)

##### Elements/Outcomes

1.4.1 Describe the seed provision systems in different farming systems.

1.4.2 Outline the constraints in small-scale seed provision systems.

1.4.3 Choose feasible improvements to existing seed provision systems in small-scale farming.

Activity	Material, Media and Equipment	Time
1. Using Transparency 1.4.1 state the seed provision systems in different farming systems.	➤ Transparency 1.4.1a and b	6 minutes
2. Facilitate plenary/group work on discussion of common constraints in seed provision systems in small scale farming systems	➤ Flipchart	16 minutes
3. Based on Transparency 1.4.2 and 1.4.3 point out other constraints and feasible improvements to seed provision systems in small-scale farming.	➤ Transparency 1.4.2 and 1.4.3	15 minutes



**Sub-Module 1.5****Assist farmers in Implementing the Participatory Rapid Farmer Seed Demand Assessment (42 minutes)****Elements/Outcomes**

- 1.5.1 Explain Rapid Farmer Seed Demand Assessment
- 1.5.2 Demonstrate an appropriate example of Rapid Farmer Seed Demand Assessment.
- 1.5.3 Facilitate farmers to implement Rapid Farmer Seed Demand Assessment.

Activity	Material, Media and Equipment	Time
1. Refer to Handout 1.5 on Rapid Farmer Seed Demand Assessment and explain the objectives of the procedure. Allow trainees to read the rest of the handout.	➤ Handout 1.5.	10 minutes
2. List and discuss information required for Rapid Farmer Seed Demand Assessment.	➤ Chalkboard Chalk	6 minutes
3. Illustrate derivation of seed demand by using a calculation exercise on Rapid Farmer Seed Demand Assessment.	➤ Exercise in Handout 1.5	14 minutes
4. Ask trainees to write self assessment test and self-evaluate based on answer key	➤ Written test.	8 minutes
5. Clarify questions from trainees		4 minutes

Module 1

The Small-Scale Seed Production Training Programme

**Intentionally left blank**

# Module 1

## Trainee Manual

### Sub-Module 1.1

#### Discuss what constitutes seed (19 minutes)

##### Elements/Outcomes

1.1.1. Define seed

1.1.2. Describe critical structures for different seed types.

Activities	Materials, Media and Equipment	Time
1. View Transparency 1.1.1a and 1.1.1b for the meaning of seed. On invitation by the instructor, analyze and state important differences in seed types.	➤ Transparency 1.1.1a and 1.1.1b/ Handout Seed samples	5 minutes
2. Identify the seed coat, embryo, seed store, hypocotyl and epicotyl in Transparency 1.1.2 and in seed samples.	➤ Seed samples Transparency 1.1.2/ Handout notes	14 minutes

## Module 1

### The Small-Scale Seed Production Training Programme

#### Trainee Manual

### Sub-Module 1.2

#### Explain the role of seed in food security (13 minutes)

##### Elements/Outcomes

1.2.1 Define food security

1.2.2 Explain seed security and its influence on food security.

Activity	Material Media and Equipment	Time
1. View Transparency 1.2 on food security, noting the important role of seed security.	➤ Transparency 1.2	3 minutes
2. Contribute to the discussion on feasible options to achieve food security, noting the strengths and weaknesses, particularly of seed security.	➤ Flipchart, Pens	10 minutes

**Sub-Module 1.3****Analyze Farming Systems Enterprises and Components, With Particular Reference to Small-scale Farming. (17 minutes)****Elements/Outcomes**

- 1.3.1 Describe the different types of farming systems.
- 1.3.2 Facilitate the farmers to rank farming system enterprises and components in small scale farming systems.

Activities	Materials Media and Equipment	Time
1. Read Transparency 1.3 on the common farming systems in each of the agro-ecological zones.	➤ Transparency 1.3	4 minutes
2. In your assigned group, contribute to the discussion on farming systems enterprises and components in small scale farming.	➤ Flipchart Pens Report	10 minutes
3. Answer oral questions on farming system enterprises and components.		3 minutes

## Module 1

### The Small-Scale Seed Production Training Programme

#### Trainee Manual

### Sub-Module 1.4

#### Explain Seed Provision Systems as a Function of Farming Systems. (37 minutes)

##### Elements/Outcomes

1.4.1 Describe the seed provision systems in different farming systems.

1.4.2 Outline the constraints in small scale seed provision systems.

1.4.3 Choose feasible improvements to existing seed provision systems in small-scale farming

Activity	Material Media and Equipment	Time
1. Refer to Transparency 1.4.1 on seed Provision systems.	➤ Transparency 1.4.1	6 minutes
2. Revert to your original groups; discuss and list common problems in seed provision systems in small scale farming systems.	➤ Flipchart, Pens	10 minutes
3. Present your group findings to plenary.	➤ Flipchart, Pens	6 minutes
4. Note additional constraints (Transparency 1.4.2) and improvements to seed provision systems in small scale farming as pointed out by the instructor (Transparency 1.4.3).	➤ Transparency 1.4.2 ➤ Transparency 1.4.3	15 minutes

**Sub-Module 1.5****Assist farmers in implementing the Participatory Rapid Farmer Seed Demand Assessment (42 minutes)****Elements/Outcomes**

- 1.5.1 Explain Rapid Farmer Seed Demand Assessment.
- 1.5.2 Demonstrate an appropriate example of Rapid Farmer Seed Demand Assessment
- 1.5.3 Facilitate farmers to implement Rapid Farmer Seed Demand Assessment.

Activities	Materials Media and Equipment	Time
1. Read Handout 1.5 on Rapid Farmer Seed Demand Assessment.	➤ Handout 1.5	10 minutes
2. On being invited, propose the type of information required for Rapid Farmer Seed Demand Assessment, its purpose and source of that information.	➤ Chalkboard Chalk	6 minutes
3. Follow the explanation from the instructor on derivation of seed demand levels using an exercise in Handout 1.5.	➤ Exercise in Handout 1.5	14 minutes
3. Write Self Assessment Test	➤ Self Assessment Test	8 minutes
4. Note wrong responses against the answer key and seek clarification where you have queries.		4 minutes

Module 1

The Small-Scale Seed Production Training Programme

**Intentionally left blank**

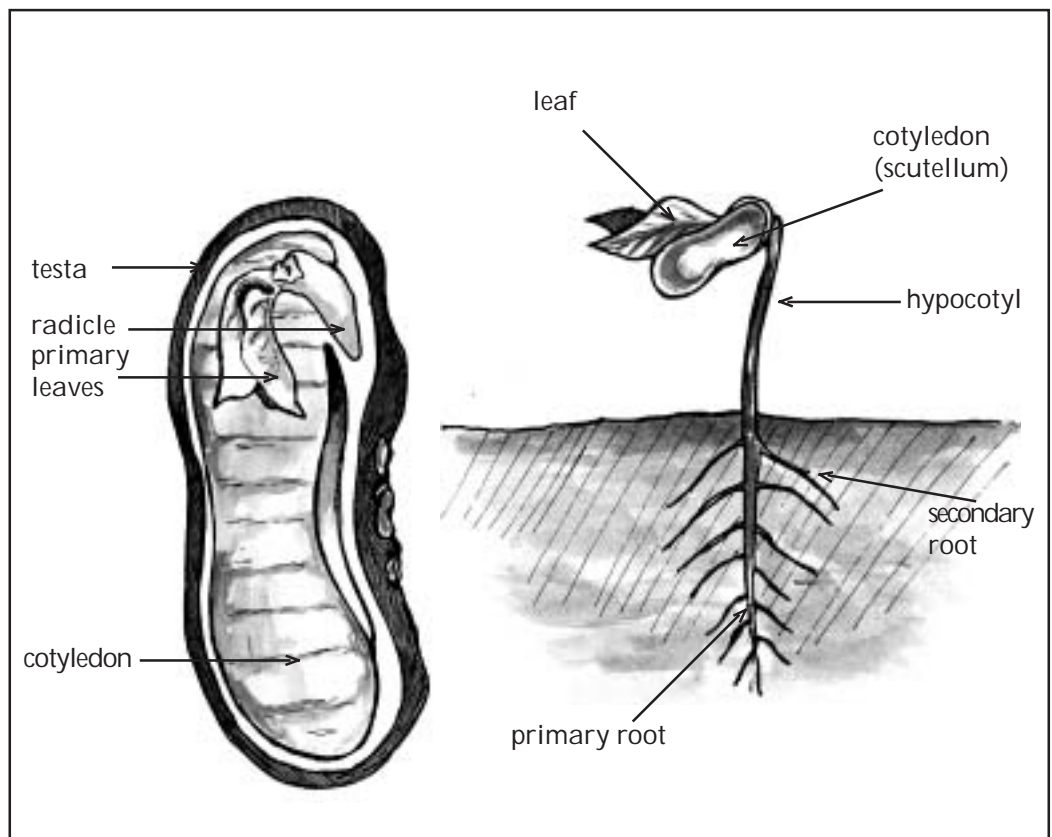


### Handout on Seed security and its role in Food Security for small-scale farming systems.

#### 1.1.1 What is seed?

Seed is a living plant part which when provided with ideal growing conditions, can originate a fully functional plant. Seed will produce an entire plant with roots, stems and leaves, back to seed again. It is a vehicle for genetic information that makes plants reproducible. Whilst strictly speaking, seeds are structures that have embryos, however, the term seed includes any plant part that is intended for reproducing plants that is, true seed as well as vegetative planting material.

There are two main types of true seed, dicotyledons and monocotyledons. Also there are various types of vegetative propagating materials as illustrated in 1.1.1.c.

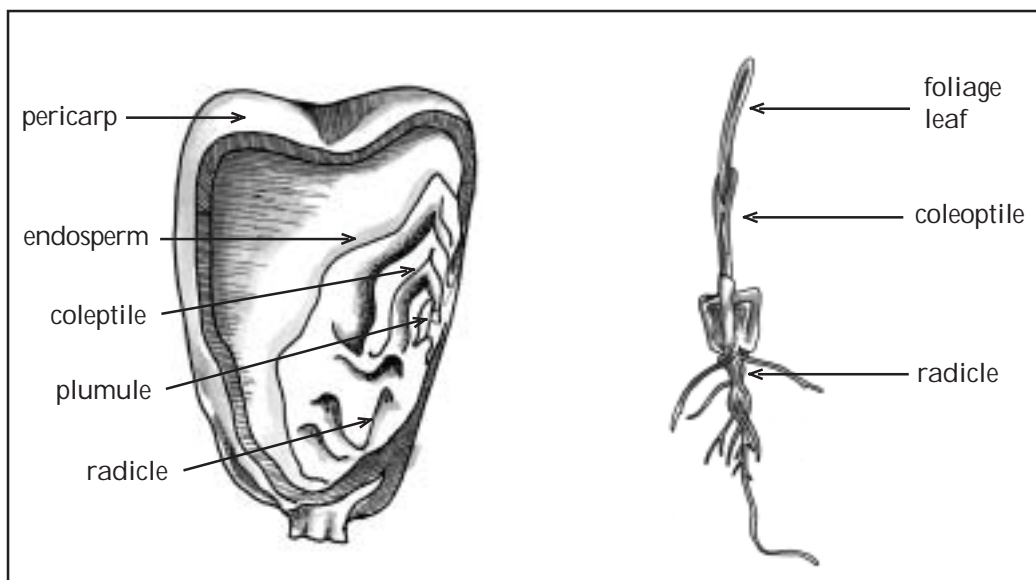


1.1.1 (a) Bean - a dicotyledonous seed.

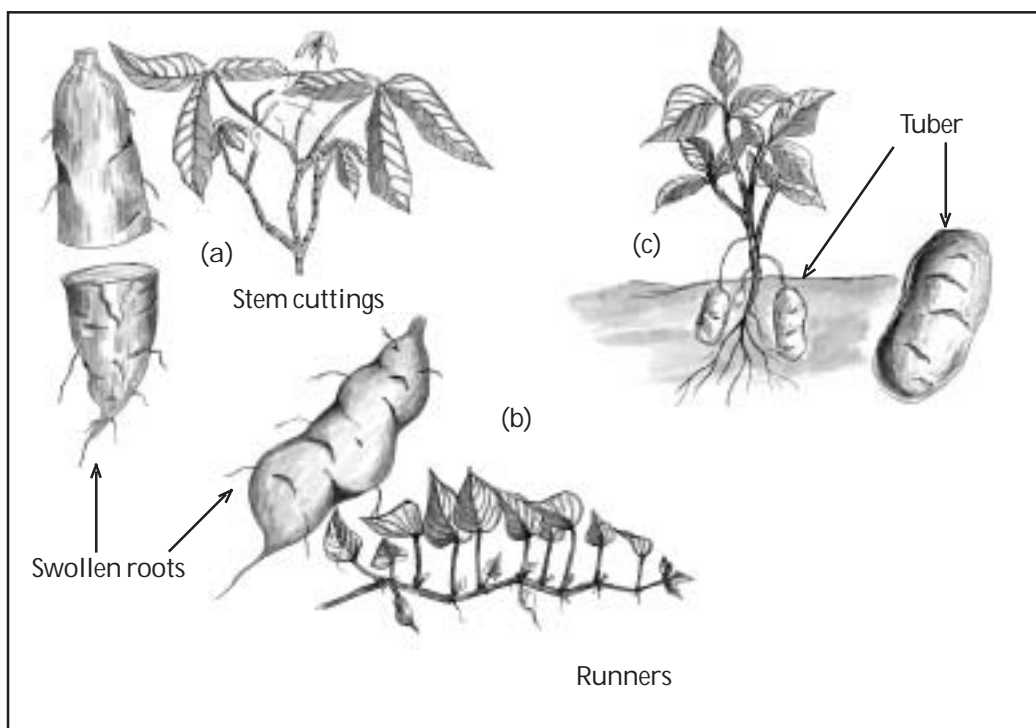
# Module 1

## The Small-Scale Seed Production Training Programme

### Notes



1.1.1 (b) Maize - a monocotyledonous seed



1.1.1 (c) Vegetatively propagating materials: (a) stems (cassava), (b) runners (sweet potatoes), (c) tubers (Irish potato).

### **1.1.2 Critical seed structures and their functions**

A typical seed consists of a seed coat, an embryo and some food store. The outer coat is called the testa and is sometimes extremely hard, forming a strong protective cover for the embryo within. The embryo is the rudimentary plant part that develops from the fertilized egg, and in a mature resting seed the embryo is normally dormant. The developed embryo in a seed consists of four main parts-the plumule, the radicle, the cotyledons and the hypocotyls. The plumule is the terminal bud of the embryo which gives rise to the first vegetative shoot of the plant, whilst the radicle is at the opposite end. It is the first root of the plant, and is situated at the tip of the hypocotyls. Amongst all parts the radicle emerges first after germination has started.

Cotyledons are food storage parts that in dicotyledons emerge from the soil to be the first leaves. In monocotyledons, they never function as leaves.

The hypocotyl is the true stem and extends from the cotyledons to the radicle.

Practically most dicotyledonous plants store their food in the cotyledons and monocotyledonous plants store theirs in the endosperm.

## **1.2 The role of seed in food security.**

Food security is the assured availability of food for a community over a phase to harvesting of the next crop. It is highly dependent on seed security. Availability of high quality seed of diverse crops is an important factor for sustainable and high crop productivity. Critical aspects of seed security entail the right seed type, of high quality, at sufficient quantities and available when required. It is not enough for seed to be available in the vicinity of small-scale farmers, it has to be accessible to them. In other words, farmers should have the means to purchase the seed, either in cash, labor or commodity exchange.

### Quantity

Enough quantities must be available to allow planting of adequate hectarages ensuring adequate food for specific households. Seed is commonly in chronic shortage in small-scale farming as a result of unresponsive formal seed supply systems, in combination with natural or man-made disasters causing farmers to consume seed as food, or loose source seed.

### Quality

Good quality seed gives improved crop productivity in terms of yield and quality of grain. Seed quality refers to seed viability and vigor, which when high ensures good seed germination, seedling emergence and seedling survival. High seed quality also

## Module 1

### The Small-Scale Seed Production Training Programme

#### Notes

means being free from pests and diseases which when present, often causes a reduction in quality and yield of the resultant crop. Pests and diseases also reduce viability of the seed due to the resultant damage of some seed components.

#### Diversity

A diversity of seed types allows planting of a wide range of crops and this ensures provision of all essential food components for human growth and health. Diversity also guards against uncertainties e.g. droughts, pests and/or diseases for example in growing sorghum and maize one is likely to reap a harvest from sorghum in a drought year, since it tends to have higher tolerance to moisture stress.

#### Timeliness of seed supply

Seed should be supplied in time for early planting to allow the crop to grow during favourable environmental conditions, thus ensuring food security.

### **1.3 Farming systems enterprise with particular reference to small-scale farming**

Agriculture is a sustained effort to modify the natural environment impacting on crop and livestock activities with the objective of achieving a regular and sustained food supply. An agricultural system is defined as a set of elements, entities or components that are interrelated and interacting. Running the farm involves organized decision making in which a balance of crop and livestock production activities are implemented with the objective of satisfying the farmers goals such as profit maximization in the case of large scale commercial farms or food security in the case of the small farms. Farms can be defined as systems because on farm activities are closely related to each other by the common use of natural and human resources. At farm level resources can be complemented to produce a dynamic and high output system. The most common form of interaction is that an output from one system becomes an input of another.

#### **1.3.1 The basis of a farming systems classification**

There is a diversity of farming systems depending on the farmer's objectives and the environment. Every farm is different for example small scale, large scale, and resettlement and communal. Classification of farming systems is useful in demarcating agricultural potential and indication of farming activities that can be carried out in a particular region. Classification could be based on the following criteria:

#### I. Land management

Under land management, two broad categories are identifiable: annual and perennial cropping.

#### II. Intensity of cropping

This reflects how frequent a piece of land is used. Examples under this classification are shifting cultivation, semi-permanent cultivation and permanent cultivation.

#### III. Water supply

Crops can either be rain fed or irrigated. Under rain fed conditions crops are totally dependent on natural rainfall and cropping is normally targeted to coincide with this period. In very wet areas cropping can be done after the rainy season where residual moisture is utilized, for instance in the establishment of off-season seed gardens. Such seed crops grown off-season are advantaged in that they meet less risk of contamination from food crops. In instances where irrigation is used, the crop is either fully irrigated or only supplemented with irrigation water when drought spells are extended, which become detrimental to the crop. There are various irrigation systems that include furrow, flood or overhead irrigation. Relevance under small-scale farming depends on economic endowment and other factors such as the slope of the land, availability of water and scale of production.

#### IV. Types of crops produced

Crops can either be food- or cash-crops, among others. The type of crop produced depends on factors such as taste and preference, adaptability and market requirements. Some crops have a number of uses so they are more preferred than others. For instance, maize has many uses including provision of human and livestock feed, and has low labor and other input requirements. Maize provides food spread over a wide part of the season, from early stages when it can be consumed as green mealies to its extended stay in the field during the dry down period at which stage the hard grain is easily milled or cooked in various dishes. Maize is not as susceptible to pest damage as other cereals such as sorghum, pearl millet or rice.

#### V. Technological Level

Technological level determines scale of production, for example highly advanced technologies allows larges scale and highly intensive production, whilst simple technologies call for simpler ways of production at a smaller scale. Use of lower levels of technology, common among small-scale farming communities, often results in higher quality seed due to less damaging seed harvesting and conditioning methods.

## Module 1

### The Small-Scale Seed Production Training Programme

#### Notes

#### VI. Degree Of Commercialization

The level of commercialization of an enterprise affects the choice of crops grown. Highly commercialised enterprises tend to go for those crops or enterprises that are considered more profitable. Where the degree of commercialization is low, other factors affecting choice of crop tend to become more prominent such as food security, number of possible uses, customs and beliefs.

In classifying farming systems based on the degree of commercialization, four categories are observable:

- a. Subsistence farming - < 25% of production sold
- b. Partially commercialized farming: - sales make up 25 – 50% of production
- c. Semi – commercial farming: sales made up of 50 – 75% of production.
- d. Commercial farming – more than 75% of production are sales.

#### **1.4.1 Seed provision systems in different farming systems.**

There are two main groups of seed provision systems viz. formal and informal.

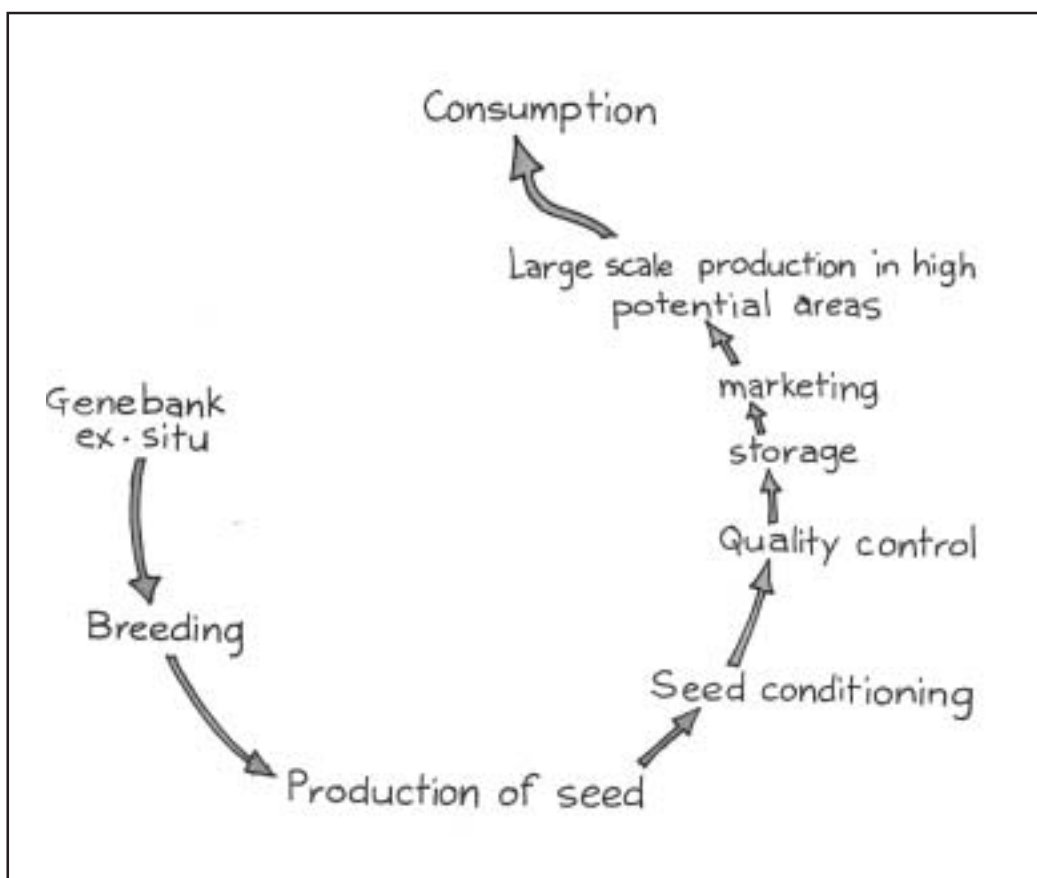
##### Formal Seed Supply Systems

Seed provision under this system covers seed production and supply mechanisms that are governed by defined methodologies and controlled stages of multiplication and international standardization of methodologies. Formal systems are often divided into a clear functional division of labour and management where each component is linked and highly dependent on each other; if one of them malfunctions, the whole system collapses.

Public and private seed companies invest in Research and Development of the formal sector in order to maintain or improve national self-sufficiency in food production. However most of the varieties produced are often not appropriate to the needs of small-scale farmers and complex environmental stresses in low input conditions. Farmers here usually plant crops with more genetic diversity than the small portfolios of materials provided by formal breeding and seed programs. In total, the formal sector has difficulty in addressing the differentiated and varied needs of farming households in marginalised areas.

##### Local (informal) Seed Supply Systems

The informal seed supply system comprises the small-scale farm households, tenants, local traders, with women forming a very large proportion among them.



1.4.1(a) Formal seed provision systems tend to be vertical

The small-scale farmers develop and maintain their own plant genetic resource, based on local means of seed production, selection and exchange. Newly introduced varieties are subject to farmers' experimentation, and when adopted they become part of the local gene pool. Integration involves physical mixing of seeds and spontaneous crossing with other materials. The informal seed sector has strong local character, without necessarily being confined to a small geographical area.

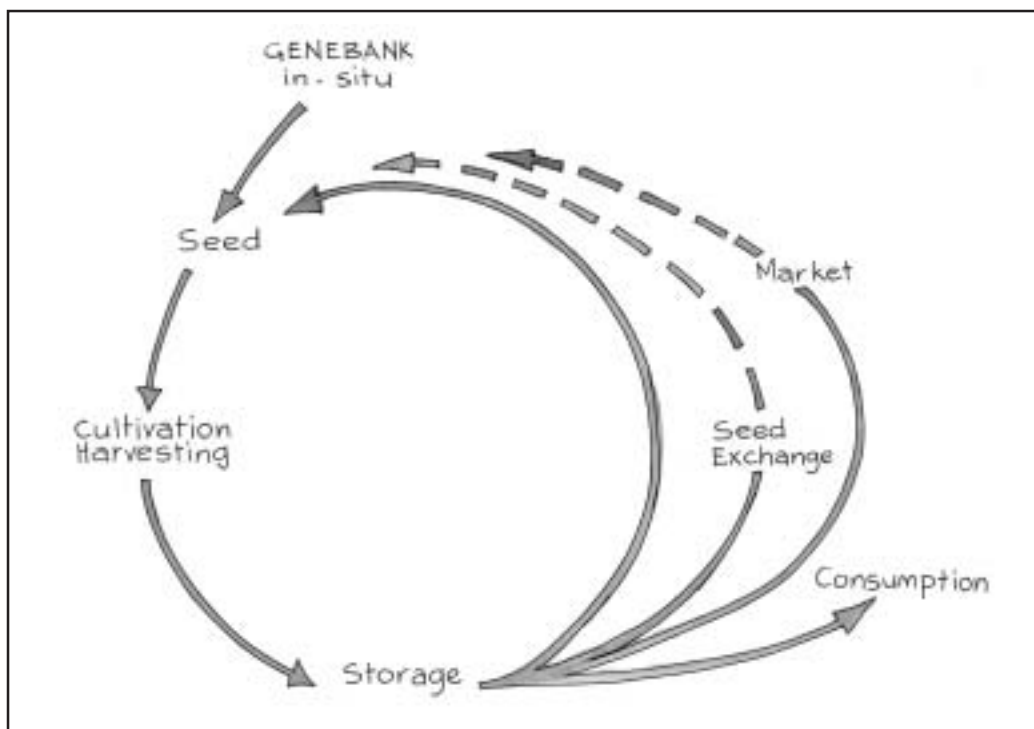
Local seed management systems vary greatly.

In some communities, seed management is elaborate and sophisticated, linked with religious and cultural ceremonies, with specialized seed producers and selectors, and a high degree of farmer experimentation. In other communities it is simply a question of retention of seed, with multiple opportunities for improvement.

## Module 1

### The Small-Scale Seed Production Training Programme

#### Notes



1.4.1 (b) Informal seed provision systems tend to be cyclical.

There are many situations in which local varieties perform better than improved varieties. In other situations improved varieties may be a significant contribution to local portfolio of materials because of their higher yield potential or other strong characteristics.

#### Seed selection

There are some important factors considered by the farmers in the selection of their planting material and these include:

- Production values - yield potential and stability.
- Consumption values – shape, taste, colour and suitability for different methods of preparation, baking and boiling.
- Economic values – early maturity, longevity in storage and risk avoidance. If crops mature early, this breaks the “season of hunger”.
- Cultural values – in some communities crop and produce appearances are related to certain beliefs and customs.



### 1.4.2 Challenges to the informal seed provision systems

The informal system is well adapted to local farming environments, which are typically characterized by a combination of biological and non-biological pressures creating very specific local conditions. Thus materials produced may only be able to perform under the local conditions. If these materials are grown elsewhere, they may not perform well. This reflects the need for diverse and well-adapted improved germplasm.

#### Selection

Rate of improvement is slow since the farmers' selection system depends only on natural ways of increasing genetic variation such as mutation and casual out crossing. Any introduction of diseases that are new to the area as a result of increased trade and research may pose a severe threat to a whole crop if resistant germplasm is not introduced too. Evidence from field studies show that seed quality in many situations is sub-optimal due to diseases and storage problems.

#### Production

Due to the nature of the small-scale production system, there is a tendency for genetic contamination of varieties.

#### Free food and seed relief

Interventions such as food- and seed-relief often undermines local initiatives since farmers develop a donor dependency syndrome.

#### Diffusion

Technological diffusion tends to be slow especially where ethnic boundaries are to be crossed. Often diffusion of potentially adapted varieties can be the weakest link in local supply systems particularly by poor farmers within the community.

#### Limitations of the regulatory framework

The regulatory and legal framework of the national formal seed system in many countries becomes a factor that limits the development of the community-based seed production system. National seed regulations are usually based on international standards, which are often useless or incompatible with farmers' reality. They impose restrictions on free exchange and marketing of seeds. The combination of compulsory variety registration and seed certification is especially a heavy constraint both on the efficient functioning of the formal seed sector and on the development of alternative seed systems.

## Module 1

### The Small-Scale Seed Production Training Programme

#### Notes

#### **1.4.3 How can the informal seed provision system be improved?**

Improving the local seed system means improving seed security, enhancing seed quality, and the availability of good varieties and reliable seed source structures. A number of avenues exist for improvements to the small scale farming seed supply system.

The most important is to build on farmers' knowledge and capacities. Farmers have particular knowledge of their seeds and varieties. They are good selectors of varieties for their own use because they can weigh the different requirements at the same time; they can consider the needs of the household, how the variety fits into the total production system and how it adapts to the environment.

The complementarity of the formal and informal sector offers multiple opportunities to develop a well-integrated seed sector in which both formal and informal actors play a significant role. Farmers' capacities and knowledge regarding local conditions, seed selection and traditional mechanisms of seed exchange are valuable elements in the functioning of the informal seed sector. Instead of replacing this sector the formal sector can build on these elements to address more effectively seed demands of small-scale farmers. Introducing improved seed technology to local conditions can help in improving seed production by the small-scale farmers. Farmer-based organizations can play an important role in this respect through participatory approaches.

Provision of training can further reinforce such farmers' capability and knowledge. In addition, the regulatory framework can be changed to suit and facilitate community-based seed provision systems.

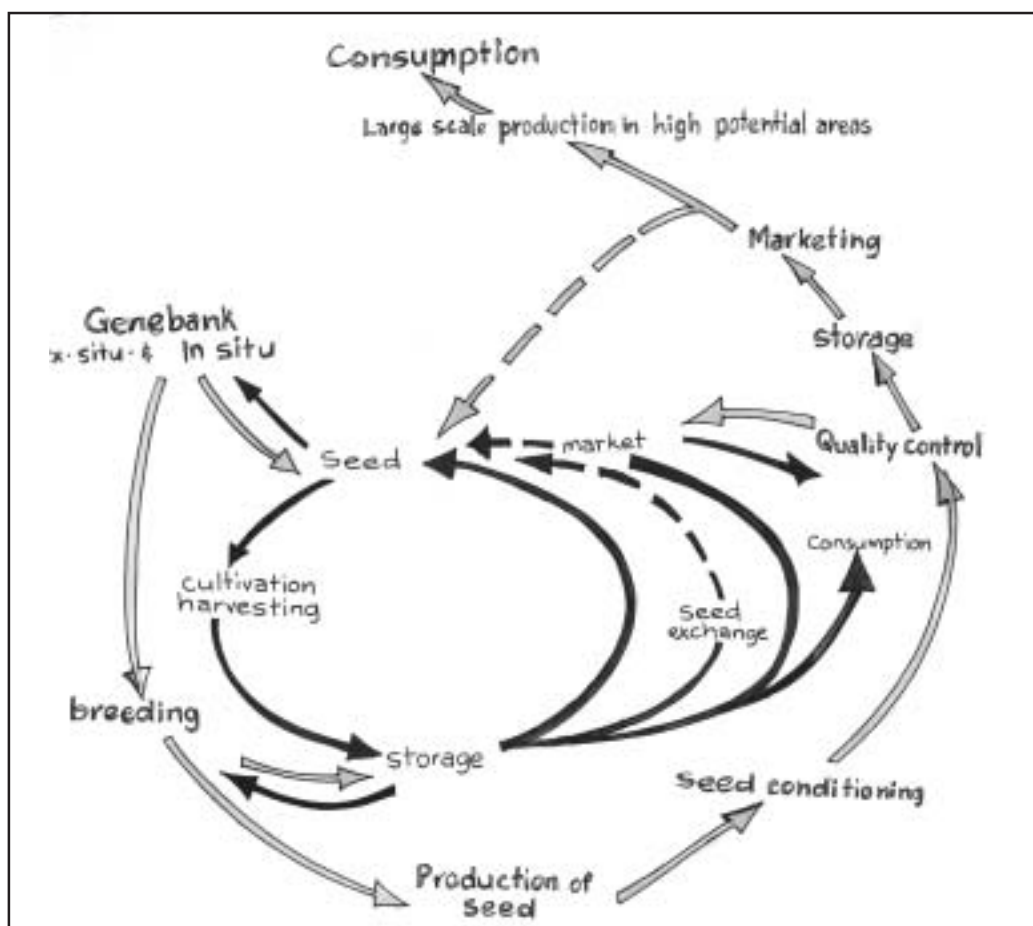
#### **1.5 Participatory Rapid Farmer Seed Demand Assessment.**

##### **1.5.1 What is Rapid Farmer Seed Demand Assessment?**

This is an assessment done so as to estimate the amount of seed required.

Seed demand is affected by willingness of farmers to buy seed, characteristics of other seed sources with respect to quality, price and security and the farmer's financial capacity to buy seed.

Seed demand originates from a number of sources particularly emergency, poverty, need for quality seed and requirements for variety change. In emergency seed demand, requirements arise after a drought, floods or civil disorders.



1.4.3. Complementarity of formal and informal seed provision systems offer major opportunities for improving seed availability and access.

Seed shortage arising from poverty affects the poorer category of farmers. Such farmers may not recover after poor harvest, which may force them to sell or consume their seed stocks. The richer farmers among the small scale farming communities may need to restock higher quality seed from time to time. This could be after deterioration of a variety or due to the use of hybrid seed, where the use of second generation seed is not recommended. On the other hand, some farmers may want to try new varieties.

### 1.5.2 How is seed demand assessed?

Seed demand is calculated based on area to be planted with a specific crop, proportion of that area planted to the preferred variety, the seed sowing rate, and the seed replacement rate. The seed replacement rate is the average number of

## Module 1

### The Small-Scale Seed Production Training Programme

#### Notes

years a farmer uses and reproduces the seed before buying new seed, to re-invigorate it. The replacement rate depends on the degeneration of the variety beyond acceptable limits, that is when yields become seriously depressed. For example OPV maize varieties should be replaced after 4 - 5 years from introduction of new seed.

As an example of seed demand, suppose there are 250 ha of sorghum to be planted.

The seed rate is 8 kg/ha

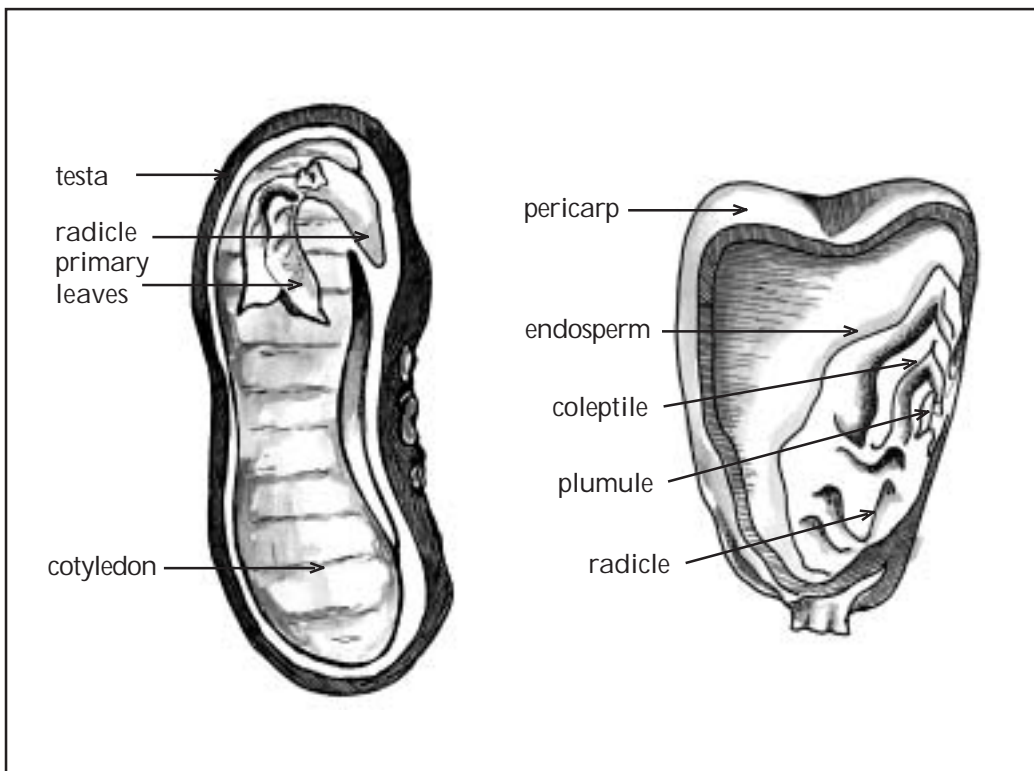
1. Potential demand is:  $8 \times 250 = 2\,000$  kg/year
2. Assume that total area planted with modern varieties is 30%.  
Potential demand for modern varieties is:  $2000 \times \frac{30}{100} = 600$  kg
3. Seed replacement rate of sorghum is 3 years since it is a semi-cross pollinated crop.  
Calculated yearly demand is  $600 \text{ kg}/3 = 200$  kg/year

### 1.1.1a What is seed?

- ◆ A living plant part which when provided with ideal growing conditions, can produce a fully functional plant.
- ◆ A carrier of genetic material
- ◆ Includes any plant part that is intended for planting and will include the true seed and vegetative propagation materials such as runners, cuttings, buds, bulbs, corms, roots or any plant part used for propagation purposes.
- ◆ True seed is a result of pollination and fertilization of the ovule resulting in combination of genetic material- thus causing variation
- ◆ Vegetative propagation materials give daughter plants that are identical to the parent plants.
- ◆ The difference between seed and grain is that seed is used for planting purposes whereas grain ends up being used for consumption; their production is also different in that grain does not require any controlled procedures such as pollination and certification which are required for seed.

### 1.1.1.b True seed types

- ◆ there are two main types of true seed namely
  - monocotyledonous, and
  - dicotyledonous seed
- ◆ A monocotyledonous seed is one that possesses only one cotyledon.
- ◆ A dicotyledonous seed is one that possesses two cotyledons.



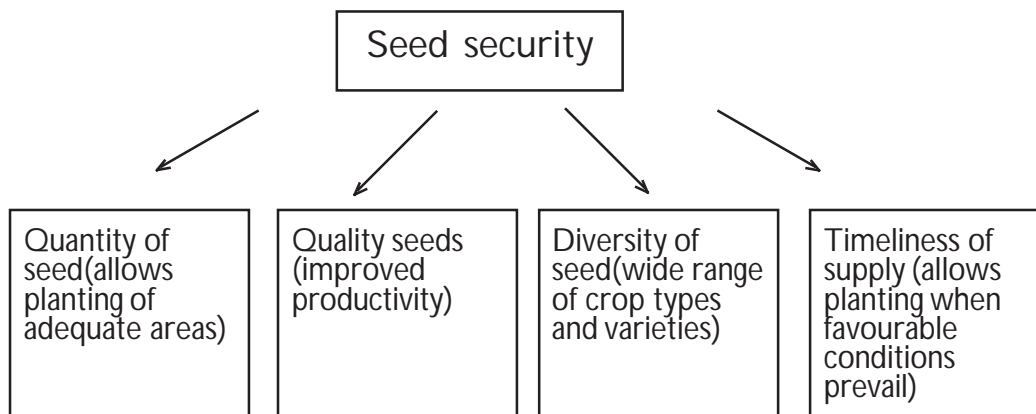
Bean - a dicotyledonous seed. Maize - a monocotyledonous seed

### 1.1.2 Critical seed structures and their functions

Component	Function	Implication on seed viability
a) Embryo	Grows to give a new plant	• If damaged or dead seed germination and viability are lost.
b) Seed coat	Protection of seed parts.	• If damaged there is entry of water and pathogens – lowers seed viability, when intact it improves seed viability
c) Endosperm	Food store mainly in monocotyledons seeds.	• If small or exhausted due to long or poor storage viability is lost.
d) Cotyledon	Food store mainly in dicotyledons.	• If small or damaged vigour is lower.
e) Radicle	Develops into the plants' root system.	• If damaged seed viability is lost.
f) Plumule	Develops into the plants' shoot system.	• If damaged seed viability is lost.
g) Epicotyl	It elongates in hypogeal germination with the result that the plumule is thrust upwards through the soil but the cotyledons remain below the ground.	• If damaged the plumule might fail to emerge and therefore the seed dies.
h) Hypocotyl	Is the stem below the cotyledon. On germination it becomes hook shaped and forces a channel through the soil as it grows.	• If damaged seedling emergence may fail

## 1.2 Role of seed in food security

- ◆ Seed security is a prerequisite to food security
- ◆ it has several important components namely-:
- ◆ Right seed type, high quality, sufficient quantities and availability at the right time, and accessible to the farmer.



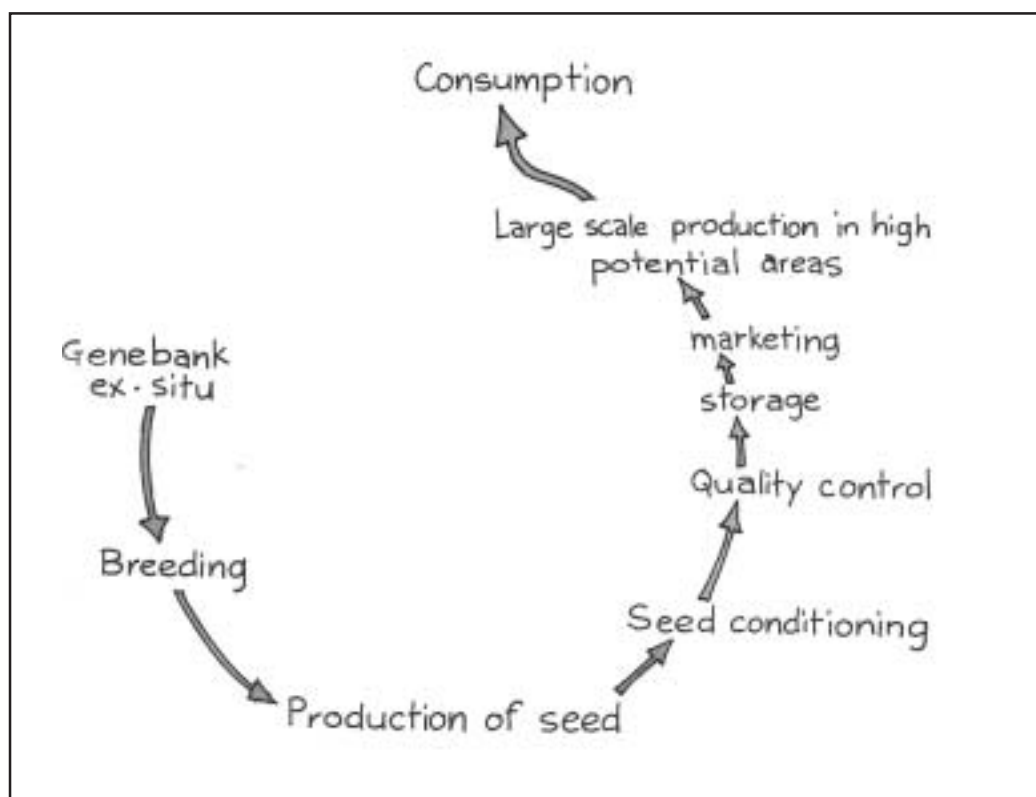


### 1.3 Farming system enterprises

- ◆ A way of grouping farms according to farm activities undertaken on that particular farm.
  
- ◆ Farming system classification is based on the following factors-:
  1. Type of land management
  
  2. Intensity of cropping- reflects how frequently a piece of land is used and quantity of inputs used.
  
  3. Water supply - based on whether or not crops are either wholly rainfed or they receive additional water by irrigation.
  
  4. Types of crops produced – food crops, cash e.t.c. The choice of the crop depends on the farmer's preference, market requirements as well as climatic factors.
  
  5. Technological level- relates to scale of production.
  
  6. Degree of commercialization- affects the type of crops grown and percentage of produce sold

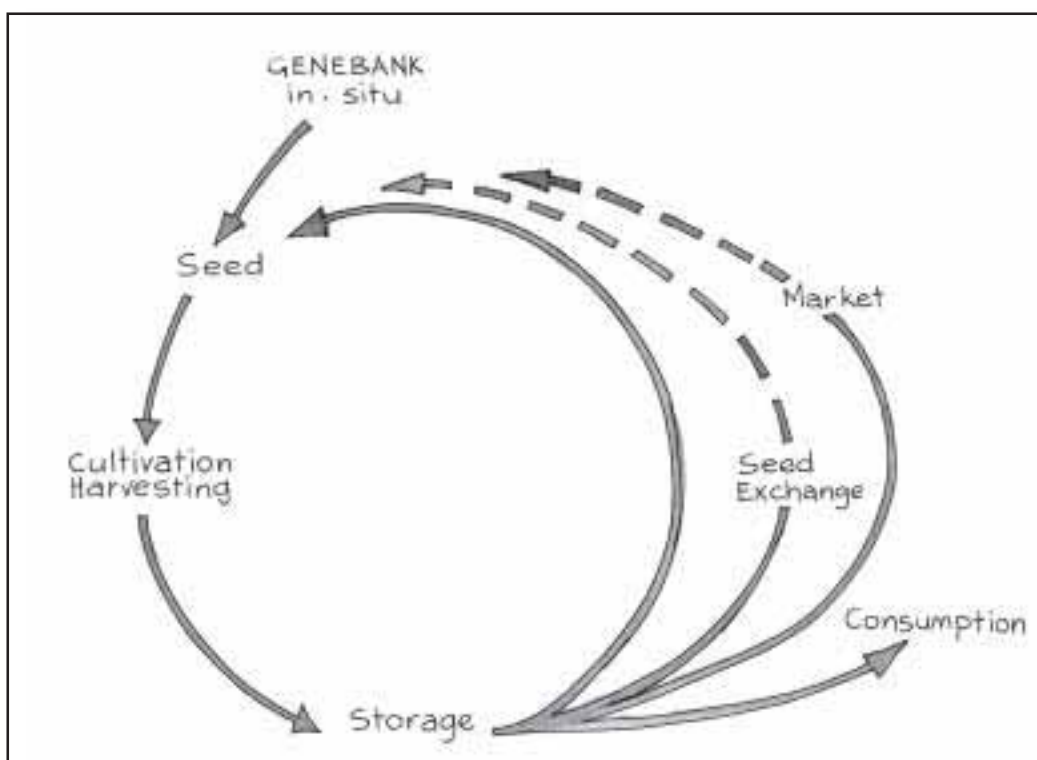
### 1.4.1 Seed provision systems

- ◆ There are two main systems
  - The formal seed supply system
  - The informal or local seed supply system.
- ◆ The formal seed supply system
  - Found in the commercial farming sector.
  - Seed production and supply mechanisms are ruled by defined methodologies.
  - There is a lot of research and funding to support this seed supply system



1.4.1 (a) Formal seed provision systems tend to be vertical

- ◆ The informal or local seed supply system
  - There in the small scale farming sector.
  - Farmers develop and maintain their own genetic resources based on local means of seed production.
  - There is a high degree of experimentation by farmers.
  - Seed selection is based on factors considered important.



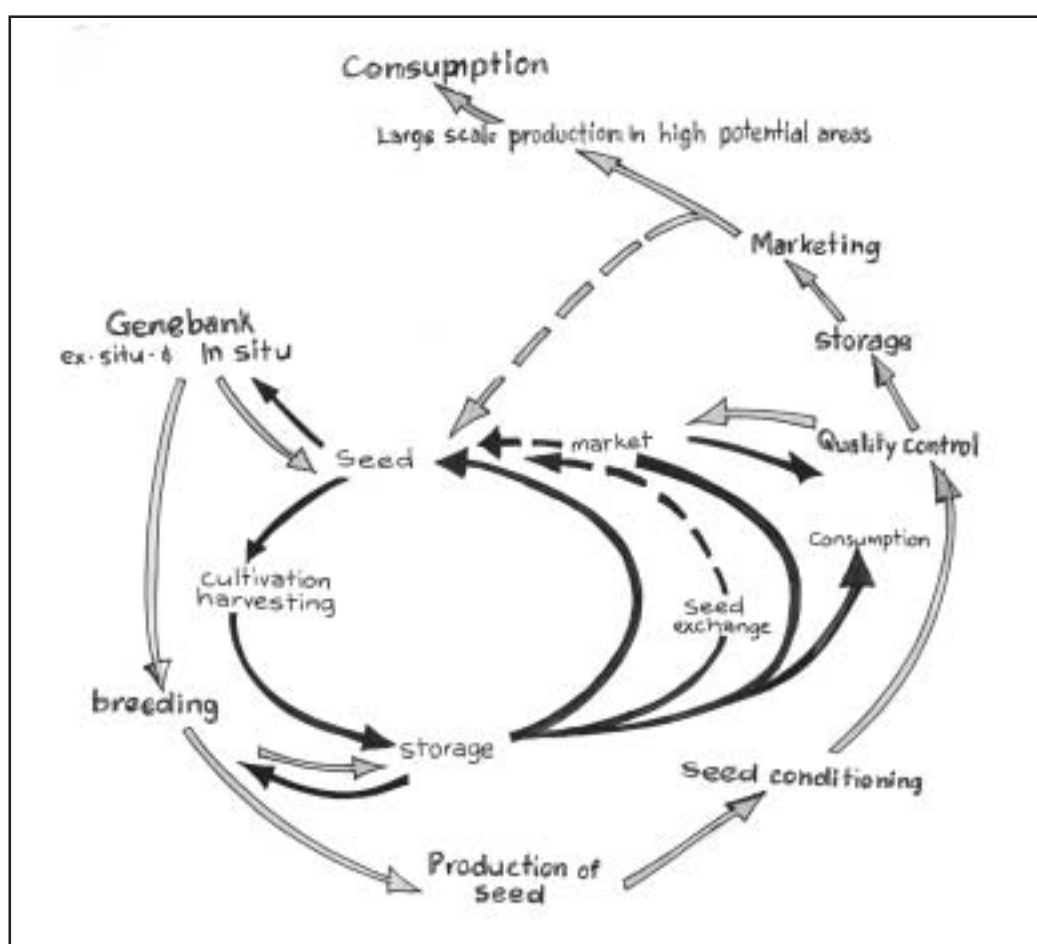
1.4.1 (b) Informal seed provision systems tend to be cyclical.

### **1.4.2 Limitations of the informal system**

- Materials produced are limited only to the local area of production
- Rate of improvement is slow since selection depends on natural ways of genetic variation.
- Challenges of reducing genetic contamination.
- Distortion by food and seed relief interventions.
- Storage of materials is also a problem
- Diffusion of materials is slow
- Regulatory framework limits the development of the informal sector.

### 1.4.3 How to improve the informal seed provision system

- Building on the farmer's knowledge and capacities
- Use of participatory approaches by farmer based organizations
- Train to strengthen farmers' knowledge
- Exploit complementarity of formal and informal seed provision systems
- Change the regulatory framework to facilitate community-based seed provision systems



1.4.3. Complementarity of formal and informal seed provision systems offer major opportunities for improving seed availability and access.

Module 1

The Small-Scale Seed Production Training Programme

**Intentionally left blank**

## Self Assessment Test

**1.1.1. State four constituents of a seed**

- a. Seed coat, embryo, endosperm, cotyledons
- b. Membrane, embryo, endosperm, cotyledons
- c. Seed coat, endosperm, angiosperm, hypocotyl

**1.2.2. The four important components of seed security are:-**

- a. Quantity, quality, timeliness of seed supply, accessibility
- b. Quality, availability, uniformity, quantity
- c. Timeliness of supply, uniformity, stability, distinctness

**1.3.1. The six different factors that are used in the classification of farming systems are:-**

- a.....
- b.....
- c.....
- d.....
- e.....
- f.....

**1.4.1. The two main seed provision systems are:-**

- a.....
- b.....

**1.5.1. The 3 origins of seed demand by farmers are:-**

- a. Poverty, market requirements, variety change
- b. Emergency, seed quality and variety change
- c. seed quality, seed quantity, seed size

## Module 1

### The Small-Scale Seed Production Training Programme

#### Self Assessment Test

#### **Answer Key to Self Assessment Test**

- 1.1.1. a
- 1.2.1. a
- 1.3.1. Type of land management, intensity of cropping, water supply, types of crops produced, technological level and degree of commercialization.
- 1.4.1. Informal and Formal Systems
- 1.5.1. b



# Module 2 -Contents

## Module 2 Facilitate formation of effective gender- balanced farmer groups for seed production

Sub-Modules .....	2- 1
Sub-Module 2.1	
Facilitate The Formation Of Farmer Seed Production Groups (60 minutes) .....	2- 2
Sub Module 2.2	
Apply agricultural extension facilitation tools and methodologies in seed production (117 minutes) .....	2- 3
Sub Module 2.3	
Facilitate the development and strengthening of Research-Extension-Farmer group linkages for Small-scale seed production (45 minutes) .....	2- 6
Sub Module 2.4	
Integrate gender issues in seed production activities (35 minutes) .....	2- 7
Instructor’s Manual .....	2- 9
Sub Module 2.1	
Facilitate the formation of Farmer Seed Production Groups (60 minutes) .....	2- 9
Sub Module 2.2	
Apply Agricultural Extension Facilitation Tools And Methodologies In Seed Production (1hr 57 minutes) .....	2-11
Sub Module 2.3	
Facilitate the development and strengthening of Research-Extension-Farmer group linkages for Small-Scale Seed Production (1hr 7 minutes) .....	2-14
Sub Module 2.4	
Integrate Gender Issues In Seed Production Activities (35 minutes) .....	2-16
Trainee Manual .....	2-19
Sub Module 2.1	
Facilitate the Formation of Farmer Seed Production Groups (60 minutes) .....	2-19
Sub Module 2.2	
Apply Agricultural Extension Facilitation Tools And Methodologies In Seed Production .....	2-21

## Contents - Module 2

### The Small-Scale Seed Production Training Programme

Sub Module 2.3	
Facilitate the development and strengthening of Research-Extension-Farmer group linkages for Small Scale Production (1hr 7minutes) .....	2-24
Sub Module 2.4	
Integrate Gender Issues In Seed Production Activities (35 minutes) .....	2-26
Notes - Handout notes on Community-based Farmer Seed Production Groups .....	2-27
2.1 Formation Of Farmer Seed Production Groups .....	2-27
2.1.2 The Concept of Group Dynamics .....	2-29
2.1.3 Facilitating Farmer Group Formation in Seed Production .....	2-32
2.2 Applying Agricultural Extension Facilitation Tools And Methodologies In Seed Production. ....	2-34
2.2.1 Differences between Conventional Agricultural Extension and Agricultural Extension Facilitation. ....	2-36
2.2.2 Agricultural Extension Facilitation Methodologies/Tools.....	2-37
2.2.3 Participatory Rural Appraisal (PRA) Tools. ....	2-38
2.3 Facilitating The Development And Strengthening Of Research-Extension-Farmer Group Linkages. ....	2-45
2.3.1 Linkage Mechanisms .....	2-45
2.3.2 Evaluating Research-Extension-Farmer Linkages: SWOT Analysis. ....	2-47
2.3.3 Strategies for Improving Existing R-E-F linkages .....	2-48
2.4 Integrating Gender Issues In Seed Production Activities ..	2-51
2.4.1 Introduction .....	2-51
2.4.2 Gender Issues in Agricultural Production .....	2-51
2.4.3 Impact of Gender Differentiation of Roles on Seed Production Activities.....	2-53
2.4.4 Impact of HIV/AIDS. ....	2-55
Transparency .....	2-57
2.1 Role of Groups in Rural Development .....	2-57
2.1.2a The Concept of Group Dynamics .....	2-58

## Module 2 - Contents

### The Small-Scale Seed Production Training Programme

2.1.2b Suggestions (Group Constraints) .....	2-59
2.1.3 Facilitating Farmer Group Formation in Seed Production .....	2-60
2.2.1 Weaknesses of the Transfer of Technology (TOT) model. ....	2-61
2.2.2 Differences between Conventional Agricultural Extension and Agricultural Extension Facilitation. ....	2-62
2.2.3 PRA Tools. ....	2-63
2.2.4 Transect Walks .....	2-64
2.2.5 Calendars .....	2-65
2.2.6 Matrix Ranking and Scoring .....	2-66
2.3 Research-Extension-Farmer Linkages.....	2-67
2.3.1a ToT Model in conventional research and extension.....	2-68
2.3b Roles of R-E-F linkages .....	2-69
2.3.1b Illustration of ideal R-E-F linkages .....	2-70
2.3.2a SWOT Analysis. ....	2-71
2.3.2b Strategies for Improving Existing R-E-F linkages.....	2-72
2.3.2c Re-Orientation of Attitudes - Roles of Different Actors .....	2-73
2.3.2d Problems in Creating Strong R-E-F Linkages.....	2-74
2.4.2 Integrating Gender Issues In Seed Production Activities .....	2-75
2.4.3 Impact of Gender Differentiation of Roles on Seed Production Activities (the issues) .....	2-76
Self Assesment Test .....	2-77
Answer Key to Self Assesment Test .....	2-81

Contents - Module 2

The Small-Scale Seed Production Training Programme

## FACILITATE FORMATION OF EFFECTIVE GENDER-BALANCED FARMER GROUPS FOR SEED PRODUCTION.

### **Purpose**

This module is intended for agricultural extension agents and rural development workers from public, private and non-governmental organizations who are working with farmers involved in community-based seed production. At the end of the module, trainees should be able to apply the knowledge and skills gained in facilitating farmer group formation and applying appropriate agricultural extension facilitation tools in the production of seed by small scale farmers.

### **Sub-Modules**

- 2.1 Facilitate the formation of farmer seed production groups.
- 2.2 Apply agricultural extension facilitation tools and methodologies in seed production.
- 2.3 Facilitate the development and strengthening of Research-Extension-Farmer group linkages for small-scale seed production.
- 2.4 Integrate gender issues in seed production activities.

## Module 2

### The Small-Scale Seed Production Training Programme

#### Sub-Module 2.1

#### Facilitate The Formation Of Farmer Seed Production Groups (60 minutes)

Element/Outcome	Performance Criteria	Assessment Instruments and Procedures
2.1.1. Explain the role of groups in rural development	<ul style="list-style-type: none"><li>➤ The role of groups in rural development is explained vis à vis<ul style="list-style-type: none"><li>a) awareness of new technologies</li><li>b) information dissemination</li><li>c) sustainability of technology adoption</li></ul></li></ul>	Plenary/group discussions.
2.1.2. Discuss the concept of group dynamics	<ul style="list-style-type: none"><li>➤ Issues related to composition, ideal numbers, intra-group interfaces and suggestions discussed</li><li>➤ An understanding of a stable group is demonstrated by describing the characteristics of a stable group that trainees know</li></ul>	Plenary/group discussions.
2.1.3. Facilitate farmer group formation	<ul style="list-style-type: none"><li>➤ Crucial issues related to group formation such as the constitution, by-laws, leadership structures, and roles of leadership and other group members explained</li><li>➤ Activities involved in seed production stated to facilitate group formation based on issues such as gender &amp; common need</li><li>➤ Facilitation skills in group formation demonstrated within a training group context</li></ul>	Plenary/group discussions. Group exercises

## The Small-Scale Seed Production Training Programme

**Sub Module 2.2****Apply agricultural extension facilitation tools and methodologies in seed production (117 minutes)**

Element/Outcome	Performance Criteria	Assessment Instruments and Procedures
2.2.1. Distinguish between conventional agricultural extension & extension facilitation	<ul style="list-style-type: none"> <li>➤ Differences between conventional agricultural extension and extension facilitation described in terms of:               <ul style="list-style-type: none"> <li>a) the different roles played by agricultural extension &amp; extension facilitation</li> <li>b) methods used, and</li> <li>c) defining characteristics of each of the methods used</li> </ul> </li> <li>➤ Examples that show differences between facilitation and conventional extension outlined to show the need for an attitudinal change.</li> <li>➤ Commitment for a paradigm shift &amp; attitudinal re-orientation in agricultural extension demonstrated</li> </ul>	Pair-wise discussions Brain storming exercises Group exercise Plenary presentations & discussions Written responses
2.2.2. Describe the different agricultural extension facilitation methodologies such as RRA & PRA relevant to seed production by small scale farmers	<ul style="list-style-type: none"> <li>➤ Different facilitation tools, how each tool is used, and expected results explained.</li> <li>➤ Appropriate examples on the application tools that should be used presented:               <ul style="list-style-type: none"> <li>a) for different learning circumstances or contexts</li> <li>b) to meet different objectives, and</li> <li>c) to suit the facilitation of seed production activities</li> </ul> </li> </ul>	Plenary/group discussions Written responses Class presentations followed by comments by other participants

## Module 2

### The Small-Scale Seed Production Training Programme

Element/Outcome	Performance Criteria	Assessment Instruments and Procedures
2.2.3. Apply facilitation tools in seed production activities	<ul style="list-style-type: none"> <li>➤ Understanding of each tool shown by practically demonstrating its application to include transect walks, mapping, and matrix ranking based on the following criteria:               <ul style="list-style-type: none"> <li>a) Practical skills required for each tool demonstrated.</li> <li>b) Ability to facilitate joint-learning exercises with other trainees/farmers demonstrated</li> <li>c) Ability to match different facilitation tools to different learning circumstances demonstrated</li> <li>d) An ability to stimulate interest and the participation of all participants with respect to gender, age, social status and economic well-being demonstrated</li> <li>e) Understanding of the distinction between the roles of the trainees and those of the facilitator demonstrated</li> <li>f) Roles assigned in a way that clearly demonstrates positive attitude towards trainees' ability to contribute meaningfully</li> <li>g) Ability to generate a rich and diverse knowledge base from participatory exercises illustrated</li> </ul> </li> </ul>	<p>Group practical exercises in which trainees demonstrate the use of at least two (2) PRA exercises</p> <p>Role plays within class setting</p> <p>Simulation exercises</p> <p>Case study questions</p>



## The Small-Scale Seed Production Training Programme

Element/Outcome	Performance Criteria	Assessment Instruments and Procedures
	h) Ability to generate simple but meaningful information that can be used for later interventions demonstrated.	
2.2.4. Demonstrate team building skills	➤ Various team-building skills demonstrated by trainees in groups.	Group practical exercises

## Module 2

### The Small-Scale Seed Production Training Programme

#### Sub Module 2.3

#### Facilitate the development and strengthening of Research-Extension-Farmer group linkages for small-scale seed production (45 minutes)

Elements/Outcomes	Performance Criteria	Assessment Instruments and Procedures
2.3.1. Explain the importance of Research-Extension-Farmer linkages	<ul style="list-style-type: none"> <li>➤ R-E-F linkages defined according to recent literature</li> <li>➤ R-E-F linkages explained by use of a link diagram</li> <li>➤ The roles and importance of R-E-F linkages outlined</li> <li>➤ Potential impact of strong R-E-F linkages explained</li> </ul>	<p>Plenary/group discussion.</p> <p>Written response</p>
2.3.2. Evaluate existing Research-Extension-Farmer linkages	<ul style="list-style-type: none"> <li>➤ Strengths of R-E-F linkages within the context of one's own working area or district determined</li> <li>➤ Areas of potential and constraints within existing R-E-F linkages identified</li> <li>➤ Meaningful and implementable strategies for improving R-E-F linkages suggested</li> </ul>	<p>Written responses that are orally presented</p> <p>Case study exercises</p>
2.3.3. Facilitate a reorientation of attitudes	<ul style="list-style-type: none"> <li>➤ Roles of each actor stated</li> <li>➤ The need for a paradigm and attitudinal change presented</li> <li>➤ Ability to stimulate debate on the subject demonstrated</li> <li>➤ Ability to convince fellow trainees on the need for a reorientation of attitudes illustrated</li> </ul>	<p>Individual overnight assignments &amp; class presentations.</p> <p>Role plays within class setting</p> <p>Simulation exercises</p> <p>Plenary discussion &amp; debates</p>

**Sub Module 2.4****Integrate gender issues in seed production activities  
(35 minutes)**

Element/Outcome	Performance Criteria	Assessment Instruments and Procedures
2.4.1. Define the term gender	<ul style="list-style-type: none"> <li>➤ Gender defined with respect to differentiation of roles between men and women, social construction and context</li> <li>➤ Examples showing an understanding of the term gender stated.</li> </ul>	Plenary/group discussions Written responses
2.4.2. Explain gender as a concept in agricultural production.	<ul style="list-style-type: none"> <li>➤ Productive and reproductive roles of men and women, community roles of men and women, and acceptable norms in their communities with respect to agricultural production stated</li> <li>➤ Gender biases with respect to contribution to agricultural production by individual household members outlined</li> <li>➤ The issue of the contribution to agricultural production by household members linked to the issues of: -               <ul style="list-style-type: none"> <li>a) Subordination of women</li> <li>b) Non-wage labour, and</li> <li>c) Biased statistics and orientation.</li> </ul> </li> </ul>	Plenary/group discussions

## Module 2

### The Small-Scale Seed Production Training Programme

Element/Outcome	Performance Criteria	Assessment Instruments
2.4.3. Evaluate the impact of gender differentiation of roles on seed production activities	<ul style="list-style-type: none"> <li>➤ Different roles allocated to men and women within a selected specific socio-cultural context described</li> <li>➤ Understanding of the disaggregated roles of men and women demonstrated by generating gender disaggregated roles for seed production group activities</li> <li>➤ The concept of gender division of labour explained</li> <li>➤ The concept of time allocation explained</li> <li>➤ The different roles of women in reproduction (e.g. household chores) and production (e.g. farming activities) and potential impact on seed production activities discussed</li> </ul>	<p>Plenary/group discussions</p> <p>Written responses</p> <p>Brain storming exercises</p> <p>Plenary presentations</p>

# Module 2

## Instructor's Manual

### Sub Module 2.1

#### Facilitate the formation of Farmer Seed Production Groups (60 minutes)

##### Elements/Outcomes

2.1.1 Explain the role of groups in rural development.

2.1.2 Discuss the concept of group dynamics.

2.1.3 Facilitate farmer group formation.

Activities	Materials, Media and Equipment	Time
1. Introduce session by linking trainees working environment (rural development) and the need to work in groups.		1 minute
2. Conduct a brainstorming exercise on the types of groups found in small-scale farming environment, highlighting the characteristics of the type of group.	➤ Flipchart/Chalk Board	5 minutes
3. Facilitate a plenary discussion on the role of groups in rural development, noting down additional inputs.	➤ Flipcharts/Chalk Board	15 minutes
4. Give participants handout 2.1 highlighting key issues on the role of groups in agricultural production, concept of group dynamics and farmer group formation (for use after the course).	➤ Handout 2.1	2 minutes
5. Introduce the concept of group dynamics by asking trainees to describe the problems they usually encounter in dealing with farmer groups and in engaging farmers in group discussions, noting down contributions on flipcharts.	➤ Flipcharts/Chalk Board	5 minutes

## Module 2

### The Small-Scale Seed Production Training Programme

#### Instructor's Manual

Activity	Material, Media and Equipment	Time
6. Emphasize highlighted or suggested problems of group dynamics by sharing transparency 2.1.2a illustrating characteristics usually encountered in groups.	➤ Transparency 2.1.2 Handout 2.1.2	5 minutes
7. Give a step-by-step detailed description of suggestions of how one can deal with each of the identified/highlighted problems encountered in group and refer trainees to Handout 2.1.2b	➤ Handout 2.1.2b	5 minutes
8. Explain the stages of farmer group formation, describing how trainees should deal with issues related to the constitution, by-laws, leadership structures, and division of roles between group members, ideal numbers, effective gender-balance and ensuring the sustainability of the group.	➤ Flipchart Transparency 2.1.3 Handout 2.1 highlighting the main points.	5 minutes
9. Facilitate a role-play by trainees highlighting the issues above.		10 minutes
10. Refer trainees to Handout 2.1	➤ Handout 2.1	2 minutes
11. Conduct a question and answer session and gauge trainees' level of understanding with respect to all covered issues and reinforce those areas requiring further elaboration.		5 minutes

**Sub Module 2.2****Apply Agricultural Extension Facilitation Tools And Methodologies In Seed Production (1hr 57 minutes)****Elements/Outcomes**

- 2.2.1 Distinguish between conventional agricultural extension and extension facilitation.
- 2.2.2 Describe the different agricultural extension facilitation methodologies such as RRA and PRA relevant to seed production by small-scale farmers.
- 2.2.3 Apply facilitation tools in seed production.
- 2.2.4 Demonstrate team - building skills.

Activities	Materials, Media and Equipment	Time
1. Introduce the concept of agricultural extension facilitation by highlighting the weaknesses and failures of conventional agricultural extension noting down key areas of weaknesses and failures and contributions by trainees	➤ Flip Chart/Chalk Board	5 minutes
2. Based on highlighted weaknesses and failures of conventional agricultural extension, explain the need for a paradigm shift and attitudinal re-orientation in agricultural extension by highlighting the issue of farmer participation, the KSA triangle and other PRA tools that can be used to facilitate attitudinal change in trainees.		5 minutes
3. Facilitate group/plenary discussions on the differences between conventional agricultural extension and agricultural facilitation in terms of a, b, c, and d (see performance criteria), noting down contribution on flip chart.	➤ Flipchart/Chalk Board	10 minutes

## Module 2

### The Small-Scale Seed Production Training Programme

#### Instructor's Manual

Activity	Material, Media and Equipment	Time
4. Give trainees Handout Number 2.2, which explains the failures/ weaknesses of conventional agricultural extension, PRA tools that can be used to address attitudes and differences between conventional agricultural and extension facilitation.	➤ Handout 2.2 and Transparencies 2.2.1 and 2.2.2 that explains the failure/ weaknesses of conventional agricultural extension and PRA tools that can be used to address attitudes in trainees.	2 minutes
5. Facilitate trainees' reading of handouts and allow them to seek clarifications and/or elaborations on all issues highlighted in the handout.		5 minutes
6. Show transparencies 2.2.3 and 2.2.6 with a list of all PRA tools relevant to crop/ seed production activities and describe each tool briefly, covering the following aspects: - i) Context under which the tool is used ii) Description and demonstration of how the tool is used. iii) Seed production activities for which the tool can be used iv) Expected results and their interpretation.	➤ Transparencies 2.2.3 - 2.2.6 Handout with a list of all PRA tools relevant to crop/ seed production activities.	15 minutes
7. Facilitate reading of Handout 2.2 which describes each tool fully in terms of all the 4 points listed above and allow trainees 15 minutes to go through the handout	➤ Handout 2.2 that describes each tool fully in terms of all the 4 points listed above	15 minutes
8. Facilitate group use/application of one PRA tool, offering assistance where necessary.		10 minutes



## The Small-Scale Seed Production Training Programme

Instructor's Manual

Activities	Materials, Media and Equipment	Time
9. Facilitate presentations on interim results produced during PRA exercises by all groups and a plenary discussion on presentations based on a set criteria and other issues that need clarification.	➤ Flip Chart/Chalk Board	20 minutes
10. Give groups an additional 30 minutes to practice use/ application of other PRA tools		30 minutes

## Module 2

### The Small-Scale Seed Production Training Programme

#### Instructor's Manual

### Sub Module 2.3

#### Facilitate the development and strengthening of Research-Extension-Farmer group linkages for Small-Scale Seed Production (1hr 7 minutes)

##### Elements/Outcomes

2.3.1 Explain the importance of Research-Extension-Farmer linkages.

2.3.2 Evaluate existing Research-Extension-Farmer linkages.

2.3.3 Facilitate a re-orientation of attitudes.

Activities	Materials, Media and Equipment	Time
1. Introduce the concept of R-E-F linkages by showing transparency 2.3a defining "Linkage mechanisms" in terms of both the institutional and functional dimensions	➤ Transparency 2.3a/Handout 2.3	2 minutes
2. Show transparency 2.3.1a with an illustrational link diagram and explain the concept of R-E-F linkages using the link diagram	➤ Transparency 2.3.1a Handout 2.3	5 minutes
3. Facilitate a plenary discussion on issues related to R-E-F linkages and the importance of R-E-F linkages, citing examples from literature and trainees' own experiences, noting down contributions on flip chart for visualisation.	➤ Flipchart/Chalk Board Transparency 2.3b	10 minutes
4. Show transparency 2.3.1b with ideal R-E-F linkages and explain how ideal R-E-F linkages are supposed to function	➤ Transparency 2.3.1b Handout 2.3	3 minutes
5. Explain the need for an evaluation of existing R-E-F linkages and the concept of a SWOT analysis.	➤ Flipchart/Chalk Board Transparency 2.3.2a	2 minutes

## The Small-Scale Seed Production Training Programme

Activities	Materials, Media and Equipment	Time
6. Facilitate group plenary discussion working on a case study to evaluate existing R-E-F linkages in Zimbabwe based on their knowledge and experiences, highlighting system strengths, weaknesses, opportunities and potentials, as well as stating ideas on how R-E-F linkages can be improved for the benefit of all, explaining how each level would benefit.	➤ Handout with case study material. Flipchart/Chalk Board.	30 minutes
7. Show transparency Number 2.3.1a illustrating the R-E-F link diagram and facilitate a brainstorming exercise on the roles of research extension and farmers in that linkage	➤ Transparency 2.3.1a Handout Flip Chart	5 minutes
8. Facilitate a discussion on the need for a paradigm and attitudinal change among all the 3 parties for the linkages to be effective, emphasising the need for all parties to appreciate the important roles played by all parties, noting down all contributions.	➤ Flip Chart/Chalk Board	5 minutes
9. Facilitate another plenary discussion session in which trainees identify problem areas with respect to attitudes and suggest how best the attitudinal problems can be solved, suggesting PRA tools that could be used to accomplish this and provide trainees with a handout which highlights all the key issues.	➤ Flip Chart Handout 2.3.9	5 minutes

## Module 2

### The Small-Scale Seed Production Training Programme

#### Instructor's Manual

### Sub Module 2.4

#### Integrate Gender Issues In Seed Production Activities (35 minutes)

##### Elements/Outcomes

2.4.1 Define the term gender

2.4.2 Explain gender as a concept in agricultural production.

2.4.3 Evaluate the impact of gender differentiation of roles on seed production activities.

Activities	Materials Media and Equipment	Time
1. Introduce the concept of gender by conducting a question and answer session, soliciting for trainees perception on the term gender, noting down highlighted concepts .	➤ Flip Chart	5 minutes
2. Show transparency 2.4.2 with definition of gender and give examples to explain the gender roles of men and women in a given culture or society, emphasising the fact that gender is a social construction which is bound to change from one society to another.	➤ Transparency 2.4.2	5 minutes
3. Explain why the concept of gender is central to agricultural production by showing transparency number 2.4.2 with statistical highlights of women's contribution to local agricultural production and explain the gender biases with respect to contribution to agricultural production highlighting issues of subordination of women, non-wage labour and biased statistics.	➤ Transparency 2.4.2	5 minutes

## The Small-Scale Seed Production Training Programme

Instructor's Manual

Activities	Materials Media and Equipment	Time
4. Facilitate a plenary discussion on the productive and reproductive roles of men and women, community roles of men and women and acceptable norms in their communities, gender division of labour, the current agricultural production activities and potential gender division of labour for seed production activities.	➤ Flip Chart/Chalk Board Transparency 2.4.3	20 minutes

Module 2

The Small-Scale Seed Production Training Programme

**Intentionally left blank**

# Module 2

## Trainee Manual/Instruction Sheet

### Sub Module 2.1

#### Facilitate the Formation of Farmer Seed Production Groups (60 minutes)

##### Elements/Outcomes

2.1.1 Explain the role of groups in rural development

2.1.2 Discuss the concept of group dynamics

2.1.3 Facilitate farmer group formation

Activities	Materials Media and Equipment	Time
1. Take note of the need for rural farmers to work in groups, and the advantages of working in groups to conduct agricultural production activities.	➤ Notebooks	1 minute
2. Participate in a brainstorming exercise on the types of groups found in small-scale farming environment highlighting characteristics of each type of group, noting all points in notebooks.	➤ Notebooks Flipcharts/Chalk Board	5 minutes
3. Participate in group discussions and presentations on the role of groups in seed production activities, recording outputs on flipcharts.	➤ Flipcharts/Chalk Board	15 minutes
4. Go through handout 2.1 on component addressing "the role of groups in agricultural production".	➤ Handout 2.1 on "Farmer seed production group formation".	2 minutes
5. Participate in the description of the problems that you usually encounter in dealing with farmer groups and in engaging farmers in group discussions, noting down contributions in notebook.	➤ Flipcharts/Chalk Board	5 minutes

## Module 2

### The Small-Scale Seed Production Training Programme

#### Trainee Manual

Activity	Material Media and Equipment	Time
6. Take note of the highlighted problems of group dynamics by observing illustrations on transparencies No. 2.1.7a and 2.1.7b, which show characteristics usually encountered in groups.	➤ Illustration 2.1.2 showing characteristics usually encountered in groups.	5 minutes
7. Follow the step-by-step detailed description of suggestions of how you can deal with each of the identified/highlighted problems encountered in groups. (Read handout 2.1.2b).	➤ Handout 2.1.2b highlighting key issues on the role of groups in agricultural production, the concept of group dynamics and farmer group formation.	5 minutes
8. Take note of the explanation given by trainer on the stages of group formation, paying particular attention to the description on how you should deal with issues related to the constitution, by-laws, leadership structures, division of roles between group members, ideal members, effective gender-balance, and ensuring the sustainability of the group.	➤ Notebook Flipchart/ Transparency 2.1.3 Handout with main points	5 minutes
9. Participate in a role-play highlighting the issues above.		10 minutes
10. Go through part of handout no.2.1.3, which covers group formation.	➤ Handout 2.1.3 (detailed under activity 7 above).	2 minutes
11. Participate in question and answer session, seeking clarification on issues you may not have understood with respect to elements 2.1.1, 2.1.2 and 2.1.3		5 minutes



**Sub Module 2.2****Apply Agricultural Extension Facilitation Tools And Methodologies In Seed Production****Elements/Outcomes**

- 2.2.1 Distinguish between conventional agricultural extension and extension facilitation.
- 2.2.2 Describe the different agricultural extension facilitation methodologies such as RRA and PRA relevant to seed production by small-scale farmers.
- 2.2.3 Apply facilitation tools in seed production activities.
- 2.2.4 Demonstrate team - building skills

Activities	Materials Media and Equipment	Time
1. Reflect on the concept of agricultural extension facilitation as it is being introduced, and participate in stating weaknesses and failures of conventional agricultural extension noting down all contributions.	➤ Notebook Flipcharts/Chalk Board	5 minutes
2. Based on highlighted weaknesses and failures of conventional agricultural extension, note the explanation given on the need for a paradigm shift and attitudinal re-orientation in order to have full participation of farmers in project. Appreciate the use of PRA tools (including the knowledge, skills, attitude triangle) that can be used to facilitate attitudinal change in trainees.		5 minutes
3. Participate in plenary group discussions on the differences between conventional agricultural extension and agricultural extension facilitation in terms of a, b, c and d (see performance criteria) noting contributions.	➤ Notebook Flipcharts/Chalk Board	10 minutes

## Module 2

### The Small-Scale Seed Production Training Programme

#### Trainee Manual

Activity	Material Media and Equipment	Time
4. Collect handout no.2.2.1 that explains the failures/weaknesses of conventional agricultural extension, PRA tools that can be used to address attitudes in trainees and differences between conventional agricultural extension and agricultural facilitation.	➤ Handout 2.2 and Transparencies 2.2.1 and 2.2.2	5 minutes
5. Seek clarification and/or clarification elaborations on all highlighted issues in this part of the lecture.		5 minutes
6. View transparency 2.2.3 - 2.2.6 with a list of all PRA tools relevant to crop/seed production activities, noting the description given about each tool in terms of the following aspects; i) Context under which the tool is used, ii) Description and demonstration of how the tool is used, iii) Seed production activities for which the tool can be used, iv) Expected results and their interpretation	➤ Transparencies 2.2.3 - 2.2.6 Handout with a list of all PRA tools relevant to crop seed production activities.	15 minutes
7. Collect handout no.2.2 which describes each PRA tool fully in terms of all the 4 points listed above and take 15 minutes to go through the handout.	➤ Handout no.2.2 with full details of PRA tools.	15 minutes
8. Participate in group practical exercises on the use/application of one PRA tool for 30 minutes.	➤ Handout 2.2 (detailed under activity 7 above).	10 minutes

Activities	Materials Media and Equipment	Time
9. Participate in plenary presentations by groups on interim results produced during PRA exercises and in a discussion on presentations as well as other issues that need clarification.	➤ Flipchart/ Chalk Board Notebook	20 minutes
10. Take 30 minutes to practice use/application of other PRA tools.		30 minutes

## Module 2

### The Small-Scale Seed Production Training Programme

#### Trainee Manual

### Sub Module 2.3

#### Facilitate the development and strengthening of Research-Extension-Farmer group linkages for Small Scale Production (1hr 7minutes)

##### Elements/Outcomes

2.3.1 Explain the importance of Research-Extension-Farmer linkages.

2.3.2 Evaluate existing Research-Extension-Farmer linkages.

2.3.3 Facilitate a reorientation of attitudes.

Activity	Material Media and Equipment	Time
1. View transparency 2.3a showing R-E-F linkages in terms of both the institutional and functional dimensions and note the definition given by the facilitator.	➤ Transparency 2.3a Handout 2.3	2 minutes
2. View transparency 2.3.1a showing an illustrational link diagram and note the explanation given on the concept of R-E-F linkages.	➤ Transparency/ Handout 2.3.1a showing illustrational link diagram on R-E-F linkages.	5 minutes
3. Participate in a plenary discussion on issues related to R-E-F linkages and the importance of R-E-F linkages giving your own experiences with R-E-F linkages, noting down contributions in notebook.	➤ Notebook Flipchart/Chalk Board Transparency 2.3b	10 minutes
4. View transparency 2.3.1b with ideal R-E-F linkages, paying attention to explanation by facilitator on how ideal R-E-F linkages are supposed to function.	➤ Transparency 2.3.1b	3 minutes
5. Note the explanation given on the need for an evaluation of existing R-E-F linkages and the concept of a SWOT Analysis.	➤ Notebook Flipchart/Chalk Board Transparency 2.3.2a	2 minutes

## The Small-Scale Seed Production Training Programme

Activities	Materials Media and Equipment	Time
6. Participate in the plenary discussion using a case study to evaluate existing R-E-F linkages in Zimbabwe based on your knowledge and experiences, highlighting strengths, weaknesses, opportunities and potentials, as well as stating ideas on how R-E-F linkages can be improved for the benefit of all, explaining how each level would benefit.	➤ Flipchart/ Chalk Board Case Study Material	30 minutes
7. View transparency 2.3.1b illustrating the R-E-F link diagram and participate in the brainstorming exercise on the roles of research, extension and farmers in that linkage.	➤ Notebook Flipchart Transparency 2.3.1b Handout 2.3.2	5 minutes
8. Participate in a discussion on the need for a paradigm and attitudinal change among all the 3 parties for the linkages to be effective, paying particular attention on the need for all parties to appreciate the important roles played by all parties, noting down contributions in notebook.	➤ Notebook Flipchart/Chalk Board Transparency 2.3.5	5 minutes
9. Participate in another plenary discussion in which together with other trainees you identify problem areas with respect to attitudes, suggesting how best the attitudinal problems can be solved and also PRA tools that could be used to accomplish this and take note of issues in Handout 2.3 highlighting all the key issues.	➤ Flipchart/Chalk Board. Notebook Handout 2.3	5 minutes

## Module 2

### The Small-Scale Seed Production Training Programme

#### Trainee Manual

### Sub Module 2.4

#### Integrate Gender Issues In Seed Production Activities (35 minutes)

##### Elements/Outcomes

2.4.1 Define the term gender.

2.4.2 Explain gender as a concept in agricultural production.

2.4.3 Evaluate the impact of gender differentiation of roles on seed production activities.

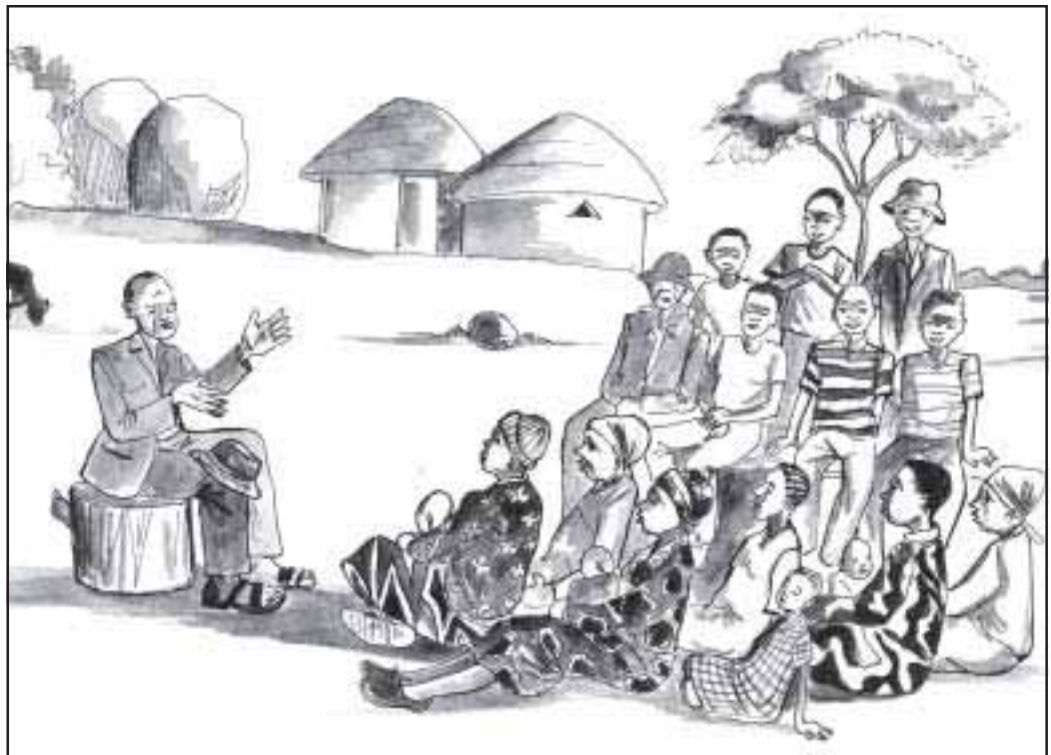
Activity	Material Media and Equipment	Time
1. Participate in the introductory question and answer session on the concept of gender, giving your own perceptions on the term gender and noting down highlighted concepts.	➤ Flipchart/Chalk Board Notebook	5 minutes
2. View transparency 2.4.2 with definition of gender, noting the examples given to explain the gender roles of men and women in a given culture or society, paying particular attention to the fact that gender is a social construction which is bound to change from one society to another.	➤ Transparency 2.4.2/Handout with definition of gender.	5 minutes
3. Note why the concept of gender is central to agricultural production by viewing transparency 2.4.2 with statistical highlights of women's contribution to local agricultural production and the explanation given about the statistics.	➤ Transparency 2.4.2/Handout showing statistical highlights of women's contribution to local agricultural production.	5 minutes
4. Participate in plenary discussion on the productive and reproductive roles of men and women, community roles of men and women, and acceptable norms in their communities, gender division of labour in current agricultural production activities and potential gender division of labour for seed production activities.	➤ Flipchart/Chalk Board Notebook Transparency 2.4.3	15 minutes

### Handout notes on Community-based Farmer Seed Production Groups

#### 2.1 Formation Of Farmer Seed Production Groups

##### 2.1.1 Role of Groups in Rural Development

Almost always people are found in groups. Starting with the family, personalities are shaped, intellectual and emotional development is influenced, cultural awareness is initiated, etc. Given this scenario, a number of rural development agencies have adopted use of the group approach as a way of maximizing outreach and coverage.



2.1 Most of what is learned in life occurs within a group context.

## Module 2

### The Small-Scale Seed Production Training Programme

#### Notes

#### **Advantages of Working in Groups**

Working through groups in rural and agricultural development ensures more effective and efficient programmes. Likewise, targeting groups in seed production programmes has several advantages:

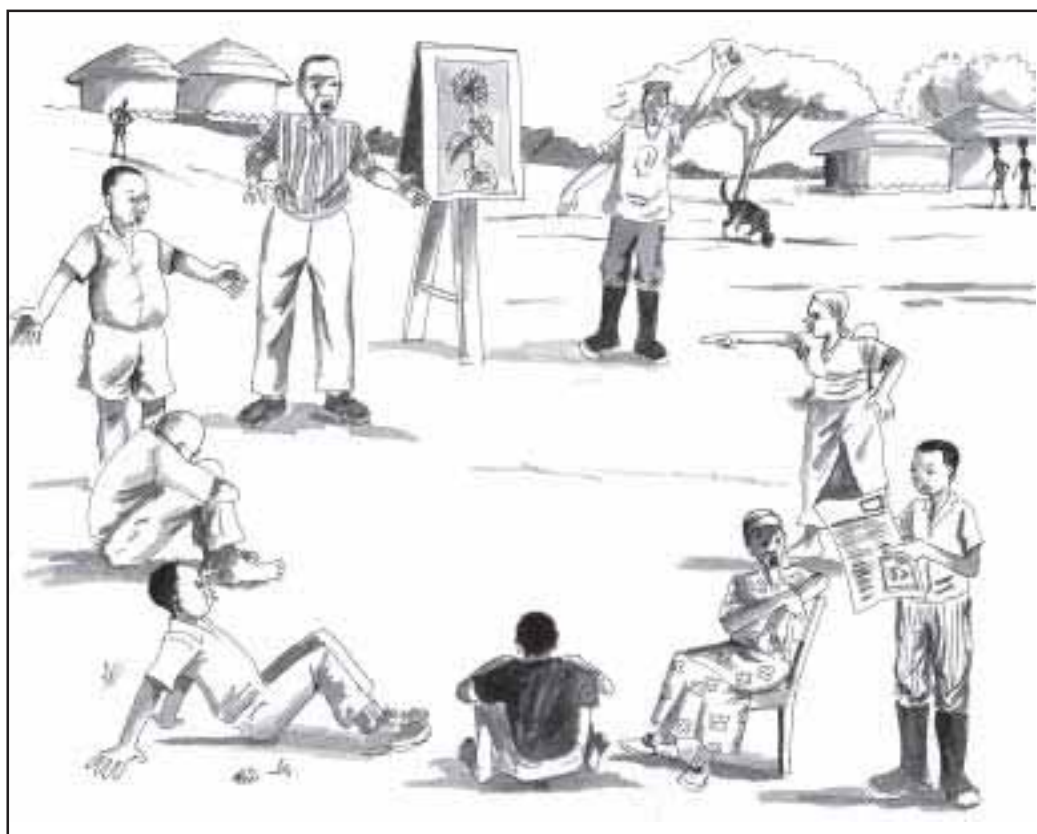
- a) Working through groups allows interaction and the sharing of ideas and experiences.
- b) It promotes confidence and encourages competition amongst group members and amongst groups in a particular area.
- c) Ensures easier and wider coverage in information dissemination.
- d) Ensures uniform dissemination of information and more representative feedback from group members.
- e) It is more efficient as the group strategy saves on time and saves on resources.
- f) Because it involves everyone, the group strategy makes it possible to overcome social pressures.
- g) Programmes tend to be more sustainable because even after the withdrawal of interventionist agencies, the group knows the objectives, plans and ways of executing them.
- h) This system creates a sustainable way of developing a community memory bank.
- i) Groups among themselves disseminate information to other members of the group.
- j) Individuals within groups share labour, especially for those tasks which are labour intensive.
- k) Groups tend to achieve economies of scale e.g. buying of inputs in bulk.
- l) Enables more organized contacts, where the group can demand services.
- m) Minimizes the "free-rider" problem, particularly if it involves common goods e.g. use of vleis or natural pasture for seed production activities.
- n) Groups have better chances of securing loans (investments) and making repayments than individuals.



### 2.1.2 The Concept of Group Dynamics

#### Common constraints when working through Groups or in conducting Group Discussions

As much as working through groups has several advantages, making interventionist programmes that target groups more effective and more efficient, the complexity and diversity within the average group setting introduces the concept of group dynamics.



2.1.2 Complexity and diversity of characters in group settings may hinder progress

## Module 2

### The Small-Scale Seed Production Training Programme

#### Notes

#### **Challenges of Group Dynamics**

- a) Some people know how to talk to but not with other people.
- b) Some people dominate discussions, particularly if there are traditional, political or opinion leaders in the group.
- c) Some people ramble without making any sense.
- d) Some people have a tendency to over-discuss issues, i.e. going past the point of making a decision.
- e) Some people are personality centered, concentrating more on personal attacks than the issue at stake.
- f) Some people have a disruptive influence.
- g) Some people tend to be too passive, resulting in unrepresentative feedback on critical issues.
- h) Some people tend to be uncritical and or independent.
- i) Some people may change the goal of the discussion for their personal gain or to protect their personal interests.
- j) The group strategy makes it difficult to reach consensus.
- k) It is difficult to convince groups.
- l) Making decisions is time consuming, which has tended to result in many decisions on methods of farming being imposed on farmers.
- m) Group complexity can cause ultimate failure.

**Suggestions on dealing with group constraints.**

**Dominating talkers:**

- i) Thank dominating talkers for their contributions, raise a new theme and invite others to contribute.
- ii) Avoid making eye contact.

**The passive:**

- i) Emphasize the importance of contributions.
- ii) Use eye contact to show that you are ready to listen to them.
- iii) Direct straight-forward questions to individuals and be positive to their contributions.

**The dependant:**

- i) Re-affirm neutrality, by emphasizing your role as a facilitator and the need for participants to discuss and make decisions.

**The hostile:**

- i) Acknowledge the individuals' feelings and re-emphasize the objective of the discussion.
- ii) Listen attentively and ask others to comment.

**The rambling:**

- i) May be normal pattern of expression depending on people's culture so tolerate it.

**Nobody talking:**

- i) Warm up the group by introducing current or jovial issues.
- ii) Rephrase the question to re-kindle discussion.

N.B. It is important to occasionally reinforce the objectives of the discussion topic to maintain focus.

## Module 2

### The Small-Scale Seed Production Training Programme

#### Notes

#### 2.1.3 Facilitating Farmer Group Formation in Seed Production

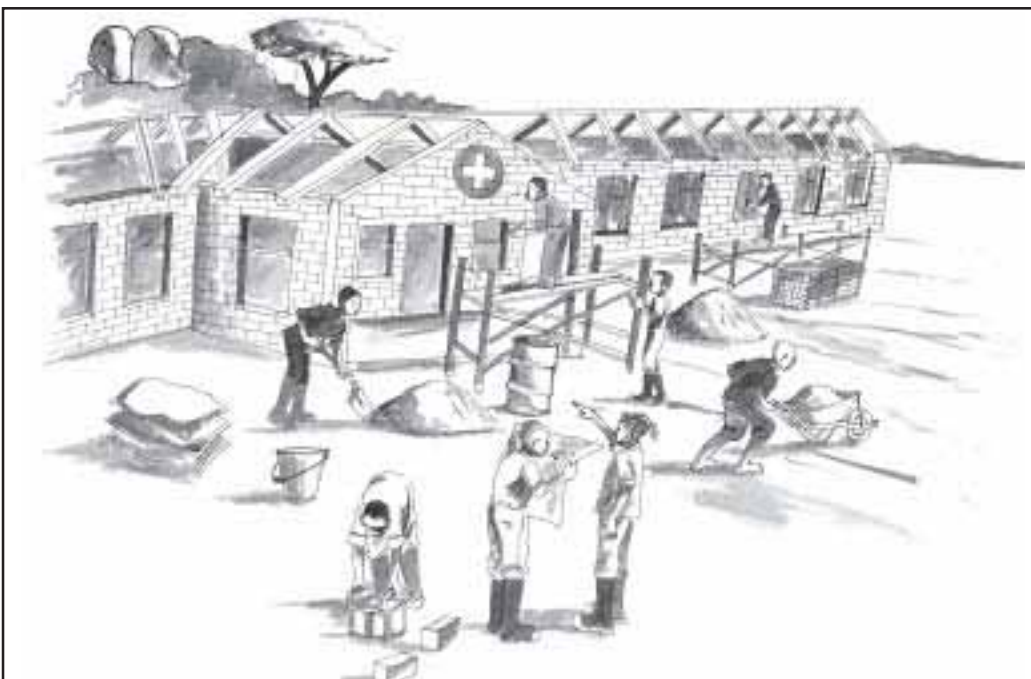
To ensure an effective facilitation of the process of farmer group formation, there is need for a locally drafted/adapted constitution. A constitution creates a conducive framework for easier cooperation.

The constitution should highlight:-

- a) The by-laws.
- b) Leadership structures.
- c) Roles of leadership.
- d) Roles of all the other group members

Ideally, effective and sustainable groups are those in which:-

- a) There is good gender balance in both membership and leadership structures.
- b) Membership is restricted to 15 or less members, although groups of 15-25 can also be effective and sustainable. Figures above 25 are not ideal.
- c) Membership is restricted to achieve an effective balance of depth in terms of understanding and co-operation.
- d) No one is suppressed nor over-whelmed by the presence of leaders.



2.1.3 (a) Much can be achieved if individuals cooperate

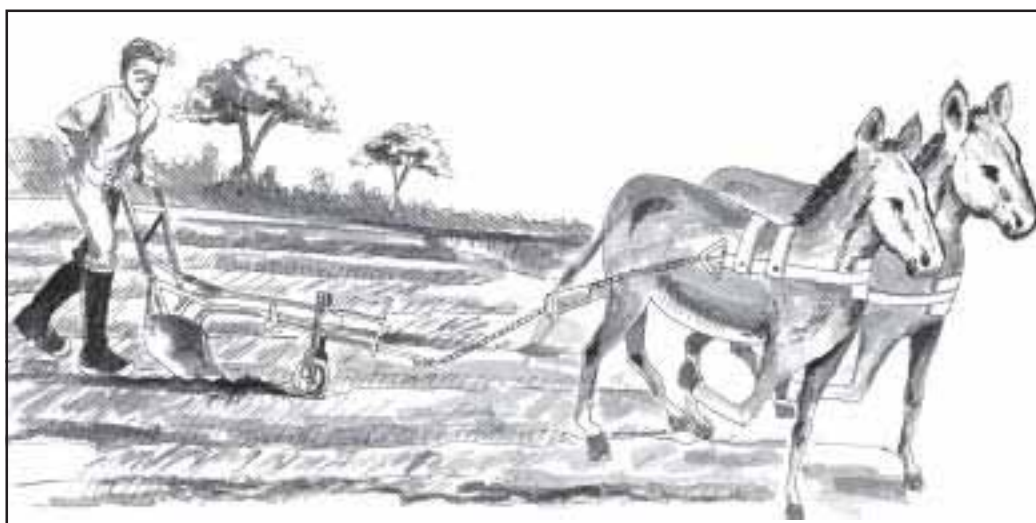
Module 2  
The Small-Scale Seed Production Training Programme

Notes

- e) There is cohesion among the members and there is no possibility of breaking into sub-groups.
- f) Members have a common interest and need (there should be a shared goal and vision).



2.1.3(b) This happens when individuals do not cooperate



2.1.3(c) Much can be achieved if individuals cooperate with others

## Module 2

### The Small-Scale Seed Production Training Programme

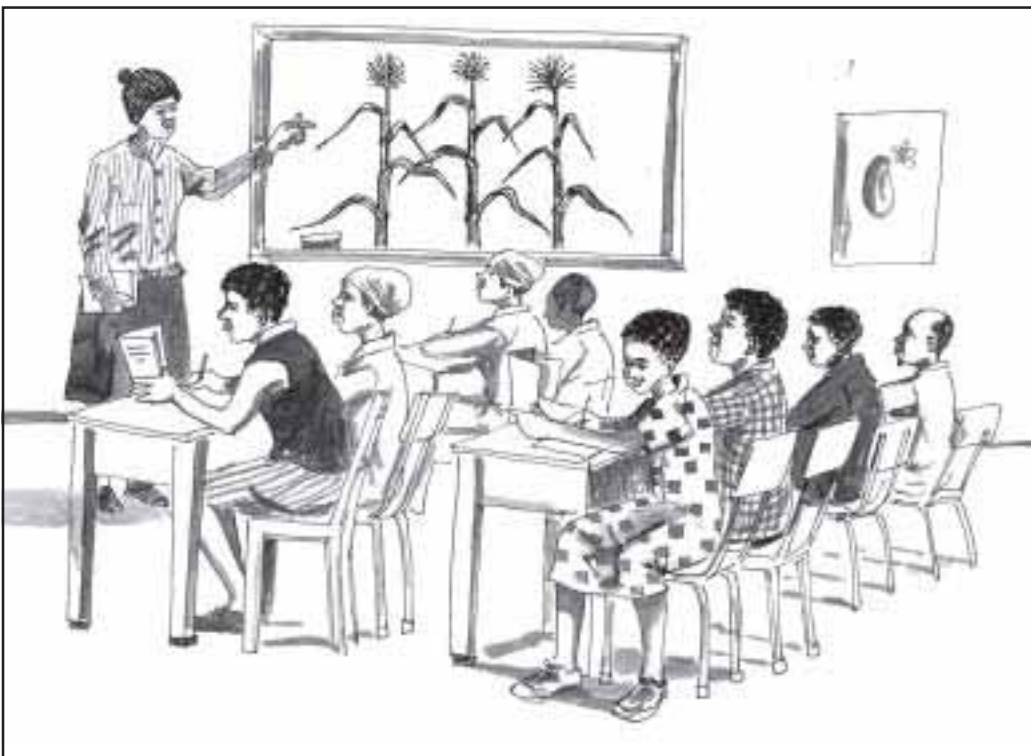
#### Notes

#### 2.2 Applying Agricultural Extension Facilitation Tools And Methodologies In Seed Production.

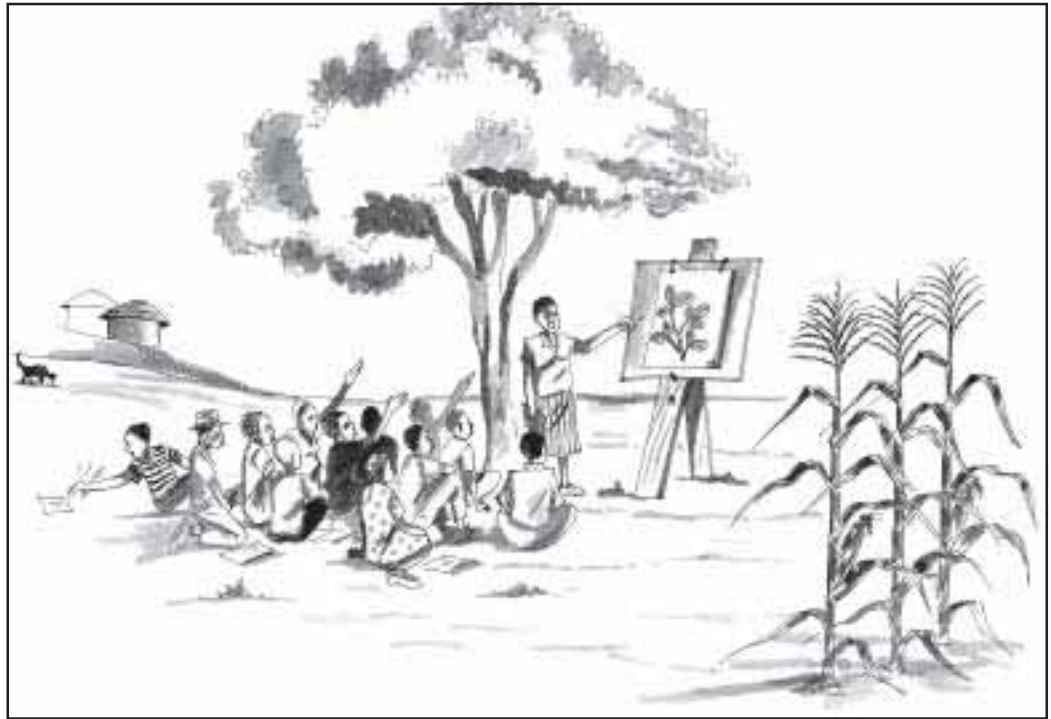
Conventional agricultural research and extension followed a top-down approach, which is commonly referred to as the Transfer of Technology (ToT) model. In the model:-

- Researchers, regarded as the only people who can generate technologies, work in isolation.
- Farmer participation is viewed as insignificant and research agenda or recommendations are arrived at without consultation with the farmers.
- Technology development emphasis is still on the transfer of technology from one set of actors (researchers) through another (extension agents), to the so called users (farmers).

The top-down approach and the lack of a feedback mechanism in the system has resulted in inappropriate recommendations, non-adoption by farmers and unsustainable community programmes. The failure of conventional research and extension prompted the shift to agricultural extension facilitation.



2.2(a) Conventional agricultural training



2.2(b) Agricultural extension facilitation.

## Module 2

### The Small-Scale Seed Production Training Programme

#### Notes

#### 2.2.1 Differences between Conventional Agricultural Extension and Agricultural Extension Facilitation.

Characteristic	Conventional Agricultural Extension	Agricultural Extension Facilitation.
Focus	Pre-concerned with improving the technical set up of the existing system.	Focus has shifted to the social and other non-technical components of the system.
Main emphasis and role	Teaching/information dissemination.	Information sharing and facilitating own farmer activities.
Basic Approach	Top-down approach	Participatory approach (active participation of farmers in discussions and decision-making).
Methods used	Rigid communication channels and structured information dissemination methods e.g. the Training and Visit (T & V) system.	Flexible and Participatory Methods e.g. Participatory Rural Appraisal (PRA) tools.



### 2.2.2 Agricultural Extension Facilitation Methodologies/ Tools.

Rapid Rural Appraisals (RRAs) were first introduced as quick ways of collecting as much information as possible in a participatory way. These were introduced as intervention methodologies that were designed to replace and or compliment formal questionnaire surveys that were deemed to be extractive and non-participatory.

Participatory Rural Appraisals (PRAs) are a more participatory version of Rapid Rural Appraisals (RRAs). These can be used for data collections, enquiries and as ways of invoking the participation of local communities in rural and or agricultural development programmes (see next section for examples).



2.2.2 A local community involved in P.R.A

## Module 2

### The Small-Scale Seed Production Training Programme

#### Notes

#### 2.2.3 Participatory Rural Appraisal (PRA) Tools.

##### **PRA tools are:-**

Simple and inexpensive ways of obtaining valuable information.

Important and effective in understanding local communities’:-

- i) Values and perceptions.
- ii) Incentives and preferences.
- iii) Classifications and criteria.
- iv) Specific conditions and criteria in local communities.

##### **Mapping**

Mapping is a common tool used in PRA. Mapping should be done by members of the local community with facilitation of research team/extensions agent.

Mapping introduces the team to the general spatial lay out of an area and the local community’s perception of their surrounding. It is critical to start PRAs by doing a mapping exercise as a way of breaking the ice. The map orients the team of outsiders to the local surrounding. All informants literate or illiterate can be involved in drawing maps.

Initiate the map drawing process by identifying key landmarks (e.g. road, school) which are in sight and sketching them on the ground. Once this is done, members



2.2.3(a) Involvement of communities in mapping

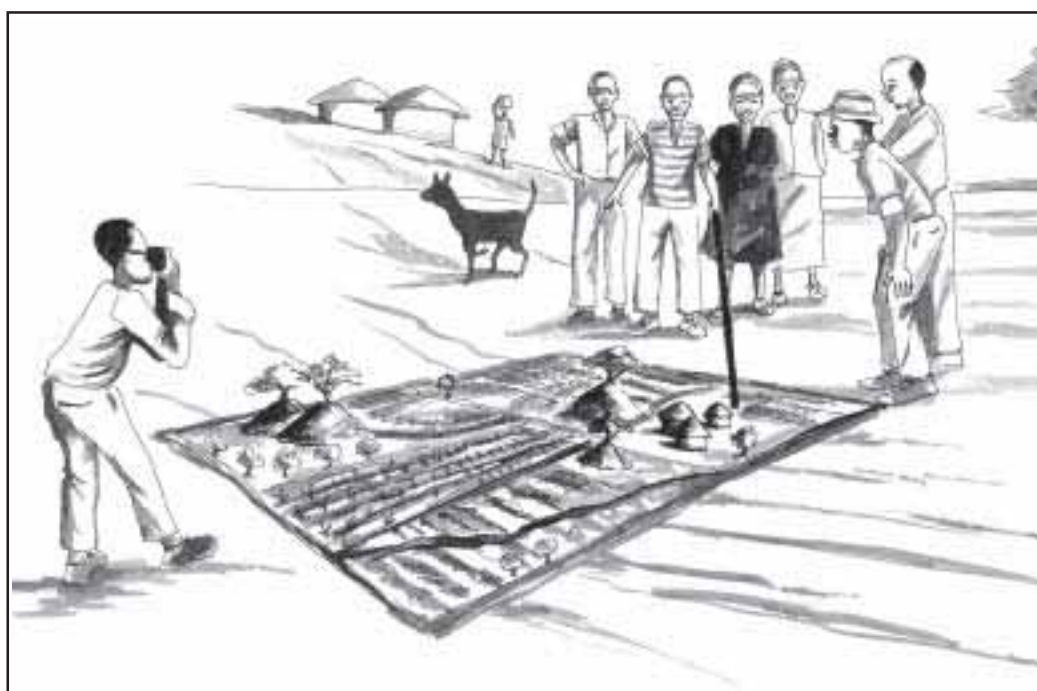
of the local community can continue with the drawing without assistance. The map can be used as a tool to provide discussion about topics that are of interest. Mapping exercises can be used to identify areas that can be used for Farmer Implemented Farmer Managed (FIFM) observation trials, training sessions, seed vouchers and seed fairs, seed gardens and seed multiplication fields.

### Transect Walks

Transect walks are designed to cut across an area thus obtaining a cross-section of land use patterns.

Choose a cross-section which seems to represent variations in the village landscape. The idea is to start at one edge of the village land and walk all the way across to the other end. The team or facilitator takes the walk with one or more informants, or stops to talk to people on the way. The team/facilitator ask questions about anything which seems to be of interest, taking particular note of:-

- a) Changes in land use patterns,
- b) Trees and soils,
- c) Water sources and other natural resources, and
- d) Animal and human activity.



2.2.3(b) How to visualize and use results of a transect walk

## Module 2

### The Small-Scale Seed Production Training Programme

#### Notes

For purposes of seed production, transect walks could be useful for identifying appropriate areas and sites that can be used for Farmer Implemented Farmer Managed (FIFM) observation trials, training sessions, seed vouchers and seed fairs, seed gardens, seed multiplication fields and seed production activities.

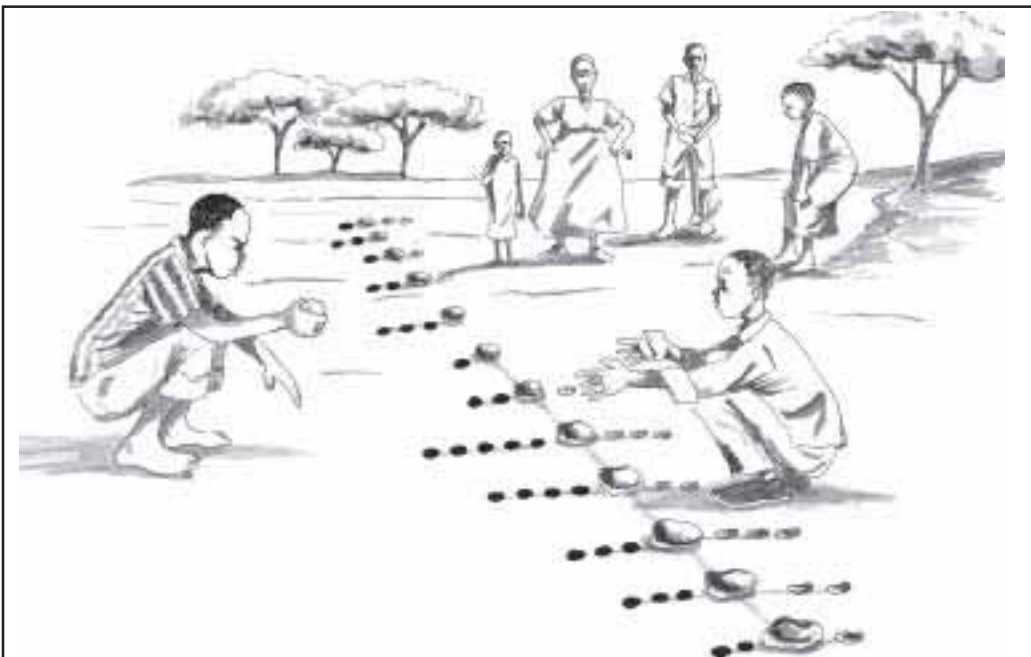
#### Calendars

Calendars are useful in helping understanding changes which take place over the course of a year e.g. seasonal calendar.

Anything that has a temporal dimension can be represented on a calendar. Calendars are drawn on an 18 months time scale so that participants can portray a complete picture of activities and changes within a particular season. Among the many things that can be represented with calendars are:-

- a) Cropping patterns.
- b) How the prices of various commodities change throughout the year.
- c) Patterns of animal management.
- d) Periods with particular problems such as food security, lack of adequate water supply, excessive rainfall, etc.

N.B. Calendars are the basis of the framework for developing a local seed system.



2.2.3(c) Individuals of a local community developing a seasonal calendar

PRA Exercises



2.2.3(d) Conducting a ranking exercise

## Module 2

### The Small-Scale Seed Production Training Programme

#### Notes

#### **Matrix Ranking and Scoring.**

##### **Objectives:**

- i) to produce a scored and/or ranked list of criteria or qualities of some topic of interest, and
- ii) to discover different perceptions amongst participants.

##### **Materials:**

Paper, flip charts, markers, any material such as fruit peelings, stones, bottle tops, paper clips, seeds, beans, graphic representations of objects under discussion, etc.

##### **Time:**

30 – 45 minutes

##### **Procedure:**

1. Participants divided into groups of 4 – 10 people. Divide responsibilities among group members – e.g. one recorder, one or two interviewers, one or two informants; or everybody can be an informant.
2. Choose a class of objects (e.g. crop varieties, horticultural crops, fertilizers, manuring methods, soil conservation techniques, post – harvest management technologies, etc.), which is important to you. If group members are all to be informants, choose a category which everybody is familiar with.
3. Within the selected category/classification, identify 5 or 6 most important objects.
4. Elicit criteria on what is good and/or bad about each object. For each item in turn, ask yourselves: “what is good about it?”. Continue probing until there are no more responses. Then ask yourselves: “What is bad about it?”. Continue until 10 – 20 criteria are produced.

Avoid vague criteria e.g. atmosphere in public bars, since crowded bars or non-crowded bars can be both positive or negative to different people, and for the same people, this can be perceived positive or negative depending on mood. At the same time, this can be a starting point for decision – making and shows the diversity of people’s perceptions or views.

5. List all the criteria. Turn all the negative criteria (e.g. vulnerable to pests, expensive) into positive criteria (e.g. resistant to pests, affordable) so that all criteria are positive. If negative criteria are not converted into positive criteria

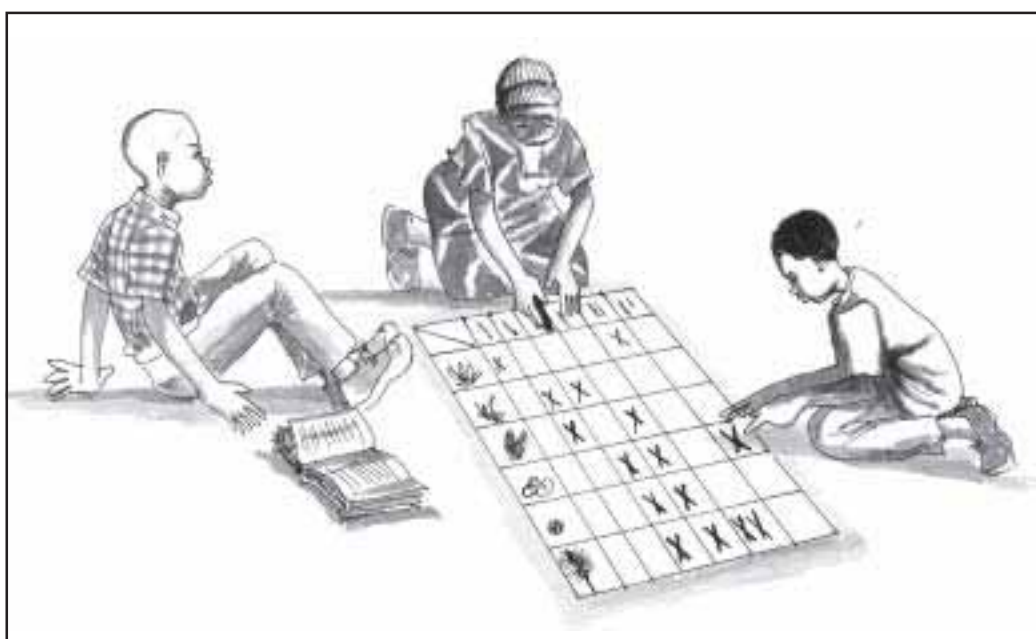
the scoring is unlikely to be consistent: i.e. participants would be giving a high score to a valued object in some cases and a high score to a negative criteria in others.

6. Draw up a matrix with the objects across the top, and the criteria down the side.

If everybody is an informant, i.e. if it is a group discussion, group members should decide which object is best for each criterion. If the group is doing a matrix ranking with six (6) objects, the following sequence of questions is recommended:-

- & "Which is best?"
- & "Which is next best?"
- & "Which is worst?"
- & "Which is next worst?"
- & "Of the two remaining, which is better?"

If you are doing a matrix scoring, choose the number of counters (e.g. stones, paperclips, bottle tops) to allocate as a maximum per cell or per row. Each box is then filled with the number participants think is representative of the relative value of that item.



2.3.2 A matrix ranking/scoring sheet as drawn by locals.

## Module 2

### The Small-Scale Seed Production Training Programme

#### Notes

7. Record your rankings/scorings directly onto the matrix.
8. The interviewer (s) should end with a question such as: "If you could only have one of these, which would you choose?" "Which next?" etc. This can lead to new criteria.
9. Avoid the temptation of simply "Totaling up". However, if time permits, determine the most desirable object: breed, variety, method or technology on the basis of weighted values, depending on which criteria is perceived by the group as more important than others.
10. Make arrangements to report – back (present) your findings.



## 2.3 Facilitating The Development And Strengthening Of Research-Extension-Farmer Group Linkages.

### 2.3.1 Linkage Mechanisms

Linkage Mechanisms are specific organizational procedures used to establish, maintain or improve linkages between the research, extension and farmer technology generation sub-systems.

Since “research” and “extension” have both functional and institutional meanings, linkage mechanisms also have a 2-way conceptualization.

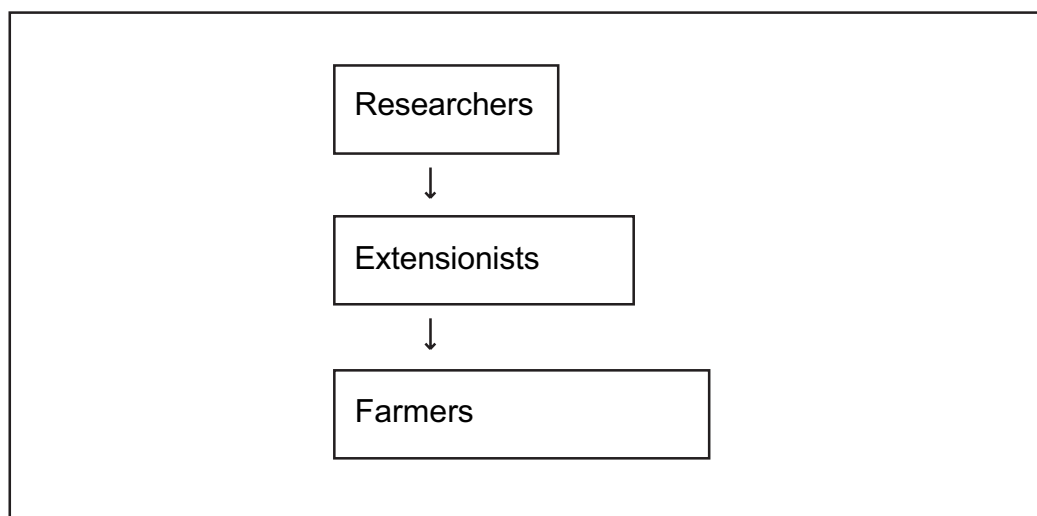
Functional Links relate to research and extension activities. Focus is on activities which aim to form a bridge between researchers, extension workers and farmers (such as joint planning, implementation and evaluation of programmes).

Institutional Links relate to the institutions and personnel that carry out these activities. Focus is on the exchange of resources (e.g. sharing of information, money, personnel and materials).

### Transfer of Technology (ToT) Model versus the ideal linkages

As already highlighted, conventional research and extension followed a top-down approach, commonly referred to as the Transfer of Technology (ToT) model.

In the model, communication and information flow is unidirectional. This lack of a feedback mechanism in the system has resulted in the development of inappropriate technologies, poor adoption by farmers and low production levels. This is why the issue of research-extension-farmer linkages is important



2.3.1(a) ToT Model used in conventional research and extension.

## Module 2

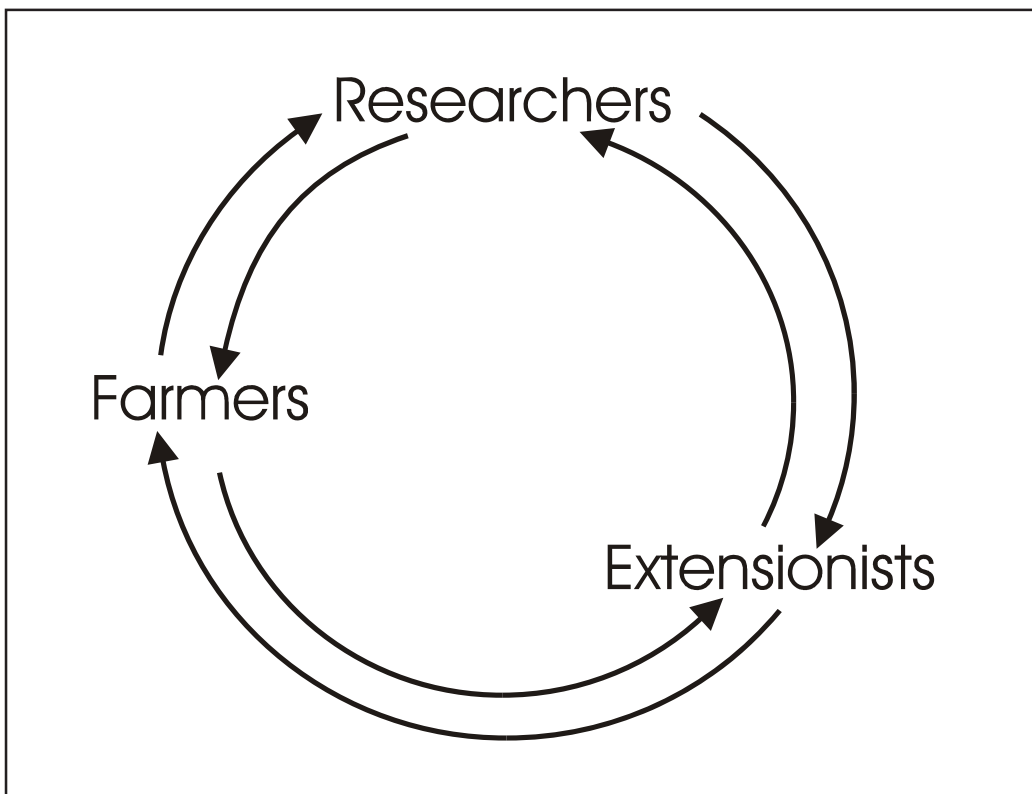
### The Small-Scale Seed Production Training Programme

#### Notes

#### The Important Roles of Research-Extension-Farmer Linkages

##### Strong R-E-F linkages:-

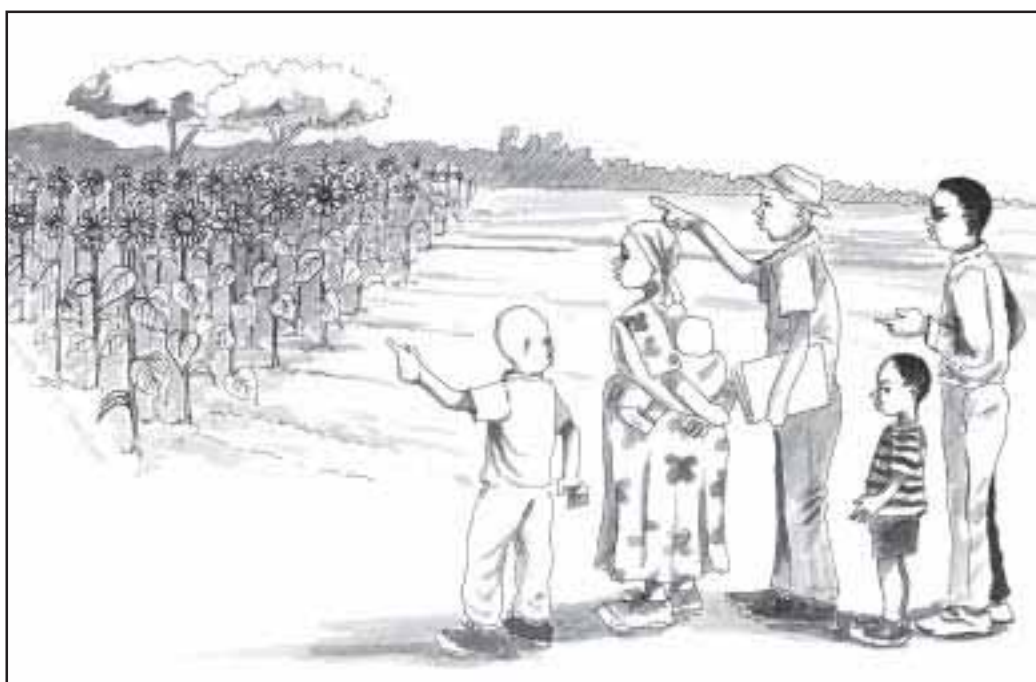
- a) Improve the efficiency of research.
- b) Facilitate the development of site-specific technologies.
- c) Empower farmers for self-help development.
- d) facilitate an understanding of farmers' criteria for selecting technologies.
- e) Increase the efficiency of extension.
- f) Increase the adoption rate of technologies (because of relevance, appropriateness, compatibility, etc.).



2.3.1(b) Illustration of ideal R-E-F Linkages

**2.3.2 Evaluating Research-Extension-Farmer Linkages:  
SWOT Analysis.**

An evaluation of existing R-E-F linkages is a pre-requisite for any attempts at improving and strengthening existing linkages.



2.3.2(b) Carrying out an evaluation exercise

A critical thorough analysis of a system or phenomenon can be achieved through the use of a SWOT analysis. This consequently looks at all aspects dealing in sequence with:

<b>Strengths</b>	<b>Weaknesses</b>
<b>Opportunities</b>	<b>Threats</b>

2.3.2c SWOT Analysis

## Module 2

### The Small-Scale Seed Production Training Programme

#### Notes

#### **2.3.3 Strategies for Improving Existing R-E-F linkages**

##### A. On-Farm Trials (OFT).

- An aspect of Farming Systems Research (FSR).
- Experiments carried out on the farmers' fields including Farmer Implemented Farmer Managed (FIFM) observation trials.
- Opportunities for researchers, extensionists and farmers to interact.

##### B. Farming Systems Research (FSR).

- Developed as a result of failures by conventional ToT approaches.
- FSR is based on farmer needs and farmer identified problems.
- Falls under FSR perspectives.
- FSR is also concerned about and addresses the users and the environment, thereby combining research and geographical information systems.
- Encourages or fosters multi-disciplinary and inter-disciplinary research teams to create variety mapping which is important for local seed provision systems.

##### C. Training and Visit (T&V) System.

- Approach developed by Daniel Benor of the World Bank.
- It encourages very strong linkages between research and extension.
- Works on the basis of extensionists receiving training on a 2-week basis from research scientists and in turn train and monitor farmer activities.
- Very successful approach, especially in irrigation schemes, where strict timetables and schedules can be followed.
- Very good in managing extension as well but approach is resource intensive.

**Re-Orientation of Attitudes (highlighting the roles of researchers, extensionists and farmers and showing the need for collaboration).**

## Researchers:-

- a) Identify constraints unknown to farmers (difficult to conceptualize for farmers).
- b) Sourcing of outside experiences.
- c) Carry out research.
- d) Technical knowledge/experts.
- e) Statistical experts.

## Extension Agents:-

- a) Dissemination of information.
- b) Communication skills both with researchers and farmers.
- c) Can interpret certain phenomenon.
- d) Bridge of extension (can introduce researchers to farmers and vice versa).
- e) Can assist with the actual management of trials during on-farm trials and seed gardens during seed production activities.

## Farmers:-

- a) Use, try and feed information back on the behavior of a technology/variety.
- b) Know and identify problems and their causes.
- c) Have knowledge of the region (know the rainfall patterns, frost occurrence, etc).
- d) Know own potentials and possibilities.
- e) Can manage trials and seed gardens.

## Problems in Creating Strong R-E-F Linkages

- a) Different departments –different priorities. In some countries, extension and research are often under different management structures or directives.
- b) Inappropriate research. This initiates a vicious circle, whereby inappropriate research erodes the confidence of researchers in the eyes of both extension agents and the farmers, thereby inhibiting the development of strong linkages between the different sub-groups.

## Module 2

### The Small-Scale Seed Production Training Programme

#### Notes

- c) Resource constraints. Traditionally, in many countries budgetary allocations to agriculture have been below the anticipated levels. This has been worsened by economic reforms and the need for governments to reduce spending.
- d) Empire building. This is a scenario whereby different ministries or different departments within the same ministry fight for the available meager resources as a way of ensuring their own survival.
- e) Professional jealousy. Researchers have a tendency of producing high powered research publications, which in most cases are removed from the reality on the ground or have no real impact on rural livelihoods. The more researchers write, the more extension agents want nothing to do with them.

## 2.4 Integrating Gender Issues In Seed Production Activities

### 2.4.1 Introduction

Gender refers to the social meaning which is attached to the behavior and roles of men and women in different societies.

### 2.4.2 Gender Issues in Agricultural Production

Most published data on rural economic activities (derived from surveys which consider male household heads as the primary data source) greatly underestimate the role women play in farm work, food processing and most importantly, women are the custodians of seed in indigenous farming systems.

However, in reality, women contribute to the physical work of farm production as well as supporting the livelihood of farm households. Women are thus the invisible agricultural producers in small-scale agriculture. It is only recently that the role of women is being appreciated.



2.4.2 Women as custodians of seed

## Module 2

### The Small-Scale Seed Production Training Programme

#### Notes

As an example, in Zimbabwe:-

- ◆ 85% of women live in the rural areas.
- ◆ Because of male migration to commercial farms, mines and towns, an estimated 40% of the rural households are female headed.
- ◆ Women provide 67% of casual labor within agriculture and the majority of labor in the rural informal sector.
- ◆ Overallly, women and children contribute 80% of the labor required for all basic and rural tasks.
- ◆ Women are also rural transporters, responsible for the transportation of fuel, water, crops from the fields and grain to and from the millers.
- ◆ However, women receive less than 10% of the credit directed to small-scale farmers and merely 1% of the total credit to agriculture.



### **2.4.3 Impact of Gender Differentiation of Roles on Seed Production Activities**

#### Biased Statistics and Orientation

Most information on women's activities in small scale farming areas comes from field studies of sample households in rural communities, not from national systems of economics statistics. This is because national systems of economic statistics do not typically collect any information on non-farm work in the household, and for farm production they understate the contribution of women because censuses and surveys are based on the household (or the farm) as a unit in which women tend to be assigned to the category of housewives.

#### Non-Wage Labour

A feature of most work undertaken by women in the farm household is that it is unpaid. This applies to both reproductive and productive activities (with the exception of wage labour and independent women involvement in agricultural marketing). Non-wage work arises mostly because women's household activities are not confronted by market prices – mostly production for use rather than for exchange.

#### The Subordination of Women

The subordination of women is related both to the gender division of labour and to non-wage work. The subordination of women is defined as the degree of control which men have over the way women conduct their lives, as well as over the intra-household allocation of tasks. Thus, the concept describes the inferior social status of women in all its various forms. An example of this concept is particularly, which describes the power relationship of men over women when, socially, men control the property, resources and income of the farm household. Other common features of patriarchy are control over the labour time of women, over their freedom of movement and over their levels of consumption.

#### Policy Aspects.

The neglect of women in economic policies concerning small-scale agriculture has tended to exacerbate the subordination of women and diminish the impact of policies designed to raise small-scale output and incomes. The male bias of most rural/agricultural development policies is well documented. It is invariably the male household head who is approached to discuss new crops, new seeds, special credit facilities, improved input package, etc. Extension agents are often male and relate almost exclusively to male farmers. The impact of the male bias in agricultural policy

## Module 2

### The Small-Scale Seed Production Training Programme

#### Notes

is to diminish the status of women, isolate them increasingly in household work which may have previously been shared more equally by men and reduce their economic independence while increasing that of men.

#### Gender Division of Labour

The 'gender division of labour' concept describes the socially defined allocation of tasks between men and women in rural households. The division of labour between the sexes is not "natural" or biological but reflects social customs, norms and beliefs which govern and circumscribe individual behavior. Since the gender division of labour is socially and not biologically determined, this is bound to change through time.

#### Reproduction Versus Production

There is a distinct difference on the role of women in reproduction and production.

Social reproduction means the way the society as a whole is renewed over time (socially and economically).

Within social reproduction is the aspect of the reproduction of people, which includes biological reproduction and daily reproduction. Daily reproduction encompasses the maintenance of the household which includes recurrent tasks such as cooking, the collection of water/fuel wood and cleaning the house. Biological reproduction on the other hand, comprises childbearing and child care. In most societies, the tasks associated with the various categories of reproduction are predominantly assigned to women.

However, only biological reproduction is necessarily restricted to women. Women in small-scale agriculture also participate in productive activities. These include production for direct household use, on-farm work, non-farm income generating activities and off-farm wage labour.

#### The Concept of Time Allocation

Time allocation is an operational concept which provides the basis for practical investigation of the gender division of labour. It refers to the average number of hours spent by individual household members in different categories of activities. The study of time allocation opens up differences between men and women in hours of work, productivity and returns to labour. It also enables an analysis of areas of cooperation, conflict, independence and obligation in the working patterns of men and women.

#### **2.4.4 Impact of HIV/AIDS.**

More recently another cause of concern for humanity, and especially in local agricultural systems within the SADC region is the issue of HIV infection and AIDS.

HIV/AIDS is an issue that also affects seed production activities for several reasons:-

- ◆ HIV/AIDS affects mainly the active part of the population (generally those between 20 – 40 years), thereby seriously depleting available labour resources.
- ◆ Due to prolonged illness in a lot of the cases, HIV/AIDS reduces the effectiveness of available labor resources for those who are affected.
- ◆ For the same reason, HIV/AIDS also reduces the effectiveness of available labor resources through time spend caring for other members of the household affected by the disease.

Module 2

The Small-Scale Seed Production Training Programme

**Intentionally left blank**

### **2.1 Role of Groups in Rural Development**

#### **2.1.1 Working through groups:-**

- ❖ Allows interaction, sharing of ideas and experiences.
- ❖ Promotes confidence.
- ❖ Encourages competition amongst group members and amongst groups.
- ❖ Ensures easier and wider coverage in information dissemination.
- ❖ Ensures uniform dissemination of information.
- ❖ Ensures more representative feedback from group members.
- ❖ It is more efficient - saves on time and resources.
- ❖ Makes it possible to overcome social pressures.
- ❖ Programs tend to be more sustainable.
- ❖ Facilitates the development of a community memory bank.
- ❖ Facilitates information dissemination within the group.
- ❖ Individuals within groups share labor.
- ❖ Groups achieve economies of scale.
- ❖ Enables more organized contacts.
- ❖ Minimizes the “free-rider” problem.
- ❖ Groups have better chances of securing loans (investments) and making repayments than individuals.

## Module 2

### The Small-Scale Seed Production Training Programme

#### Transparency

#### **2.1.2a The Concept of Group Dynamics**

- ❖ Some people:-
  - ◆ Know how to talk to, but not with others.
  - ◆ Dominate discussions.
  - ◆ Ramble without making any sense.
  - ◆ Have a tendency to over-discuss issues.
  - ◆ Are personality-centered.
  - ◆ Have a disruptive influence.
  - ◆ Tend to be too passive.
  - ◆ Tend to be uncritical or too dependent.
  - ◆ May change the goal of the discussion.
- ❖ It is also difficult to reach consensus.
- ❖ It is difficult to convince groups.
- ❖ Making decisions is time consuming.
- ❖ Group complexity can cause ultimate failure.

### 2.1.2b Suggestions (Group Constraints).

#### **Dominating talkers:**

- ◆ Acknowledge their contributions, raise a new theme and invite others to contribute.
- ◆ Avoid making eye contact.

#### **The passive:**

- ◆ Emphasize the importance of contributions.
- ◆ Use eye contact to show that you are ready to listen to them.
- ◆ Make use of straight-forward questions and be positive to their contributions.

#### **The dependant:**

- ◆ Re-affirm neutrality.

#### **The hostile:**

- ◆ Acknowledge the individuals' feelings and re-emphasize the objective of the discussion.
- ◆ Listen attentively and ask others to comment.

#### **The rambling:**

- ◆ May be normal pattern of expression depending on people's culture so tolerate it.

#### **Nobody talking:**

- ◆ Warm up the group by introducing current or jovial issues.
- ◆ Rephrase the question to re-kindle discussion.

N.B. It is important to occasionally reinforce the objectives of the topic to maintain focus.

## Module 2

### The Small-Scale Seed Production Training Programme

#### Transparency

#### **2.1.3 Facilitating Farmer Group Formation in Seed Production**

Effective and sustainable groups are those in which:-

- ❖ There is good gender balance in both membership and leadership structures.
- ❖ Membership is restricted to 15 or less. Figures above 25 are not ideal.
- ❖ Membership is restricted to achieve an effective balance of depth in terms of understanding and co-operation.
- ❖ No one is suppressed nor over-whelmed by the presence of leaders.
- ❖ There is cohesion among the members and there is no possibility of breaking into sub-groups.
- ❖ Members have a common interest and need (shared goal and vision).



### **2.2.1 Weaknesses of the Transfer of Technology (TOT) model.**

- ❖ Researchers regarded as the sole generators of technologies.
- ❖ Researchers work in isolation.
- ❖ Farmer participation is viewed as insignificant.
- ❖ Research agendas or recommendations are arrived at without consultation with the farmers.
- ❖ Technology development emphasis is still on the transfer of technology.
- ❖ Uni-directional technology transfer from researchers through extension agents to farmers.
- ❖ The TOT model is a top-down approach.
- ❖ The model lacks a feedback mechanism.
- ❖ The result:-
  - ◆ Inappropriate recommendations.
  - ◆ Non-adoption of technologies by farmers.
  - ◆ Unsustainable community programmes.

**2.2.2. Differences between Conventional/Agricultural Extension and Agricultural Extension Facilitation.**

Characteristic	Conventional Agricultural Extension	Agricultural Extension Facilitation.
1. Focus	Improving the technical set-up of the existing system.	Social and other non-technical components of the system.
2. Main Emphasis and Role	Teaching. Information dissemination.	Information sharing. Facilitating farmer activities.
3. Basic Approach	Top-down approach	Participatory approach.
4. Methods Used	Rigid communication channels and dissemination methods.	Flexible and participatory methods.

### 2.2.3 PRA Tools.

#### Mapping

- ❖ Mapping is a common tool used in PRA.
- ❖ Done by members of the local community with facilitation by research team/extension agent.
- ❖ Mapping introduces the team to the general spatial lay out of an area.
- ❖ Also gives local community's perception of their surrounding.
- ❖ It is a way of breaking the ice.
- ❖ The map orients the team of outsiders to the local surrounding.
- ❖ All informants (literate or illiterate) can be involved in drawing maps.
- ❖ For seed production activities, mapping exercises can be used to identify areas that can be used for:-
  - ◆ FIFM observation trials.
  - ◆ Seed gardens.
  - ◆ Seed multiplication fields.

## Module 2

### The Small-Scale Seed Production Training Programme

#### Transparency

#### **2.2.4 Transect Walks**

- ❖ Transect walks are designed to cut across an area thus obtaining a cross-section of land use patterns.
- ❖ The team or facilitator takes the walk with one or more informants, or stops to talk to people on the way.
- ❖ The team/facilitator asks questions about anything which seems to be of interest, taking particular note of:-
  - ◆ Changes in land use patterns.
  - ◆ Trees and soils.
  - ◆ Water sources and other natural resources.
  - ◆ Animal and human activity.
- ❖ For purposes of seed production, transect walks could be useful for identifying appropriate areas and sites that can be used for FIFM observation trials, seed gardens, seed vouchers and fairs, training sessions, etc.

### 2.2.5 Calendars

- ❖ Calendars are useful in helping understanding changes which take place over the course of a year.
- ❖ Anything that has a temporal dimension can be represented on a calendar.
- ❖ Drawn on an 18 months time-scale to portray a complete picture of activities and changes within a particular season.
- ❖ Among the many things that can be represented with calendars are:-
  - ◆ Cropping patterns.
  - ◆ How the prices of various commodities change throughout the year.
  - ◆ Patterns of animal management.
  - ◆ Periods with particular problems such as food insecurity, lack of adequate water supply, excessive rainfall, etc.

N.B. Calendars are the basis of the framework for developing a local seed system.

### **2.2.6 Matrix Ranking and Scoring**

- ❖ The objective is to produce a scored and/or ranked list of criteria of some topic of interest e.g. open pollinated maize varieties.
- ❖ Materials can include stones, bottle tops, seeds, etc.
- ❖ Participants rank objects on the basis of selected criteria.
- ❖ A matrix is drawn with the objects across the top, and the criteria down the side.
- ❖ Each box is then filled with the number participants think is representative of the relative value of that item.
- ❖ Rankings/scorings are recorded directly onto the matrix.
- ❖ Determine the most desirable object on the basis of weighted values, depending on which criterion is perceived by the group as more important than others.

### **2.3 Research-Extension-Farmer Linkages**

Linkage Mechanisms are specific organizational procedures used to establish, maintain or improve linkages between the research, extension and farmer technology generation sub-systems.

Functional Links relate to research and extension activities. Focus is on activities which aim to form a bridge between researchers, extension workers and farmers (such as joint planning, implementation and evaluation of programmes).

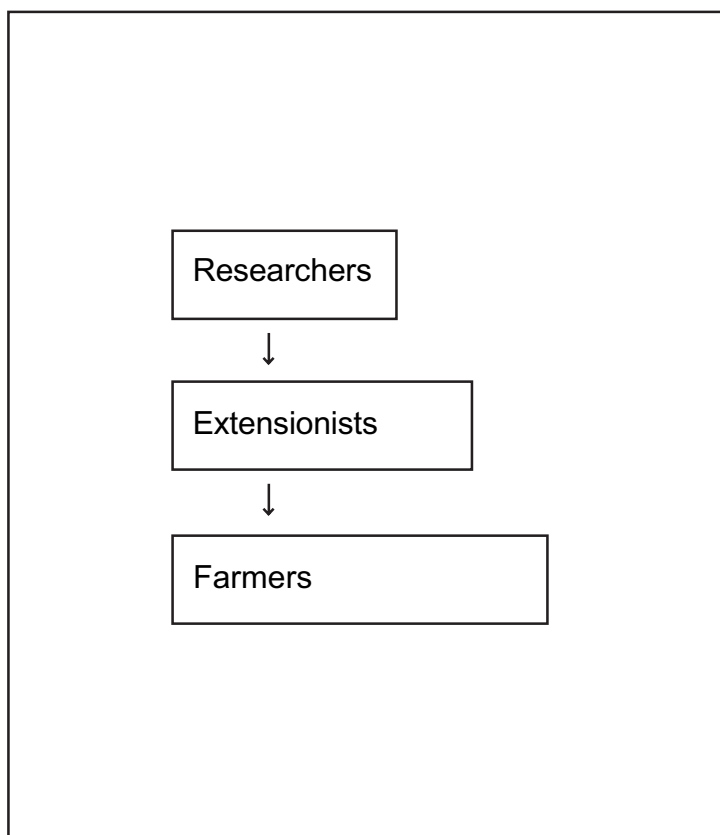
Institutional Links relate to the institutions and personnel that carry out these activities. Focus is on the exchange of resources (e.g. sharing of information, money, personnel and materials).

## Module 2

### The Small-Scale Seed Production Training Programme

Transparency

#### 2.3.1.a ToT Model in conventional research and extension



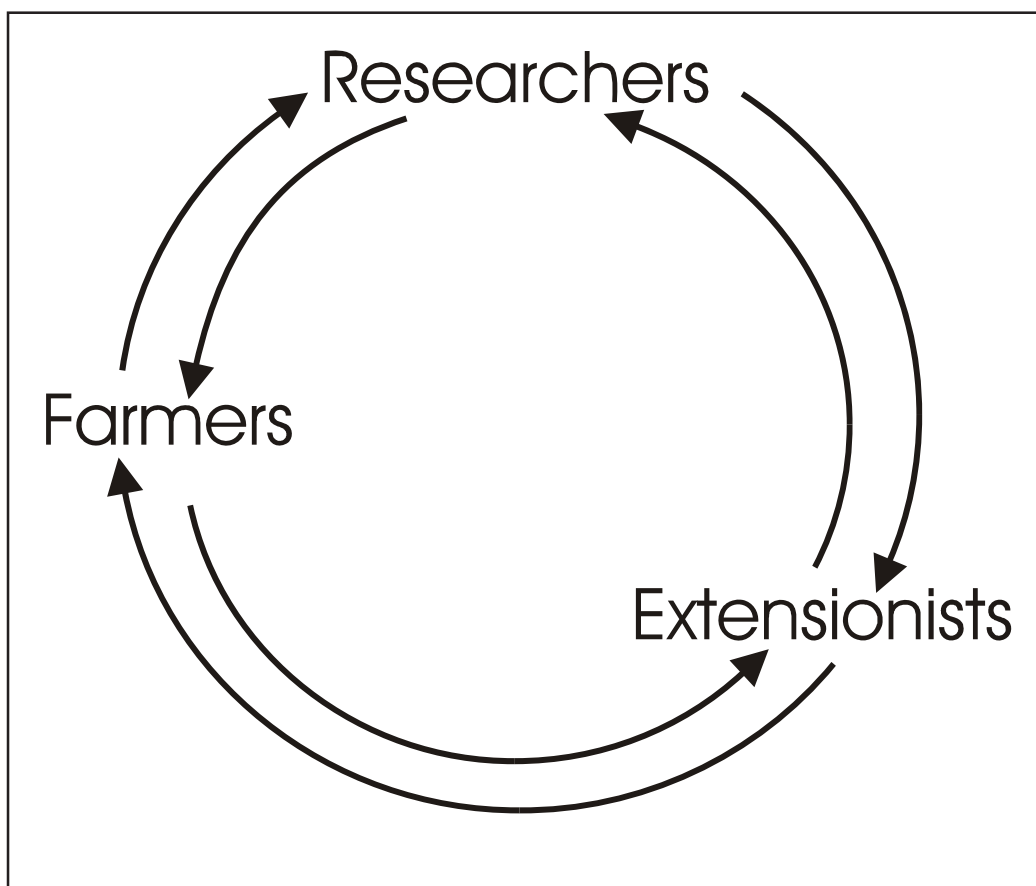


### **2.3.1.b Roles of R-E-F linkages**

Strong Research-Extension-Farmer linkages:-

- ❖ Improve the efficiency of research.
- ❖ Facilitate the development of site-specific technologies.
- ❖ Empower farmers for self-help development.
- ❖ Facilitate an understanding of farmers' criteria for selecting technologies.
- ❖ Increase the efficiency of extension.
- ❖ Increase the adoption rate of technologies (because of relevance, appropriateness, compatibility etc.).

**2.3.1.c Illustration of ideal R-E-F linkages**



2.3.1(b) Illustration of ideal R-E-F Linkages

**2.3.2.a SWOT Analysis.**

<p><b>Strengths</b></p>	<p><b>Weaknesses</b></p>
<p><b>Opportunities</b></p>	<p><b>Threats</b></p>

2.3.2(c) SWOT Analysis

### **2.3.2.b Strategies for Improving Existing R-E-F linkages**

- i) On-Farm Trials (OFT).
  - ◆ An aspect of Farming Systems Research (FSR).
  - ◆ Experiments carried out on the farmers' fields.
  - ◆ Opportunities for researchers, extensionists and farmers to interact.
- ii) Farming Systems Research (FSR).
  - ◆ Developed as a result of failures by conventional ToT approaches.
  - ◆ FSR is based on farmer needs and farmer identified problems.
  - ◆ Falls under FSR perspectives.
  - ◆ FSR is also concerned about and addresses the users and the environment.
  - ◆ Encourages or fosters multi-disciplinary and inter-disciplinary research teams.
- iii) Training and Visit (T&V) System.
  - ◆ Approach developed by Daniel Benor of the World Bank.
  - ◆ Encourages very strong linkages between research and extension.
  - ◆ Works on the basis of extensionists receiving training on a 2-week basis from research scientists and in training and monitoring farmer activities.
  - ◆ Very successful approach, especially in irrigation schemes, where strict timetables and schedules can be followed.
  - ◆ Very good in managing extension as well but approach is resource intensive.

### 2.3.2.c Re-Orientation of Attitudes - Roles of Different Actors

Researchers:-

- ◆ Identify constraints unknown to farmers (difficult to conceptualize for farmers).
- ◆ Sourcing of outside experiences.
- ◆ Carry out research.
- ◆ Technical knowledge/experts.
- ◆ Statistical experts.

Extension Agents:-

- ◆ Dissemination of information.
- ◆ Communication skills both with researchers and farmers.
- ◆ Can interpret certain phenomenon.
- ◆ Bridge of extension (can introduce researchers to farmers and vice versa).
- ◆ Can assist with the actual management of trials during on-farm trials and seed gardens during seed production activities.

Farmers:-

- ◆ Use, try and feed information back on the behavior of a technology/variety.
- ◆ Know and identify problems and their causes.
- ◆ Have knowledge of the region (know the rainfall patterns, frost occurrence, etc).
- ◆ Know own potentials and possibilities.
- ◆ Can manage trials and seed gardens.

## Module 2

### The Small-Scale Seed Production Training Programme

#### Transparency

#### **2.3.2.d Problems in Creating Strong R-E-F Linkages**

- ❖ Different departments –different priorities.
- ❖ Inappropriate research.
- ❖ Resource constraints.
- ❖ Empire building.
- ❖ Professional jealousy.

### **2.4.2 Integrating Gender Issues In Seed Production Activities**

Gender refers to the social meaning, which is attached to the behavior and roles of men and women in different societies.

Example:-

Zimbabwean Gender Statistics

- ❖ 85% of women live in the rural areas.
- ❖ Because of male migration to commercial farms, mines and towns, an estimated 40% of the rural households are female headed.
- ❖ Women provide 67% of casual labor within agriculture and the majority of labor in the rural informal sector.
- ❖ Overall, women and children contribute 80% of the labor required for all basic and rural tasks.
- ❖ Women are also rural transporters, responsible for the transportation of fuel, water, crops from the fields and grain to and from the millers.
- ❖ However, women receive less than 10% of the credit directed to small-scale farmers and merely 1% of the total credit to agriculture.

## Module 2

### The Small-Scale Seed Production Training Programme

#### Transparency

#### **2.4.3 Impact of Gender Differentiation of Roles on Seed Production Activities (the issues)**

- ❖ Biased Statistics and Orientation
- ❖ Non-Wage Labour
- ❖ The Subordination of Women
- ❖ Policy Aspects
- ❖ Gender Division of Labour
- ❖ Reproduction Versus Production
- ❖ The Concept of Time Allocation



## Module 2

# Self Assessment Test

- 2.1 Which of the following statements is not a true reflection of the principles related to the group approach which can be used for the successful implementation of seed production programme activities:-
- a) Working through groups allows interaction and the sharing of ideas and experiences.
  - b) Working through groups ensures uniform dissemination of information and more representative feedback from group members.
  - c) The group approach was developed as a result of failures by conventional ToT approaches.
  - d) Programmes tend to be more sustainable given that the group knows the objectives, plans and how to implement them.
  - e) Groups tend to achieve economies of scale since they can purchase inputs in bulk and market produce as a group.

## Module 2

### The Small-Scale Seed Production Training Programme

#### Self Assessment Test

2.2 State the four (4) major distinguishing characteristics between conventional agricultural extension and agricultural extension facilitation.

a) \_\_\_\_\_

b) \_\_\_\_\_

c) \_\_\_\_\_

d) \_\_\_\_\_

2.3 Suggest three practical strategies that can be used to improve existing research-extension-farmer linkages.

a) \_\_\_\_\_

b) \_\_\_\_\_

c) \_\_\_\_\_

## Module 2

### The Small-Scale Seed Production Training Programme

#### Self Assessment Test

- 2.4 Which of the following statements is not a true reflection of the facts regarding gender issues in agricultural production within the context of a developing country in the SADC region:-
- a) The male bias of most rural/agricultural development policies is not well documented.
  - b) The gender division of labour is socially and not biologically determined, and is bound to change through time.
  - c) Women are the invisible agricultural producers in small-scale agriculture.
  - d) Socially, men control the labour time of women, their freedom of movement, their levels of consumption, the property, resources and income of the farm household.
  - e) A feature of most work undertaken by women in the farm household is that it is unpaid.

**Answer Key to Self Assessment Test**

Sub Module 1:- C

Sub Module 2:- Focus, Emphasis and Role, Approach, and Methods used.

Sub Module 3:- On-Farm Trials (OFT), Farming Systems Research (FSR) and, the Training and Visit (T & V) System.

Sub Module 4:- A

Module 2

The Small-Scale Seed Production Training Programme

**Intentionally left blank**

# Module 3 -Contents

## Module 3

### Facilitate farmers to identify improved crop varieties in farmer implemented farmer managed observation trials

Sub-Modules .....	3- 1
Sub-Module 3.1	
Discuss variety characterization in farmer implemented farmer managed (FIFM) observation trials .....	3- 2
Sub Module 3.2	
Facilitate farmers to plan and implement variety observation trials .....	3- 3
Sub Module 3.3	
Discuss crop pollination in relation to FIFM observation trials .....	3- 5
Sub Module 3.4	
Assist farmers identify and access farmer selected varieties (FSV) .....	3- 6
Sub Module 3.5	
Facilitate farmers to determine seed physiological quality testing .....	3- 6
Instructor's Manual .....	3- 7
Sub Module 3.1	
Discuss variety characterization in farmer-implemented farmer-managed (FIFM) observation trials (20 minutes) .....	3- 7
Sub Module 3.2	
Facilitate farmers plan and implement variety observation trials (60 minutes) .....	3- 8
Sub module 3.3	
Discuss crop pollination in relation to farmer-implemented farmer-managed observation trials (15 minutes) .....	3-10
Sub Module 3.4	
Assist farmers to identify and access farmer selected varieties (15 minutes) .....	3-11

## Contents - Module 3

### The Small-Scale Seed Production Training Programme

Sub Module 3.5	
Facilitate farmers determine seed physiological quality (32 minutes) .....	3-12
Trainee Manual .....	3-15
Sub Module 3.1	
Discuss variety characterization in farmer-implemented farmer-managed (FIFM) observation trials (20 minutes) ...	3-15
Sub Module 3.2	
Facilitate farmers plan and implement variety observation trials (60 minutes) .....	3-17
Sub module 3.3	
Discuss crop pollination in relation to farmer-implemented farmer-managed observation trials (15 minutes) .....	3-19
Sub Module 3.4	
Assist farmers to identify and access farmer selected varieties (15 minutes) .....	3-20
Sub Module 3.5	
Facilitate farmers to determine seed physiological quality (32 minutes) .....	3-21
Notes - Facilitation of small-scale farmers to evaluate and select appropriate crop varieties through farmer implemented farmer managed variety evaluation and observation plot trials. ....	3-23
Introduction .....	3-23
3.1 Variety characterization in farmer implemented farmer managed trials .....	3-23
3.1.1 What is a crop variety? .....	3-23
3.1.2 Aspects and basis of variety characterisation .....	3-24
3.1.3 Characterisation in terms of DUS .....	3-24
3.1.4 Characterisation in terms of VCU .....	3-25
3.1.5 Importance of characterisation .....	3-25
3.2 Planning and implementation of Farmer Implemented Farmer Managed (FIFM) observation and evaluation trials .....	3-26
3.2.1 Justification for FIFM observation trials .....	3-27
3.2.2 Planning of Observation Trials .....	3-27
3.3 Capture, analysis and interpretation of observation trial data. ....	3-38



## Module 3 - Contents

### The Small-Scale Seed Production Training Programme

3.4	Accessing farmer selected variety .....	3-40
3.4.1	Definition of farmer selected variety in relation to FIFM observation trials .....	3-40
3.4.2	Accessing seed of farmer selected varieties .....	3-40
3.5	Seed Physical and Physiological Quality Determination ....	3-40
3.5.1.	Rationale for Determination of Seed Physical Quality .....	3-40
3.5.1.1	Sampling of a seed lot .....	3-41
3.5.1.2	Physical purity testing .....	3-41
3.5.2	Justification for seed physiological quality testing .....	3-41
3.5.3	Determining seed physiological quality .....	3-42
Appendix 3.1	.....	3-45
	Trial protocol for a groundnut adaptation trial .....	3-45
	To the participating farmer .....	3-45
	Trial Protocol .....	3-45
	Proposed plot layout: .....	3-45
	Inputs: .....	3-45
	Management: .....	3-46
	Monitoring: .....	3-47
	Data analysis .....	3-47
Appendix 3.2	Data record sheets for a maize trial .....	3-48
	General Information about the farm .....	3-48
Transparency	.....	3-51
3.1.3	Characterisation of varieties in terms of DUS .....	3-51
3.1.4	Characterisation of varieties in terms of VCU .....	3-52
3.2a	Procedure for conducting FIFM observation trials .....	3-53
3.2b	Example: Summary of results from a maize variety trial ...	3-54
3.5	Procedures for seed physiological quality testing .....	3-55
Self Assessment Test	.....	3-57
Answer Key to Self Assessment Test	.....	3-58

## Contents - Module 3

### The Small-Scale Seed Production Training Programme

## FACILITATE FARMERS TO IDENTIFY IMPROVED CROP VARIETIES IN FARMER IMPLEMENTED FARMER MANAGED OBSERVATION TRIALS

### **Purpose**

The module is intended for agricultural extension agents and rural development officers from the public, private and non-governmental organizations working with farmers involved in community based seed production activities. At the end of this module the trainees will be able to assist farmers evaluate varieties in farmer-implemented farmer-managed observation trials and select those that best suit their conditions.

### **Sub-Modules**

- 3.1 Discuss variety characterization in FIFM observation trials
- 3.2 Facilitate farmers to plan and implement variety observation trials
- 3.3. Discuss crop pollination in relation to FIFM observation trials
- 3.4 Assist farmers identify and access farmer selected varieties
- 3.5 Facilitate farmers to determine seed physiological quality

## Module 3

### The Small-Scale Seed Production Training Programme

#### Sub-Module 3.1

#### Discuss variety characterization in farmer implemented farmer managed (FIFM) observation trials

Element/Outcome	Performance Criteria	Assessment Instruments and Procedures
3.1.1 Define a variety		Plenary discussion
3.1.2 Explain variety characterization	<ul style="list-style-type: none"> <li>➤ The explanation to include:               <ul style="list-style-type: none"> <li>• Aspects used in differentiating varieties (morphological, physiological and performance).</li> <li>• the basis of variety characterization (i.e. genetic make-up, environmental conditions and their interaction)</li> </ul> </li> </ul>	Plenary/group discussion
3.1.3 Discuss variety characterization in terms of distinctness, uniformity and stability (DUS)	<ul style="list-style-type: none"> <li>➤ The discussion to include a description of DUS, its importance in FIFM observation trials and community based projects.</li> </ul>	Self assessment test
3.1.4 Discuss variety characterization in terms of value for cultivation and use (VCU).	<ul style="list-style-type: none"> <li>➤ The discussion to include a description of VCU, its importance in FIFM observation trials and community based seed projects.</li> </ul>	Self assessment test
3.1.5 Explain relevance of variety characterization in FIFM observation trials and community based seed projects	<ul style="list-style-type: none"> <li>➤ Influence of variety characterization on selection of treatments, management of trials, and data collection discussed</li> </ul>	Plenary /Group discussion

## The Small-Scale Seed Production Training Programme

**Sub Module 3.2****Facilitate farmers to plan and implement variety observation trials**

Element/Outcome	Performance Criteria	Assessment Instruments and Procedures
3.2.1 Justify FIFM observation trials	➤ Justification to include a brief description of FIFM observation trials, objectives and role in community based seed projects.	Plenary/Group discussion
3.2.2 Explain the use of FIFM observation plots to various stakeholders	➤ Stakeholders identified to include farmers, facilitators (extension / rural development / NGO officers), seed suppliers (seed company, NARS/IARC breeder, neighbouring districts), associations (farmer organization, local clubs/ co-operatives), local leadership and produce buyers; their roles and benefits discussed.	Plenary/Group discussion
3.2.3 Outline the procedure for conducting a FIFM observation trial	➤ Key components (sensitization, planning and implementation) discussed	Plenary/Group discussion
3.2.4 Outline the FIFM observation plot protocol	➤ Key components and key issues discussed	Written exercise
3.2.5 Design FIFM observation trials	➤ The key factors for site selection (locations, farmers, land), choice of experimental designs (treatments, statistical design, replications, plot size) discussed.	Plenary/Group discussion

## Module 3

### The Small-Scale Seed Production Training Programme

Element/Outcome	Performance Criteria	Assessment Instruments and Procedures
3.2.6 Explain observation plot data capture, analysis and interpretation	➤ The different types of data collected identified, the critical data specified and record sheets illustrated. Aspects of data preparation (missing data, transformations e.t.c.), different types of analysis and presentation of results explained.	Plenary/Group discussion

## The Small-Scale Seed Production Training Programme

**Sub Module 3.3****Discuss crop pollination in relation to FIFM observation trials**

Element/Outcome	Performance Criteria	Assessment Instruments and Procedures
3.3.1 Describe crop pollination types	➤ A brief explanation (short definition) of crop pollination given, the different crop pollination types (self-, cross- & semi cross pollinating) stated and their relevance/ importance in FIFM discussed	Plenary/Group discussion
3.3.2 Discuss crop and pollination dynamics in relation to FIFM observation trials	➤ To include pollen production, movement (pollinating agents) and pollination in different crop types and implications on FIFM observation trials.	Plenary/Group discussion

## Module 3

### The Small-Scale Seed Production Training Programme

#### Sub Module 3.4

##### Assist farmers identify and access farmer selected varieties (FSV)

Element/Outcome	Performance Criteria	Assessment Instruments and Procedures
3.4.1 Explain farmer selected varieties (FSV)	➤ To include definition of FSV in relation to FIFM observation trial and the types of FSV differentiated by origin and variety type	Plenary/Group discussion
3.4.2 Advise farmers on accessing FSV for subsequent use in FIFM observation trials and community based seed projects	➤ The processes in accessing the seed of different types of FSV for subsequent use in FIFM observation trials and community based seed projects outlined	Plenary/Group discussion

#### Sub Module 3.5

##### Facilitate farmers to determine seed physiological quality testing

Element/Outcome	Performance Criteria	Assessment Instruments and Procedures
3.5.1 Explain seed physiological quality	➤ The explanation to include seed germination and vigor	Self assessment test
3.5.2 Justify seed physiological quality testing in relation to FIFM observation trials	➤ To include importance in establishment of FIFM observation trials and in seed retention for use in subsequent activities	Plenary/Group discussion
3.5.3 Determine seed physiological quality	➤ The procedure for sampling, germination test and vigor test outlined and the results correctly interpreted	Group exercise



# Module 3

## Instructor's Manual

### Sub Module 3.1

#### Discuss variety characterization in farmer-implemented farmer-managed (FIFM) observation trials (20 minutes)

##### Elements/Outcomes

3.1.1 Define a variety

3.1.2 Explain variety characterization

3.1.3 Discuss variety characterization in terms of distinctness, uniformity and stability (DUS)

3.1.4 Discuss variety characterization in terms of value for cultivation and use (VCU).

3.1.5 Explain relevance of variety characterization in FIFM observation trials and community based seed projects.

Activities	Materials Media Equipment	Time
1. Start the session by asking trainees to define a variety		2 minutes
2. Facilitate a class discussion aimed at identifying aspects that differentiate varieties and the basis for the differences	➤ Flip chart, markers	4 minutes
3. Show transparency 3.1 which summarizes characterization in terms of distinctness, uniformity and stability	➤ Transparency 3.1	3 minutes
4. Conduct a brain storming session aimed at identifying the farmers' criteria for value for use and cultivation.	➤ Flip chart	5 minutes
5. Show transparency 3.2 which summarizes characterization in terms of value for use and cultivation for trainees to compare with their list	➤ Transparency 3.2	2 minutes
6. Facilitate a class discussion on the relevance and importance of characterization in farmer-implemented farmer-managed observation trials and community based seed projects to wrap up the session.	➤ Flip chart	4 minutes

## Module 3

### The Small-Scale Seed Production Training Programme

#### Instructor's Manual

### Sub Module 3.2

#### Facilitate farmers plan and implement variety observation trials (60 minutes)

##### Elements/Outcomes

3.2.1 Justify FIFM observation trial

3.2.2 Explain the use of FIFM observation plots to various stakeholders

3.2.3 Outline the procedure for conducting a FIFM observation trial

3.2.4 Outline the FIFM observation plot protocol

3.2.5 Design FIFM observation trial

3.2.6 Explain observation plot data capture, analysis and interpretation

Activity	Material Media and Equipment	Time
1. Introduce the session by assessing trainees prior knowledge of the description, objectives and role of FIFM variety observation trials		3 minutes
2. Refer trainees to section 3.2. of the handout notes and allow trainees to read for 4 minutes	➤ Handout section 3.2	4 minutes
3. Conduct a brainstorming session to identify the stakeholders, their role and benefits in FIFM observation trial.	➤ Flip chart	5 minutes
4. Show transparency 3.2a outlining the procedure for conducting FIFM observation trials and facilitate a class discussion on the key points.	➤ Transparency 3.2a	5 minutes
5. Refer trainees to the detailed section 3.2 on designing FIFM observation trial and lead trainees, highlighting the key aspects	➤ Handout section 3.2.	8 minutes

## The Small-Scale Seed Production Training Programme

Activities	Materials Media and Equipment	Time
6. Recap on VCU in sub module 3.1. Conduct a class discussion to identify the data to be captured and categorize it by nature and importance.	➤ Flip chart	5 minutes
7. Divide trainees into 3-4 groups to work on a simulation exercise aimed at producing a trial protocol and data record sheets for a FIFM observation trial.		15 minutes
8. Facilitate presentation by 2 groups and allow other groups to comment		8 minutes
9. Show transparency 3.2b summarizing results from a FIFM observation trial and facilitate a class debate on selection of an ideal improved variety. Highlight the key aspects to wrap up the sub module	➤ Transparency 3.2b	7 minutes

## Module 3

### The Small-Scale Seed Production Training Programme

#### Instructor's Manual

#### Sub module 3.3

#### Discuss crop pollination in relation to farmer-implemented farmer-managed observation trials (15 minutes)

#### Elements/Outcomes

3.3.1 Describe crop pollination types

3.3.2 Discuss crop and pollination dynamics in relation to FIFM observation trials

Activity	Material Media and Equipment	Time
1. Introduce the topic by a question and answer session covering background information on pollination in agricultural crops	➤ List of key questions on pollination and answer key	5 minutes
2. Conduct a brainstorming session on crop and pollination dynamics in relation to FIFM observation trials and community based seed activities	➤ Flip chart	10 minutes

**Sub Module 3.4****Assist farmers to identify and access farmer selected varieties (15 minutes)****Elements/Outcomes**

3.4.1 Explain farmer selected varieties (FSV)

3.4.2 Advise farmers on accessing FSV for subsequent use in FIFM observation trials and community based seed production projects

Activity	Materials Media and Equipment	Time
1. Seek contribution from trainees on the definition of the farmer selected variety (FSV), and the differentiation by origin and variety types	➤ Flip chart	5 minutes
2. Ask trainees to read section 3.4 on identification and access to farmer selected varieties in the handout	➤ Handout notes section 3.4	5 minutes
3. Conduct a question and answer session to clarify issues		5 minutes

## Module 3

### The Small-Scale Seed Production Training Programme

#### Instructor's Manual

### Sub Module 3.5

#### Facilitate farmers determine seed physiological quality (32 minutes)

##### Elements/Outcomes

3.5.1 Explain seed physiological quality

3.5.2 Justify seed physiological quality testing in relation to FIFM observation trials

3.5.3 Determine seed physiological quality

Activity	Material Media and Equipment	Time
1. Refer trainees to section 3.5.1 and 3.5.2 in the handout notes explaining and justifying seed physiological quality testing and allow 3 minutes to read	➤ Handout notes section 3.5.1 and 3.5.2	3 minutes
2. Conduct a question and answer session to clarify issues		2 minutes
3. Demonstrate sampling by taking 3 sub samples (top, middle and bottom) from each bag, mixing the sub-samples and then taking the required sample	➤ 2 bags of seed, a small cup for taking sub samples, packets for taking samples.	5 minutes
4. Demonstrate and facilitate trainees to follow the procedure for a germination test by showing the germination box filled with sand. Divide it into two, plant a portion ensuring equal spacing and equal depth. Use another box with already germinated seed, unearth the seedlings and count and record normal, abnormal and non-germinated seeds from one portion of the box.	➤ Germination box filled with sand, seed sample, germination box with already germinated seed, pencil, paper for recording	12 minutes
5. Refer trainees to section 3.5.3c of the handout on seed vigor and allow 3 minutes to read	➤ Handout notes section 3.5.3c	3 minutes

## The Small-Scale Seed Production Training Programme

Activities	Materials Media and Equipment	Time
6. Refer trainees to visuals in the handout illustrating calculation of germination % and determining seed vigor	➤ Handout visual 3.5.3a and 3.5.3b	2 minutes
7. Wrap up the module by asking trainees to answer the key question at the end of the module for 3 minutes	➤ List of key questions	3 minutes
8. Call out the answers and ask trainees to mark their work. Get feedback and clarify issues	➤ Answer key	2 minutes

Module 3

The Small-Scale Seed Production Training Programme

**Intentionally left blank**



# Module 3

## Trainee Manual/Instruction Sheet

### Sub Module 3.1

#### Discuss variety characterization in farmer-implemented farmer-managed (FIFM) observation trials (20 minutes)

##### Elements/Outcomes

3.1.1 Define a variety

3.1.2 Explain variety characterization

3.1.3 Discuss variety characterization in terms of distinctness, uniformity and stability (DUS)

3.1.4 Discuss variety characterization in terms of value for cultivation and use (VCU).

3.1.5 Explain relevance of variety characterization in FIFM observation trials and community-based seed projects.

Activities	Materials Media Equipment	Time
1. Write your definition of a variety and participate in the class activity	➤ Note pad, pen	2 minutes
2. Participate in a class discussion aimed at identifying aspects that differentiate varieties and the basis for the differences. Note down key points	➤ Flip chart, markers, notepad, pen	4 minutes
3. View transparency 3.1.1 which summarizes characterization in terms of distinctness, uniformity and stability	➤ Transparency 3.1	3 minutes
4. Participate in a brain storming session aimed at identifying the farmers' criteria for value for use and cultivation.	➤ Flip chart, markers	5 minutes
5. View transparency 3.2 which summarizes characterization in terms of value-for-use and cultivation and compare with the outcome of the brain storming session.	➤ Transparency 3.2	2 minutes

## Module 3

### The Small-Scale Seed Production Training Programme

#### Trainee Manual

Activity	Material Media Equipment	Time
6. Participate in a class discussion on the relevance and importance of characterization in farmer-implemented farmer-managed observation trials and community based seed projects. Note key points.	➤ Flip chart, markers, note pad, pen	4 minutes

**Sub Module 3.2****Facilitate farmers plan and implement variety observation trials (60 minutes)****Elements/Outcomes**

- 3.2.1 Justify FIFM observation trial
- 3.2.2 Explain the use of FIFM observation plots to various stakeholders
- 3.2.3 Outline the procedure for conducting a FIFM observation trial
- 3.2.4 Outline the FIFM observation plot protocol
- 3.2.5 Design FIFM observation trial
- 3.2.6 Explain observation plot data capture, analysis and interpretation

Activities	Materials Media and Equipment	Time
1. Participate in the class activity aimed at outlining the description, objectives and role of FIFM variety observation trials. Note down key points	➤ Note pad, pen	3 minutes
2. Read section 3.2 of the handout for 4 minutes and compare to the outcome of the class activity	➤ Handout notes section 3.2	4 minutes
3. Participate in a brainstorming session to identify the stakeholders, their role and benefits in FIFM observation trial. Note key aspects.	➤ Flip chart, markers	5 minutes
4. View transparency 3.2a outlining the procedure for conducting FIFM observation trials and participate in a class discussion on the key points.	➤ Transparency 3.3	5 minutes
5. Open section 3.2 of the handout on designing FIFM observation trial and note critical areas being highlighted by the trainer as you flip through	➤ Handout notes section 3.2	8 minutes

## Module 3

### The Small-Scale Seed Production Training Programme

#### Trainee Manual

Activity	Material Media and Equipment	Time
6. Recap on VCU in sub module 3.1. Participate in a class discussion to identify the data to be captured and categorize it by nature and importance. Note down critical points.	➤ Flip chart, markers, note pad, pen	5 minutes
7. Move into groups to work on a simulation exercise aimed at producing a trial protocol and data record sheets for a FIFM observation trial.	➤ Flip chart, markers	15 minutes
8. Participate in group presentations and note key issues raised.	➤ Note pad, pen	8 minutes
9. View transparency 3.2b summarizing results from a FIFM observation trial and participate in a class debate on selection of an ideal improved variety	➤ Transparency 3.2b	4 minutes
10. Open section 3.2 of the handout detailing final selection and note key aspects being highlighted by the trainer.	➤ Handout section 3.2	3 minutes

**Sub module 3.3****Discuss crop pollination in relation to farmer-implemented farmer-managed observation trials (15 minutes)****Elements/ Outcomes**

3.3.1 Describe crop pollination types

3.3.2 Discuss crop and pollination dynamics in relation to FIFM observation trials

Activities	Materials Media Equipment	Time
1. Participate in a question and answer session covering background information on pollination in agricultural crops	➤ List of key questions on pollination and answer key	5 minutes
2. Participate in a brainstorming session on crop and pollination dynamics in relation to FIFM observation trials and community based seed activities and note key points raised	➤ Flip chart, markers, note pad, pen	10 minutes

## Module 3

### The Small-Scale Seed Production Training Programme

#### Trainee Manual

#### Sub Module 3.4

#### Assist farmers to identify and access farmer selected varieties (15 minutes)

##### Elements/ Outcomes

3.4.1 Explain farmer-selected varieties (FSV)

3.4.2 Advise farmers on access to FSV for subsequent use in FIFM observation trials and community based seed production projects

Activity	Material Media and Equipment	Time
1. Participate in a class activity focussing on the definition of the farmer selected variety (FSV), and the differentiation by origin and variety types	➤ Flip chart, markers	5 minutes
2. Read section 3.4 on identification and access to farmer selected varieties in the handout	➤ Handout notes section 3.4	5 minutes
3. Participate in a question and answer session to clarify issues		5 minutes

**Sub Module 3.5****Facilitate farmers to determine seed physiological quality  
(32 minutes)****Elements/ Outcomes**

3.5.1 Explain seed physiological quality

3.5.2 Justify seed physiological quality testing in relation to FIFM observation trials

3.5.3 Determine seed physiological quality

Activities	Materials Media and Equipment	Time
1. Read section 3.5.1 and 3.5.2 in the handout explaining and justifying seed physiological quality testing for 3 minutes	➤ Handout section 3.5.1 and 3.5.2	3 minutes
2. Participate in a question and answer session to clarify issues		2 minutes
3. Observe demonstration of sampling whereby 3 sub samples (top, middle and bottom) from each bag are drawn, mixed and then the required sample is taken	➤ 2 bags of seed, a small cup for taking sub samples, packets for taking samples.	5 minutes
4. Participate in the procedure for a germination test. Work with a germination box filled with sand, being planted to ensure equal spacing and equal depth. Work with another box with already germinated seed where seedlings are carefully unearthed, counted and records of normal, abnormal and non-germinated seeds from one portion of the box taken.	➤ Germination box filled with sand, seed sample, germination box with already germinated seed, pencil, paper for recording	12 minutes

## Module 3

### The Small-Scale Seed Production Training Programme

#### Trainee Manual

Activity	Material Media and Equipment	Time
5. Read section – of the handout on seed vigor for 3 minutes.	➤ Handout 3.5.3a	3 minutes
6. View visuals in the handout illustrating calculation of germination % and determining seed vigor	➤ Handout 3.5.3b	2 minutes
7. Answer the key question at the end of the module for 3 minutes to wrap up the module	➤ List of key questions	3 minutes
8. Mark your work using answers being called by trainer. Give feedback and seek clarification on any misunderstanding	➤ Answer key	2 minutes



**Notes on facilitation of small-scale farmers to evaluate and select appropriate crop varieties through farmer implemented farmer managed variety evaluation and observation plot trials.**

### **Introduction**

This module describes the participatory research and extension approaches used to train small-scale farmer groups on how to evaluate and select crop varieties appropriate for their food and economic security concerns.

### **3.1 Variety characterization in farmer implemented farmer managed trials**

#### **3.1.1 What is a crop variety?**

Most of us have observed some variation in the characteristics of a given crop such as differences in grain colour, plant height, leaf shape etc. When a group of plants exists, which is distinct in one or more characteristics from other groups of plants of the same crop species, and which maintains its distinctive characteristics when reproduced; this group of plants constitutes a variety. Such distinct characteristics help describe or characterise a variety.



3.1.1 Field Bean Varieties Characterised by Variation in Colour, Size and Shape

## Module 3

### The Small-Scale Seed Production Training Programme

#### Notes

#### **3.1.2 Aspects and basis of variety characterisation**

One variety may flower or mature earlier than another. Such distinctive and observable growth development characteristics often have a physiological basis. For some characteristics, the variation has distinct categories such as grain texture in maize that is either dent or flint. Such variation is qualitative in nature. However, for characteristics such as yield, seed size, plant height and others, there are no distinct categories, instead the observed variations are continuous in range. This type of variation is quantitative in nature. But what brings about this variation used in characterising varieties?

The underlying causes of the visible (phenotypic) characteristics are the interactions between the genotype (genetic make-up) of the variety and the environment conditions under which it is produced. The genetic basis for variation is made possible by different hereditary information carried in the plant cells. This can be observed in maize varieties ZM 421 and ZM 521 where the varieties exhibit observable differences in their flowering periods and fertilisation profile under the same agroenvironmental conditions.

Relative performance of varieties may change with the environment, such as observed variation in yield potential between some groundnut varieties such as Valencia types that yield better than Spanish types in the high rainfall areas, yet the reverse is true in low rainfall areas. Such responses are due to the impact of the interactions between variety genotype and environmental conditions under which the variety is grown.

In local seed provision systems two commonly used criteria for characterising varieties are their distinctness from other varieties, uniformity and stability (DUS,) and value for cultivation and use (VCU) in a given community.

#### **3.1.3 Characterisation in terms of DUS**

DUS characterisation emphasises variety:

- ◆ Distinctness where a variety is clearly differentiated from other existing varieties by one or more identifiable characteristics or traits;
- ◆ Uniformity in expression of one or two relevant traits such period of flowering from crop emergence, which if uniform, only varies within very narrow ranges.
- ◆ Stability, which is the ability to maintain its distinctive characteristics over time following repeated propagation.

DUS characterisation is important for variety identification purposes particularly for seed producers and plant breeders. The recorded information is used for registration into a national approved variety list. DUS is further important in variety verification and validation during seed crop inspections at farmer field level. In this regard, training farmers in correctly describing crop varieties based on DUS characteristics is the basis for knowledge and information acquisition required for quality seed production.

### 3.1.4 Characterisation in terms of VCU

Value for Cultivation and Use (VCU) is a useful criterion for selecting varieties.

- ◆ Cultivation value includes aspects such as yield potential, stability and ease of harvesting
- ◆ Use relates to values such as:-
  - Consumption (palatability, suitability for different food preparations),
  - Economic returns accrued through grain quality and storability which could be commercially important,
  - Maturity profiles that relate to hunger risk avoidance for the produce to last the whole year through staggered harvests and
  - Cultural practises where the variety traits are used in customary ceremonies within a given community.

Ultimately, efforts by breeders and seed houses can only bear fruit if the VCU criterion of a given variety is in conformity to the social and economic needs of the farmers. It is on the basis of VCU characterisation that farmers are able to select varieties specifically appropriate to their needs through FIFM variety evaluation and observation trials.

### 3.1.5 Importance of characterisation

Accurate descriptions of characterisation of distinctive traits in any variety are important for its correct identification. Secondly, characterisation also allows farmers to select varieties based on their preferred choices. Thirdly, roguing off-types is possible only if variety characteristics are clearly spelt. For correct characterisation it is critical that the expression of such distinctive traits be observed under different agroenvironmental conditions over a number of seasons.

For indigenous farmers to gain the requisite knowledge and information to accurately characterise a variety, it is essential that farmers share their experiences. It has been observed that farmer groups are the best media for information and knowledge diffusion within a community.

### 3.2 Planning and implementation of Farmer Implemented Farmer Managed (FIFM) observation and evaluation trials

Normally there are three phases in conducting observation trials where farmers are fully involved namely; sensitisation, planning and implementation. The first stage involves accurate identification of problems associated with seed provision. Since farmers are involved, PRA tools can be very useful. Once problems have been identified, beneficial partnerships have to be forged with other stakeholders. To arouse interest and subsequent participation of the identified partners requires a sensitisation process.



3.2(a) Phases in conducting FIFM trials, "Decision Making"

### **Justification for FIFM observation trials**

FIFM variety evaluation and observation trial plots are established on the field where a similar food crop would be grown. The trial is established at the edge of the crop where it is accessible to the whole community for evaluation and observation. The trials are used basically to conduct:

- ◆ Training of facilitators and farmers in variety evaluation for DUS and VCU under local agroenvironmental conditions and farming systems including developing community memory domains within the communities where the majority of participants might be illiterate
- ◆ Field school training of facilitators/farmers in variety characterisation for generating knowledge and information systems for determination of variety genetic quality and of variety growth parameters
- ◆ Development of germplasm GIS adaptability maps by international agricultural agencies
- ◆ Verification of information generated in similar agro-ecological conditions and farming systems important for determination of value for cultivation and use of a variety
- ◆ Field Days for variety performance promotion and advertisement within a potential seed market zone.

### **Planning of Observation Trials**

Planning for implementation of variety evaluation, verification and observation trials at

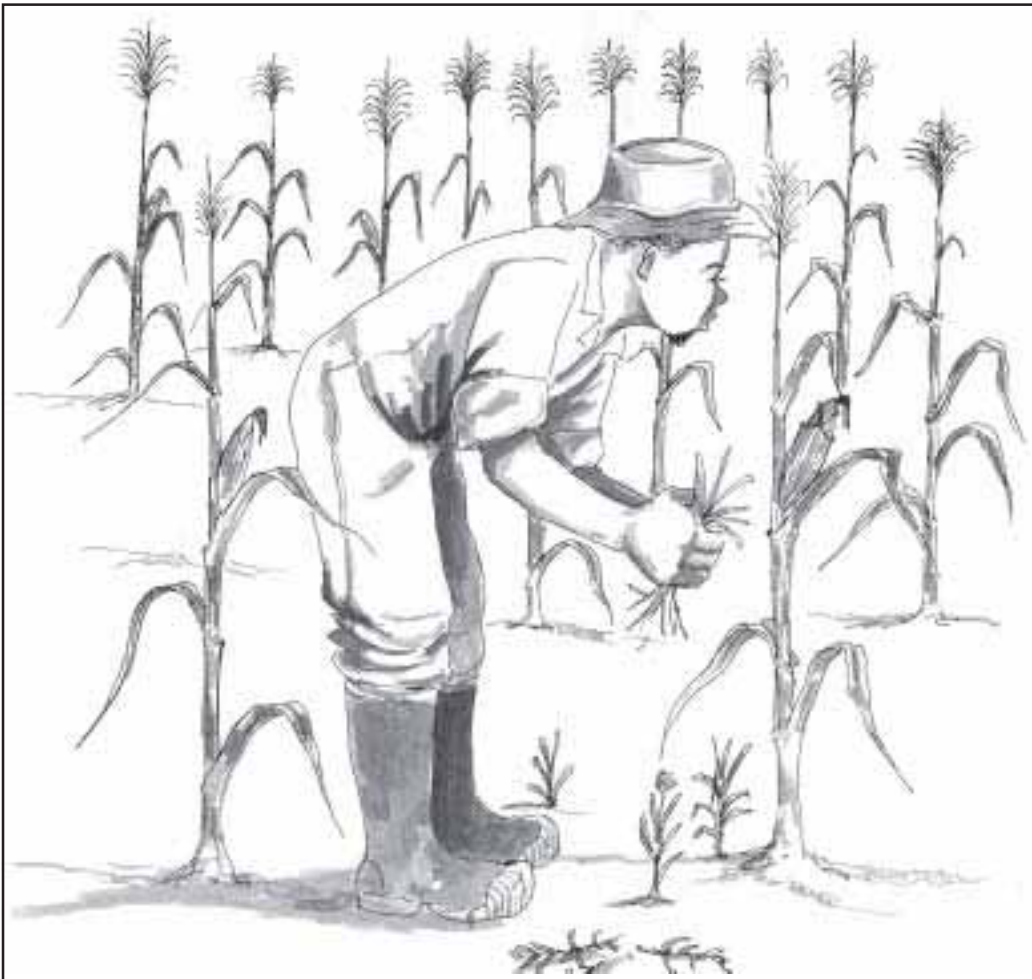
- ◆ Facilitator level involves key financial support institutions (NGOs or public financial support agencies), extension, research personnel. The facilitators explain the rationale of the concept based on knowledge, information and technology selection to farmers for quality seed production. Table 3.2a gives a guide on planning and implementation of FIFM trial activities.
- ◆ Community level mobilisation to explain the concept of local seed provision systems to the targeted groups of farmers involving the rationale for selection of appropriate crops for their own household food security and consistent with farmers socio-economic expectations. Variety characterisation is done for the purpose of local quality seed production and supply processes to enable farming communities to verify variety genetic purity, seed physical and physiological quality and variety genetic purity maintenance on their own.

## Module 3

### The Small-Scale Seed Production Training Programme

#### Notes

- ◆ Work-plan preparation with selected participants, minimum of six observation trials per crop per village to cater for randomisation
- ◆ Discuss activities designed to achieve expected results
- ◆ Selection of variety preference and diversity
- ◆ Selection of varieties for multiplication
- ◆ Generation of information and knowledge systems for quality seed production



3.2(b) Phases in conducting FIFM trials, "Implementing"

**Table 3.2 (a)**  
**Framework for Planning and Implementation of FIFM variety evaluation and observation trial plots**

Activity	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	Responsible Stakeholder	Cost centre
1. PRA seed demand surveys and farmer consultative meetings																		
2. Extension facilitator/Farmer community problem diagnosis meeting																		
3. Community Seed Problem sensitisation sessions, establishment of farmer seed provision groups																		
4. Selection of pilot seed project area																		
5. Stakeholders' Seed Project Evaluation and Budgeted Program Planning Session																		
6. Train the trainer workshop on implementation of FIFM variety evaluation and observation trial plots																		
7. Identification of farmer participants and selection of FIFM trial sites																		
8. Trial plots seed acquisition from preferred germplasm sources																		

# Module 3

## The Small-Scale Seed Production Training Programme

### Notes

Activity	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	Responsible Stakeholder	Cost centre
9. Train the farmer participants on the use of FIFM trial protocols. Important data to be recorded being the critical aspect of this session																		
10. Seed and protocol distribution for FIFM variety evaluation and observation trials																		
11. Monitoring and evaluation during the establishment of all trials																		
12. Field school training in variety evaluation at vegetative stage																		
13. Field school training in variety evaluation and trait observation at flower initiation stage																		
14. Field school training in variety evaluation and trait observation at 50% flowering .																		
15. Fields days and community field schools to train farmers in variety characterisation after all varieties have flowered.																		
16. Field school on training for determination of seed grain physiological maturity. Prepare for Field day for community exposure to variation in variety expression at harvest																		



Activity	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	Responsible Stakeholder	Cost centre
17. Field school training on trial harvesting and fruiting body conditioning																		
18. Field day for community evaluation of variety development and suitability for cultivation in the area based on observations																		
19. Training in variety evaluation based on yield potential, palatability and seed grading and grain processing for food.																		
20. Trials data after collection and its analysis																		
21. Scientific trial data analysis by research and extension																		
22. Seed Fairs for exposure of introduced technology and RRA of available crop and variety diversity used in the local farming systems																		
23. Farmer ranking of varieties and selection of farmer selected varieties																		
24. FIM variety evaluation for VCU and DUS workshop with all stakeholders																		

Activity	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	Responsible Stakeholder	Cost centre
25.Stakeholders meeting for planning for training in seed production off-season in seed gardens																		
26.Basic seed acquisition and distribution for pilot seed multiplication of FSV in seed gardens																		
27.Stakeholders Review of all FIFM trials data. Budgeted Program planning for the 2 <sup>nd</sup> season of FIFM variety, evaluation, verification and observation trials																		
28.Workshop for training all participants in field implementation of quality seed testing including physical and physiological aspects																		

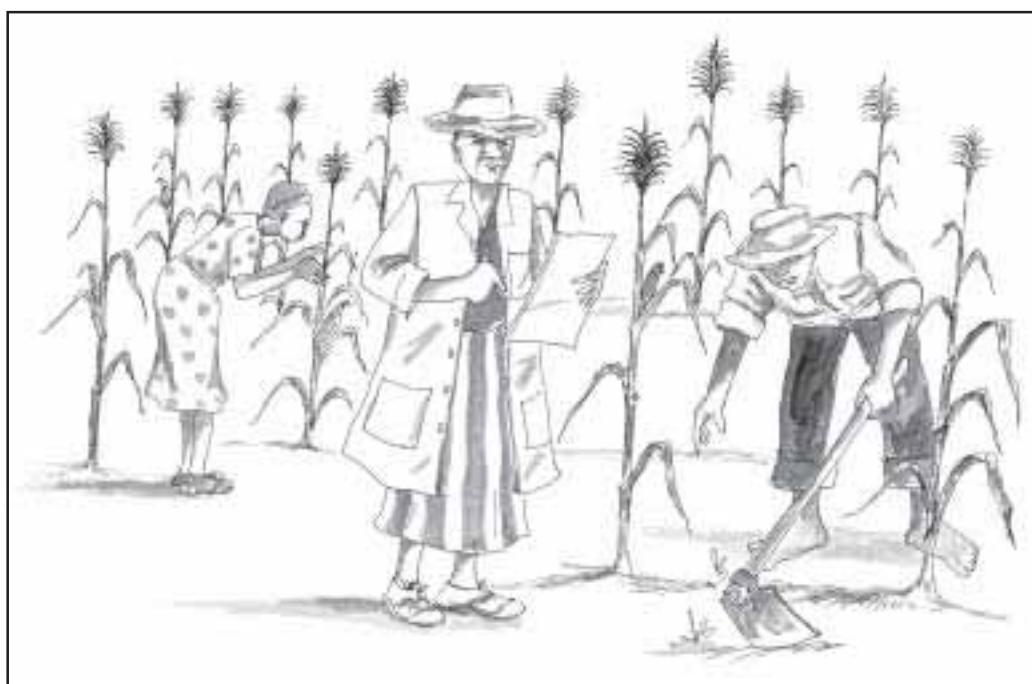
Note. This framework as presented above is for the first year of implementation of the FIFM variety evaluation and observation trial plots. In subsequent years, the farmer group associations assume more responsibility for most field activities such as

- ❖ Maintenance and Evaluation activities for determining correct times for field school training
- ❖ Hosting Field days where they would be engaged in farmer to farmer extension of seed provision processes involving determination of VCU and the importance of DUS in quality seed production
- ❖ Arranging Seed Fairs

### Requirements of Observation Trials

Observation trials within a village should be:

- ◆ Widely separated at least over 0.5-1.0 km apart to capture local micro-environmental differences and afford more farmers to have easy access to the trial
- ◆ All participants to use the same seed rate and have the same size of plots as indicated in the protocols for each crop
- ◆ Participants to record all data/information requested for in the protocol at the right time
- ◆ Each farmer to use their preferred method of crop husbandry including timing for land preparation, planting time and fertiliser application, but to keep accurate records of all agronomic treatments given to the trial block
- ◆ The observation trial should be part of the main crop, which the farmer would grow for his/her own use so that it receives exactly the same attention as the rest of the crop. The main-crop backs-up as a control and gives a good reference point for variety performance for the farmer.



3.2.c: Phases in conducting FIFM trials, "Evaluation"

## Module 3

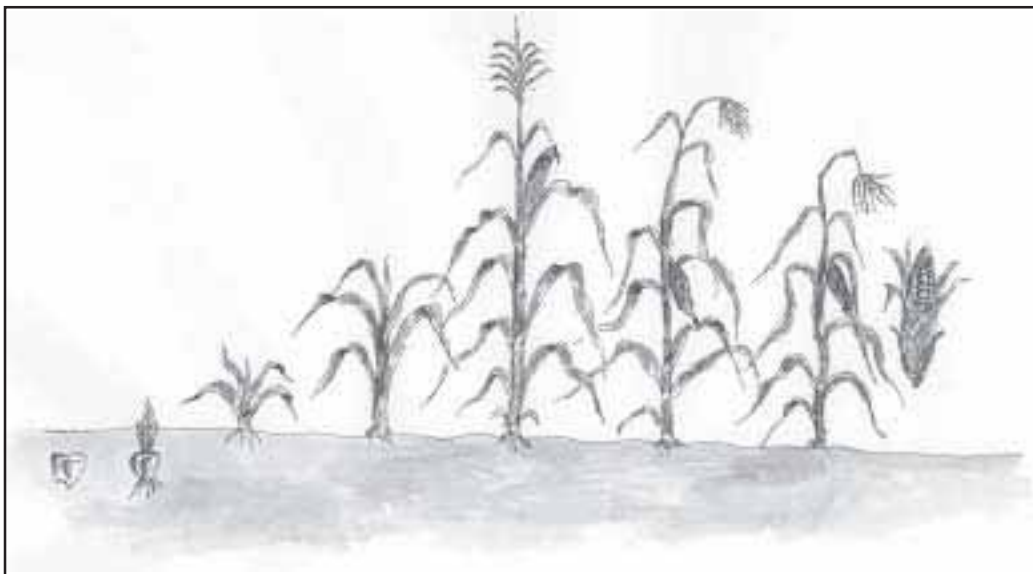
### The Small-Scale Seed Production Training Programme

#### Notes

#### Stakeholders to the program

Variety evaluation, verification and observation trials are an invaluable training tool for acquiring quality seed provision knowledge and information systems. To this end, it is important that the whole program be community based for it to achieve the stated community project purpose and ultimately the goal. Therefore the

- ◆ Farmer community is the key component as they provide the land, labour and data capture capacity
- ◆ Village extension services (agricultural, administrative, health, education etc) facilitate the explanation of the protocols to farmers and explain the importance of data capture at appropriate times
- ◆ Breeder/Agronomist who will be responsible initially for training in identification of salient crop agronomic development characteristics important for variety differentiation (flowering, period of pollination, flower colour, synchronisation or lack of it, physiological maturity, conditioning, etc)
- ◆ Germplasm source (technology) provider should supply introduced varieties as basic or first generation certified seed for use in the program



3.2(d) Variety characterisation based on key crop agronomic development stages

**Farmer implemented farmer managed observation trial protocol**

In variety characterisation it is important that farmers record accurately information at critical stages of crop development, which are used to differentiate varieties from each other. The critical criteria used are measured from crop emergence. It is therefore critical that the trial block be planted on the same time in each trial site. To accommodate this at farmer level each farmer plants one block in his or her own crop.

Replication and randomisation is achieved through no less than six trials per village and by each farmer using their own farming systems to plant the block. Within a district, there could be over 18 similar trials, which will offer the requisite scientific level of replication and randomisation to offer scientifically valid results.

If the program is conducted in many districts and provinces, a single year's data might cover all known agroecological regions to validate farmer selection of varieties (FSV) preferred for their areas. The second season would be used to verify and validate the VCU and DUS criteria for each variety and launch quality seed production systems covered in Module 4 in the second or third season of the program.

The information data capture and procedures for laying out FIFM variety evaluation and observation plots are summarised in Table 3.2 (b) relating to opv maize FIFM trial block. The protocol for each crop FIFM variety evaluation, verification and observation (VEVO) trial contains all the key instructions for:

- ◆ Block trial lay-out and spacing
- ◆ Seed generation to use
- ◆ Critical characterisation data to be collected
- ◆ When and how to prepare for field days and schools including seed fairs
- ◆ When and where to send data for analysis

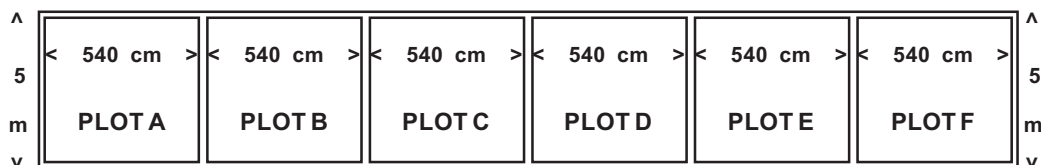
# Module 3

## The Small-Scale Seed Production Training Programme

### Notes

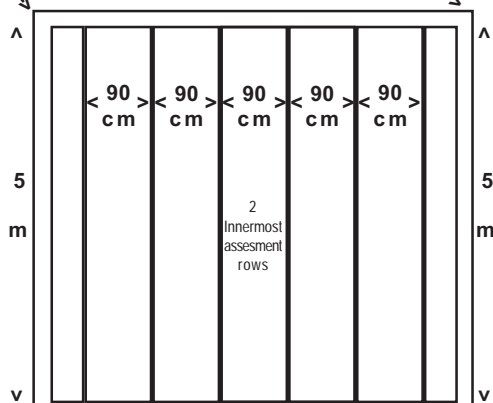
### Block Field Lay-Out Plan for a Variety Evaluation, Verification and observation (VEVO) Trial in a Participant's Food Production Crop

#### VEVO TRIAL BLOCK



A-F Represent six plots. Five (5) will be quality seed provided by the project. One (1) must be supplied by the farmer from on-farm saved seed of a preferred variety used as a known control

Single Plot Lay-Out Showing the Six Rows To Be Planted



FIFM variety evaluation and observation trial plot with a farmer's crop

The white lines are planted rows of the test variety

- Only the two-(2) innermost rows are to be used for evaluated for all characteristics of the variety and seed-saving (but not recommended for open pollinated varieties). The other four (4) rows are discards to be used for testing other traits like taste, milling and shelling ration, processing, seed quality testing, training and storage

**Table 3.2 (b) The information data capture and procedures for laying out FIFM variety evaluation and observation plots relating to opv maize FIFM trial block.**

DATA SHEET-1

Please Return to Facilitator before 25 May \_\_\_\_\_

Farmer's Name \_\_\_\_\_ District \_\_\_\_\_ Village \_\_\_\_\_ Chief \_\_\_\_\_

Extension Agent's Name \_\_\_\_\_ Supporting NGO's Officer name \_\_\_\_\_

Date Trial Planted \_\_\_\_\_ who planted the trial? (Tick correct answer) a) Self b) Family c) Farmer group

Variety	No of Days to 50% Crop Emergence	No of Days to 50% tasselling	No of Days to Pollen Shed Initiation	No of Days 50% Silk Production	Period of pollen shed in days	No. of Days to 50% Physiological Maturity	No. of Days to Harvest	Plant Height in cm	Yield in kg of grain at 12% moisture content from 10 cobs chosen at random	Colour Of Grain At Maturity	Type of Grain
1											
2											
3											
4											
5											
6											

Note::

- ◆ All periods are determined from the day the plot is observed with 50% plant emergence, except for pollen shed which is calculated from the day pollen is first shed to the day it stops
- ◆ Data from the shaded areas need to be accurately recorded as it occurs. Avoid filling in using memory. If not filled in, as it occurs you better leave it blank

## Module 3

### The Small-Scale Seed Production Training Programme

#### Notes

Plot size for FIFM-VEVO trials are predetermined not to exceed 150 m<sup>2</sup>. The rationale for this being to

- Use as little space of the farmer's field as possible Encourage every farmer to participate as the block is small enough for a single person to manage alone
- Ensure that the farmer can see all six plots at once for any crop species to facilitate visual comparison at a glance
- Ensure that data is easy and speedily collected

#### **3.3 Capture, analysis and interpretation of observation trial data.**

To facilitate objective evaluation of variety performance from FIFM-VEVO every farmer participating should endeavour to complete the data sheet as honestly and accurately as possible to enable other stakeholders to subject this data to statistical analysis.

The Field School training sessions enables farmers to be aware of what data to collect for them to correctly interpret the information for DUS and VUC. During the first season it is essential that facilitator visits and help farmers capture this salient information.



3.3(e) When you are ready to analyse the data consult a biometrician if not sure



Once all the critical data has been captured, firstly, there is need to prepare it for analysis by checking for completeness. If there is missing data there are statistical methods to accommodate missing values. Secondly, check for consistency and experimental errors. If there are errors then supplement, adjust or disregard the data. Finally, transform data and prepare a code-plan for certain types of data e.g. code for seed colour, codes for farmers' variety evaluations.

Generally, there are three analysis that can be done on data collected from FIFM-VEVO trial plots-

- ◆ statistical data analysis,
- ◆ economic data analysis and
- ◆ analysis based on farmer evaluation.

The facilitators have to analyse the data after the extension facilitators with the farmers have made crude analysis based on averages. Due to a number of trials conducted, it is often not necessary to subject these farmer data to complicated biometrical analysis as the errors would tend to cancel out. But for inclusion into GIS, it is important that the collected data be analysed by a competent individual familiar with advance statistical methodologies.

## Module 3

### The Small-Scale Seed Production Training Programme

#### Notes

### **3.4 Accessing farmer selected variety**

#### **3.4.1 Definition of farmer selected variety in relation to FIFM observation trials**

Farmer selected varieties (FSVs) are those varieties identified by farmers to have specific traits they prefer based on criteria for VCU. In this regard, the criteria used by farmers to select a variety need to be properly documented by the field facilitators during field days and field schools for subsequent use in evaluating potential varieties for their use.

#### **3.4.2 Accessing seed of farmer selected varieties**

Once the farmers have identified and characterised their FSVs a source for basic seed of the varieties must be established. Once the corrected generation of seed has been found, farmers are subsequently trained in variety seed crop production (Module 4).

### **3.5 Seed Physical and Physiological Quality Determination**

It is important for farmers to know the difference between variety genetic purity maintenance as elaborated in Module 1 which will form the subject of this section.

#### **3.5.1 Rationale for Determination of Seed Physical Quality**

Normally this process is performed in seed laboratories. However, community farmers have no access to formal seed laboratories due either to distance or lack of money for such tests. Such tests ensure that the farmer grows good quality seed of the same crop relatively free from

- ◆ Inert matter or broken seed, other crop residues or sand or soil particles
- ◆ Other crop, weed in particular noxious weed seed and fungus resting bodies like sclerotia, which might look like seeds of crops.

After seed has reached 12% moisture level, it is normal that its checked in its purity in exclusion of other material. Good seed will have a ratio of 99% good seed compared to other matter. There is zero tolerance for sclerotia in most dicotyledonous crops like groundnuts, sunflower, beans etc that easily cause disease in these crops which reduces their yield considerably. Further there is zero tolerance for noxious weeds like wild oats which look like wheat, barley or oat seed and could easily cause cross-pollination with these crops or reduce grain quality. However of concern to the region are wild sorghum seed which easily contaminate the genotype of sorghum.

In this regard it is important to train farmers to identify these weed seed and sclerotia to minimise the risk of crop contamination and reduced grain quality for food.

### 3.5.1.1 Sampling of a seed lot

A 1000gm seed sample is drawn at random either by hand or augur dug deep into various seed bags until the required sample is obtained. The sample is well mixed and divided into four sub-samples. Two sub samples are combined and stored as a reference sample for further analysis. The other sample is retained for physiological quality testing, while the remainder is used for physical purity testing.

### 3.5.1.2 Physical purity testing

The 100gm are weighed out from the remaining sample and spread out on a piece of white paper. The sample is inspected by removing:

- ◆ whole seed where any seed of the crop in question which is over half a seed is referred to a whole
- ◆ other crop seed which include weed seed, other seed of crops not related to the species under test and sclerotia
- ◆ inert matter and broken seed which includes crop residues, broken seed less than half a seed and soil particles

### 3.5.2 Justification for seed physiological quality testing

Germination capacity and vigour determine field establishment. Seed of low physiological quality results in poor plant stands and crop development. Subsequently the crop is not able to compete with weed or withstand harsh conditions such as drought resulting in low yields. Though poor crop stand can be corrected by increasing the seed rate, this would result in increased seed costs.

In FIFM observation trials it is essential to have uniform population across all plots. However this is not easy since seed would be from different sources. By knowing the seed physiological quality the seed rate of each variety can be adjusted so as to achieve the target population.

## Module 3

### The Small-Scale Seed Production Training Programme

#### Notes

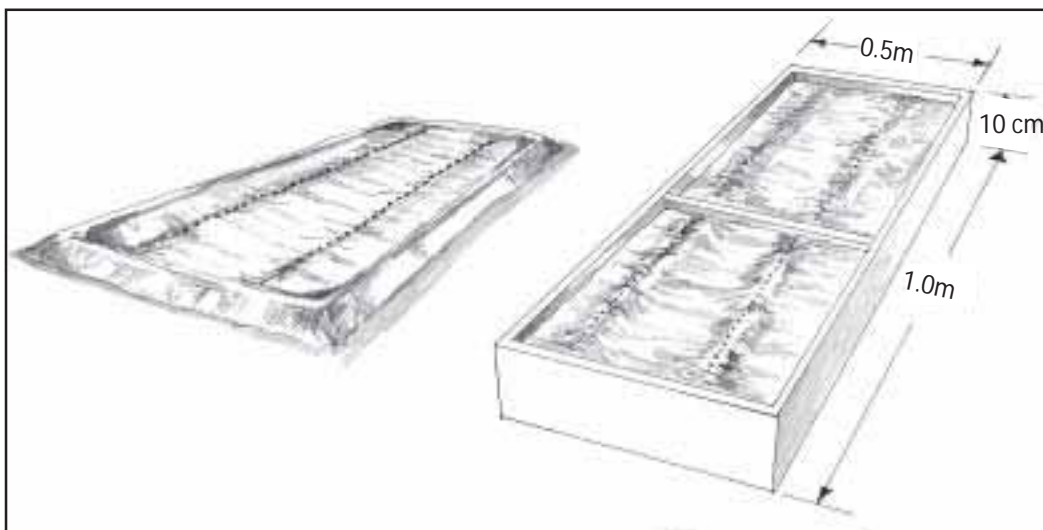
#### 3.5.3 Determining seed physiological quality

##### a. Sampling

The value of the results depend on the representativeness of the sample used. Hence it is critical to sample correctly. You need approximately 400 seeds per variety or seed lot for each germination or vigour test. Take sub-samples from the seed lot to have a composite sample. Mix the composite sample well and take the 400 seed sample for conducting the test.

##### b. Germination test:

The purpose of germination test is to determine the capacity of the seed to germinate when planted under ideal conditions. The simplest and most practical method in the field is outlined below.

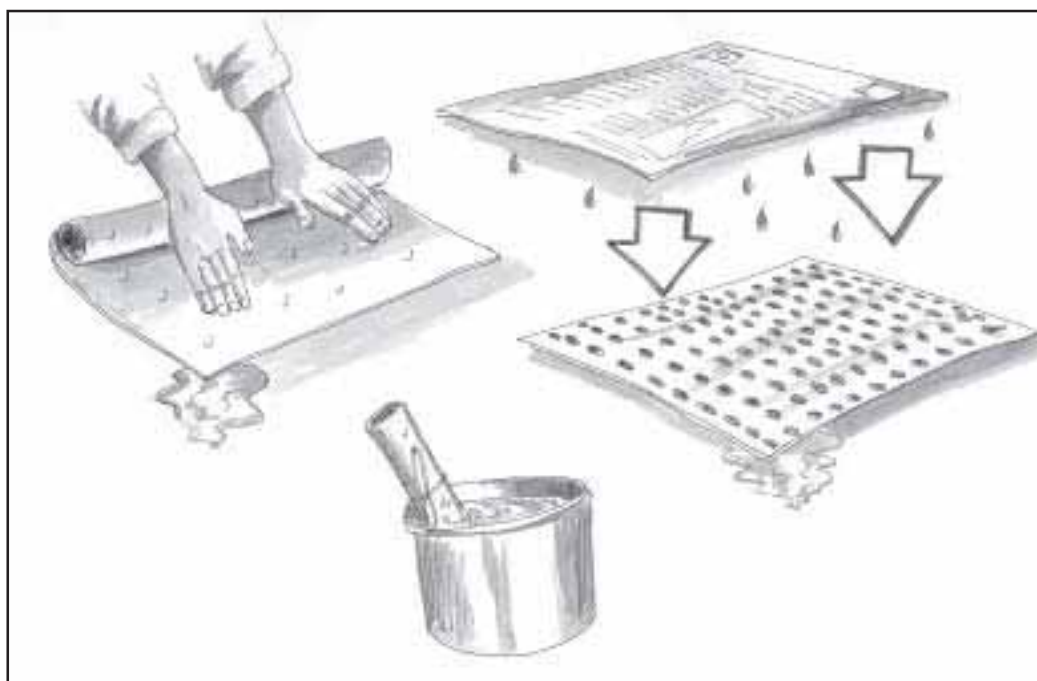


3.5.3(a) Determination of germination percentage using a germination seed box

Build an open wooden box 1.0m long, 50cm wide and 10cm deep, with holes at the bottom to allow water to drain. Fill it with clean riverbed sand. Divide it in half and plant 100 seeds in each half equally spaced and at equal depth. This will allow you to compare germination from two sections.

Place the box in a safe place e.g. in a shade or under a roof protected from direct sunlight and animals. The sand should neither be allowed to dry nor should it be water soaked.

Clean layers of cloth or paper can be used instead of the sand-box. Place the seed evenly spaced on moistened paper or cloth and then cover with another piece of moist cloth or paper. Roll this carefully and place in a safe place. Again after planting ensure the medium does not dry, and do not make it water soaked, either.



3.5.3(b) Determination of germination percentage using the cloth or paper method

After the seeds have germinated, carefully unearth seedlings in the soil or uncover those growing on paper or piece of cloth. Count and record the number of normal seedlings, abnormal seedlings and non-germinated seeds from each half. A seedling is counted as normal if all essential structures are present, it is healthy and is of expected size.

To calculate germination %, divide the number of normal seedlings by the number of seeds planted and multiply by 100. This gives you the germination rate of each batch. To obtain the average germination rate, sum the rate for each batch and divide by the number of batches.

Batch no.	Total seeds planted	Normal seedlings	Abnormal seedlings	Ungerminated seeds
1	100	82	12	6
2	100	86	9	5
Total	200	168	21	11

Batch 1 germination % =  $(82/100) \times 100 = 82$

Batch 2 germination % =  $(86/100) \times 100 = 86$

Average germination % =  $(82 + 86) / 2 = 84$

## Module 3

### The Small-Scale Seed Production Training Programme

#### Notes

In the laboratory germination tests are conducted following prescribed procedures and under controlled conditions specific for each crop. Basically, the procedure is as above but the media, temperature and humidity are clearly specified.

Failure to germinate is due to dormant or dead seed. If the number is high there may be need to further examine the seed to determine if it is dead or dormant. Germination % of dormant seed may improve following standard dormancy breaking procedures e.g. pre-washing of seed, scarification or hot water treatment followed by a germination test.

#### c. Seed vigor test:

This is aimed at selecting good or bad seed. It can be measured by germinating seed in field soil under conditions comparable to field conditions. Field soil is put in boxes as in germination tests. Two or more seed batches are planted equally spaced. The emerged seed is counted and % emerged is an indicator of seedling vigour. Alternatively observing the rate of seedling emergence in germination tests can itself be an indicator of seed vigor.

Batch	Total seeds planted	Cumulative number of emerged seedlings						
		1DAE*	2DAE	3DAE	4DAE	5DAE	6DAE	7DAE
1	100	5	19	37	49	56	61	62
2	100	21	62	79	86	88	88	88
3	100	11	28	51	63	72	81	87

\* days after emergence

Batch 1 combines both poor germination and poor vigour

Batch 2 combines good germination and good vigour

Batch 3 has good germination but poor vigour

**Appendix 3.1:****Trial protocol for a groundnut adaptation trial****To the participating farmer**

Thank you for agreeing to host this groundnut variety evaluation trial. It will be greatly appreciated if you were to allow other members of the community to visit the trial and input into the whole exercise as well as participate in any organized field school. This is a trial for you and your community, which seeks your contribution in selecting future groundnut varieties. It is, therefore, important that you give your truthful opinions about the varieties. This trial is being grown by 9 other farmers in your community and also it is in 3 other districts, each with 10 farmers. Details are summarized below.

**Trial Protocol**

Title:	Groundnut on-farm variety evaluation trial
Objectives:	To verify the yield performance of three promising varieties as well as evaluate farmer acceptability of various variety traits
Locations:	4 districts in Zimbabwe (Mhondoro, Zvimba, Mrewa and Tsholotsho) each with 10 farmers
Treatments:	3 promising groundnut varieties (338, 191, 272) and the recommended variety as a control (Falcon)
Design:	Randomised block design, with each farmer as a replication
Plot size:	0.01ha for each variety (22 rows each 10.0m long and 0.45m apart)

**Proposed plot layout:****Inputs:**

- You are supplied with 1.0kg seed of each groundnut variety dressed with a fungicide and labeled 1-4; plot pegs labeled 1- 4; field books.
- Just before harvest, you will be given four paper packets clearly labeled by plot number for submitting pod samples.

## Module 3

### The Small-Scale Seed Production Training Programme

#### Notes

#### **Management:**

1. In your groundnut field, select a large piece of homogeneous land for planting the trial plots. Mark the rows ensuring they are 0.45m apart. The total number of rows should be at least 88 and each row should be at least 10.0m long. Put peg 1 on the first row, peg 2 on row 23, peg 3 on row 45 and peg 4 on row 67.
2. At the time of planting, place the seed packets against the corresponding plots i.e. the number on the plot peg and the number on the seed packet should be the same. Sow the seed in the 22 rows of the plot, even if some seed is left over, do not sow it in the next plot.
3. Ideally the trial plots should be planted on the same day as your groundnut crop and the management of the plots should be the same as that of your main groundnut crop. It is also important to treat all plots uniformly and to carry out any operation simultaneously across all plots e.g. weed all the plots on the same day, apply the same rate of any agro-chemical across all plots.
4. During the season take the following records on the data sheet- planting date, date when 50% of the plants have emerged, dates when operations are carried out, agro-chemicals used, your perceptions about the varieties guided by the criteria listed on the record sheet. You are also supplied with a notebook for writing any other observation or any other comments during the season. If you have visitors to the plots, you can record their comments in the notebook or you can ask them to write comments in the same notebook.
5. Before crop maturity, farmers' field school should be arranged to show the varieties to neighbouring farmers in order to discuss crop performance and compatibility of the varieties with farmers' preferences. A field day may also be arranged to facilitate discussion among all stakeholders.
6. When a plot has reached maturity harvest the 5 center rows of each plot and dry the pods. Remember to write the harvest date in the record sheet. Ensure that you keep pods from different plots separately. Once the pods are dry, clean them and obtain the weight of the clean dry pods of each plot. Record the weight in the data record sheets.
7. You are required to take a pod sample from each plot for further processing. Fill the supplied paper packet half way with the clean dry pods, ensuring that the number on the paper packet corresponds with the plot number. Close the packet securely and keep them in a safe dry place.



8. You can use the remaining produce from the plots for various food preparations, noting the preferred variety for any preparation.
9. After harvesting and processing, write your variety assessment in the record sheets and ensure you have filled in all the specified information in the record sheets and all your additional comments in the notebook. These books, together with the pod samples will be collected during the month of May by the facilitator.

**Monitoring:**

The facilitator will visit participating farmers at the time of planting and monthly during the growing period of the crop to monitor cultivation practices applied and crop development as well as guide or assist farmers record observations in the record forms and notebooks.

**Data analysis**

Once all the data from the trials has been collected, it will be analysed. You and your community will receive feedback on the outcome and together we will plan the way forward.

Once again, THANK YOU

## Module 3

### The Small-Scale Seed Production Training Programme

#### Notes

### Appendix 3.2: Data record sheets for a maize trial

(Source CIMMYT Mother baby trials)

#### General Information about the farm

1. Location of the farm within natural region:..
2. Size of the farm in Acres or Hectares:.....  
Name of the farmer:..... Sex: .....
3. Size of family
  - Adults:.....male .....female
  - Children (under 15 years): .....male .....female
4. Livestock
5. How many maize varieties did you plant last year? .....
6. Which varieties did you plant? .....
7. Do you apply fertiliser or manure to your fields? .....
8. Please rate you maize uses:

Not important = 1, important = 2, very important = 3

USES	RATING
Source of food for the household	
Source of feed for the animals	
Source of income from the sale of the maize	
Others (specify)	

Information about the trial plots

1. Planting date: .....
2. Harvest date: .....
3. How important are the following characteristics of a variety to you:

Please rate Not important = 1; Important = 2; and Very important = 3

CRITERIA	RATING
Drought tolerance	
Tips cover ( cobs covered by sheats)	
Cob size	
Ear aspect	
Number of kernels per line	
Cooking time/Taste	
Kernel size	
Weevil resistance	
Time to maturity	
Resistance to disease	
How important is it to you that the colour of the kernel is white?	
Rotting of the ear	
Yield	
Lodging	
Storage	
Others (specify)	

## Module 3

### The Small-Scale Seed Production Training Programme

#### Notes

4. How do you rate the varieties in your trial on the following criteria:

Three ratings are possible namely 1 for GOOD, 2 for REGULAR, and 3 for BAD

Criteria	Variety 1	Variety 2	Variety 3	Variety 4
a. Cobs covered by sheaths/ tips cover				
b. Cob size				
c. Look of the ear/ ear aspect				
d. Number of kernel lines				
e. Cooking time/ taste				
f. Kernel size				
g. Weevil resistance				
h. Time to maturity				
i. Resistance to disease				
j. Colour of kernel				
k. Rotting of the ear				
l. Yield				
m. Lodging				
n. Others (specify)				

Remarks:

.....

### **3.1.3 Characterisation of varieties in terms of DUS**

This is when a variety is identified by its

- ❖ Distinctness- i.e. clearly differentiated from other existing varieties by one or more identifiable characteristics
- ❖ Uniformity in expression of its relevant characteristics and any variation should be describable, predictable and commercially acceptable
- ❖ Stability that is the ability to maintain its distinctive characteristics over time following repeated propagation

### **3.1.4 Characterisation of varieties in terms of VCU**

This is when a variety is identified by its Value for Cultivation and Use (VCU). The variety should have characteristics which make it worthy for production and these include:

- ❖ Production value such as yield potential and stability, yield of secondary products such as straw
- ❖ Consumption value such as shape, colour, palatability, suitability for different food preparations, maturity in relation to household food needs,
- ❖ Economic value for example quality, storability, marketability, maturity in relation to risk avoidance
- ❖ Cultural value - the characteristics should suit the beliefs and customs of the community e.g. adaptability to the farming system.

## 3.2a Procedure for conducting FIFM observation trials

### 3 Phases

Sensitisation phase

- ❖ Problem identification using PRA tools
- ❖ Identification of partners
- ❖ Sensitisation of partners.

Planning phase

- ❖ Planning meeting- Introduction of FIFM observation trial concept, identification of willing partners and their roles/ responsibilities, development of work plans
- ❖ Identification of locations (districts, villages, farmers)
- ❖ Preparation of instructions, field books, seed and other inputs
- ❖ Training of farmers

Implementation phase

- ❖ Distribution of inputs & field books
- ❖ Preparation of fields to include land preparation, demarcation of plots
- ❖ Follow-up visits- planting, emergence time, flowering time, pre-harvest time, at harvest or post harvest
- ❖ Field days
- ❖ Data analysis and interpretation

Feedback workshop

### 3.2b Example: Summary of results from a maize variety trial

Variety name	Researcher Yield (t/ha)	Farmer yields (t/ha)	Yield	Maturity	Resistance to weevil	Tolerance to disease	Ear appearance	Taste of green mealie	Size of kernel	Colour of kernel	General perception
Scores of variety assessments good = 1; average = 0.5; bad = -1											
SC403	3.50	<u>3.16</u>	<u>0.76</u>	<u>0.85</u>	0.55	<u>0.84</u>	<u>0.83</u>	0.80	<u>0.79</u>	<u>0.86</u>	<u>0.78</u>
CIM00-4	<u>3.66</u>	3.08	0.69	0.75	0.73	<u>0.84</u>	0.73	<u>0.96</u>	<u>0.65</u>	<u>0.75</u>	0.76
SC521	<u>3.51</u>	<u>3.11</u>	0.70	<u>0.88</u>	0.67	<u>0.67</u>	0.73	<u>0.74</u>	0.69	0.77	0.74
DK8031	<u>3.60</u>	<u>3.19</u>	<u>0.88</u>	<u>0.90</u>	<u>0.60</u>	<u>0.88</u>	<u>0.88</u>	<u>0.91</u>	<u>0.88</u>	<u>0.88</u>	<u>0.87</u>
ZS257	3.41	2.99	<u>0.61</u>	0.83	<u>0.85</u>	<u>0.58</u>	0.75	<u>0.86</u>	0.68	0.77	0.70
CIM99-2	3.48	3.02	0.70	<u>0.87</u>	<u>0.74</u>	0.70	<u>0.78</u>	<u>0.72</u>	0.69	<u>0.73</u>	<u>0.76</u>
PAN31	<u>3.67</u>	<u>3.20</u>	<u>0.89</u>	<u>0.74</u>	0.40	0.50	<u>0.82</u>	<u>0.55</u>	<u>0.92</u>	0.83	0.71
ZIM303	3.17	2.65	<u>0.50</u>	0.76	<u>0.75</u>	<u>0.89</u>	<u>0.58</u>	<u>0.90</u>	<u>0.76</u>	0.83	<u>0.70</u>
KEP	3.15	2.79	<u>0.72</u>	<u>0.68</u>	0.70	0.83	0.74	0.83	0.70	<u>0.73</u>	<u>0.69</u>
ZM521	3.37	2.80	0.63	0.76	<u>0.64</u>	<u>0.62</u>	<u>0.69</u>	<u>0.76</u>	<u>0.52</u>	<u>0.75</u>	<u>0.68</u>
MATUBA	<u>2.84</u>	<u>2.71</u>	<u>0.47</u>	0.76	0.72	0.72	<u>0.56</u>	0.81	<u>0.37</u>	<u>0.84</u>	<u>0.64</u>
ZM421	<u>3.21</u>	2.98	<u>0.62</u>	0.76	<u>0.83</u>	0.73	0.76	0.83	<u>0.64</u>	0.83	<u>0.76</u>

Colouring key

Best quartile; Worst quartile



### **3.5 Procedures for seed physiological quality testing**

1. Seed sampling

2. Germination test

Field- germination box with sand, cloth or paper layers

Laboratory- incubator using the sand, filter paper or rolled paper towel as media

3. Vigour test

Field- germination box with field soil,

Laboratory- stress tests such as accelerated ageing followed by germination, conductivity tests, observing seedling growth rate

**Intentionally left blank**

## Module 3

# Self Assessment Test

- 3.1.2. The basis for different leaf shapes observed in different cowpea varieties is
- genetic
  - genetic by environment interaction
  - soils
- 3.2. In FIFM observation trials it is critical to collect daily rainfall data, true or false? .....
- 3.2.5 A control variety in a FIFM observation trial is
- a variety against which all other varieties in the trial are compared with
  - a variety from the local farmers
  - a variety controlled by the breeder
- 3.5. In a germination test for batch 1 100 seeds were planted and 88 normal seedling counted, for batch 2,80 seeds were planted and 77 normal seedlings counted and in batch 3,87 normal seedlings were counted out of the 100 planted. The average germination % is
- 84%;
  - 90%;
  - 88%

## Module 3

### The Small-Scale Seed Production Training Programme

#### Self Assessment Test

#### **Answer Key to Self Assessment Test:**

- |       |       |
|-------|-------|
| 3.1   | a     |
| 3.2   | false |
| 3.2.5 | a     |
| 3.5   | b     |

# Module 4 -Contents

## Module 4

Assist farmers to produce optimum quantities of quality seed through use of appropriate agronomic practices

Sub-Modules .....	4- 1
Sub Module 4.1	
Discuss Seedbed Selection Procedures .....	4- 2
Sub Module 4.2	
Outline Seed Production Practices in Relation to Cross-pollinated, Semi-self pollinated, Self-pollinated and Vegetatively propagated crops. ....	4- 3
Sub Module 4.3	
Outline Requirements and Procedures for planting and establishment .....	4- 4
Sub Module 4.4	
Discuss Soil Fertility and Water Management in Seed Production .....	4- 5
Sub Module 4.5	
Outline Procedures for Decontamination and Weeding in Seed Crops .....	4- 6
Sub Module 4.6.	
Discuss Major Aspects of Pest and Disease Management in Seed Crops. ....	4- 7
Sub Module 4.7	
Discuss Harvesting, Conditioning and Processing in Seed Crops .....	4- 8
Sub Module 4.8	
Apply the Different Procedures used in the Storage of Seed Crops .....	4- 9
Sub Module 4.9	
Facilitate the Bulking of FSV seed by Small-scale Farmers using seed gardens .....	4-10
Instructor 's Manual .....	4-11
Sub Module 4.1	
Discuss Seedbed Selection Procedures (15 minutes) .....	4-11
Sub Module 4.2	
Outline Seed Production Practices in Relation to Cross-pollinated, Semi-self pollinated Self-pollinated and Vegetative Propagated Crops (22 minutes) .....	4-12

## Contents - Module 4

### The Small-Scale Seed Production Training Programme

Sub Module 4.3	
Outline Requirements And Procedures For Planting And Establishment (13 minutes) .....	4-13
Sub Module 4.4	
Discuss Soil Fertility and Water Management in Seed Production. (8 minutes) .....	4-14
Sub Module 4.5	
Outline Procedures For Decontamination And Weeding In Seed Crops (9 minutes) .....	4-15
Sub Module 4.6	
Discuss Major Aspects of Pest and Disease Management in Seed Crops (7 minutes) .....	4-16
Sub Module 4.7	
Discuss Harvesting, Conditioning, Processing In Seed Crops (8 minutes) .....	4-17
Sub Module 4.8	
Apply The Different Procedures Used In The Storage Of Seed Crops (6 minutes) .....	4-18
Sub Module 4.9	
Facilitate The Bulking Of FSV Seed By Small-Scale Farmers using Seed Gardens (7 minutes) .....	4-19
Trainee Manual .....	4-21
Sub Module 4.1	
Discuss Seedbed Selection Procedures (15 minutes) .....	4-21
Sub Module 4.2	
Outline Seed Production Practices in Relation to Cross-pollinated, Semi-self pollinated, Self-pollinated and Vegetative Propagated Crops (22 minutes) .....	4-22
Sub Module 4.3	
Outline Requirements And Procedures For Planting and Establishment (13 minutes) .....	4-23
Sub Module 4.4	
Discuss Soil fertility and Water Management in Seed Poduction (8 minutes) .....	4-24
Sub Module 4.5	
Outline Procedures For Decontamination And Weeding In Seed Crops (9 minutes) .....	4-25
Sub Module 4.6	
Discuss major aspects of Pest and Disease management in seed crops (7 minutes) .....	4-26

## Module 4 - Contents

### The Small-Scale Seed Production Training Programme

Sub Module 4.7	
Discuss Harvesting, Conditioning, Processing In Seed Crops (8 minutes) .....	4-27
Sub Module 4.8	
Apply The Different Procedures Used In The Storage Of Seed Crops (6 minutes) .....	4-28
Sub Module 4.9	
Facilitate The Bulking Of FSV Seed By Small-Scale Farmers Through Seed Gardens (7 minutes) .....	4-29
Notes - How to produce quality seed through use of appropriate agronomic practices .....	4-31
4.1 Introduction .....	4-31
4.1.1 Factors to consider when selecting sites for seed production .....	4-31
4.1.2 Preparation of the seedbed .....	4-37
4.1.3 Factors to consider when ploughing a seed-bed .....	4-38
4.2 The influence of pollination types on seed production practices .....	4-40
4.2.1 Crop Pollination types .....	4-40
4.2.2 Relationship between the pollination character and seed production. ....	4-43
4.3 Procedures for planting and establishment .....	4-45
4.3.1 Importance of good establishment and growth in seed production .....	4-45
4.3.2 Modifications of practices to suit requirements for seed crops .....	4-45
4.4.1 Soil fertility and water management in seed crops .....	4-50
4.4.2 Importance of soil moisture levels and air humidity .....	4-50
4.5 Procedures for decontamination and weeding in seed crops .....	4-50
4.5.1 Sources of contamination .....	4-50
4.5.2 Methods to minimize roguing .....	4-52
4.5.3 Timing and procedures for roguing .....	4-52
4.5.4 Skills required for individuals to rogue .....	4-54
4.5.5 Weeds in seed crops .....	4-54
4.6 Major aspects of pest and disease management in seed crops .....	4-55

## Contents - Module 4

### The Small-Scale Seed Production Training Programme

4.6.1	Reasons for controlling pests and diseases .....	4-55
4.6.2	Control measures for pests and diseases in the field .....	4-55
4.7	Harvesting, conditioning and processing in seed crops .....	4-56
4.7.1	Harvesting .....	4-56
4.7.2	Equipment for harvesting seed crops .....	4-56
4.7.3	Seed conditioning .....	4-56
4.8	Storage of seed crops .....	4-63
4.8.1	Objectives of seed storage .....	4-63
4.8.2	Factors that influence viability and vigour in storage .....	4-63
4.8.3	Factors that influence storability of seed .....	4-63
4.8.4	Storage techniques .....	4-64
4.9	Bulking of Farmer Selected Varieties (FSV) using seed gardens .....	4-66
4.9.1	Use of seed gardens .....	4-66
4.9.2	Procedures for setting up seed gardens .....	4-66
	Transparency .....	4-69
4.1	Seedbed Selection Procedures .....	4-70
4.1.1	Factors to consider when selecting sites for seed production .....	4-70
4.1.2	Factors to consider when selecting sites for seed production .....	4-72
4.1.3	Preparation of the seedbed .....	4-74
4.2.1	Cross Pollinating Types .....	4-75
4.3	Importance of good establishment and growth in seed production .....	4-78
	Self Assessment Test .....	4-97
	Answer Key to Self Assesment Test .....	4-99



## ASSIST FARMERS TO PRODUCE OPTIMUM QUANTITIES OF QUALITY SEED THROUGH USE OF APPROPRIATE AGRONOMIC PRACTICES

### Purpose

The main purpose of this module is to train extension agents from the public, private and non-governmental organizations in community-based seed production. At the end of this module, the extension agents will be able to train farmers in appropriate procedures and precautions for field production, processing and storage of various seed types (cross-pollinated, self-pollinated and vegetatively propagated) in order to obtain large quantities of high quality seed.

### Sub-Modules

- 4.1 Discuss Seedbed Selection Procedures.
- 4.2 Outline Seed Production Processes in Relation to Cross-Pollinated, Semi-Self Pollinated Crops, Self-Pollinated and Vegetatively Propagated Crops.
- 4.3 Outline Requirements and Procedures for Planting and Establishment of Seed Crops.
- 4.4 Discuss Soil Fertility and Water Management in Seed Production.
- 4.5 Outline Procedures for Decontamination and weeding in seed crops.
- 4.6 Discuss Control Measures for Major Pests and Diseases in Seed Crops.
- 4.7 Discuss Harvesting, Conditioning and Processing in Seed Crops.
- 4.8 Facilitate the Bulking of FSV Seed by using Seed Gardens.

## Module 4

### The Small-Scale Seed Production Training Programme

#### Sub Module 4.1

##### Discuss Seedbed Selection Procedures

Element/Outcome	Performance Criteria	Assessment Instruments and Procedures
4.1.1. Outline factors to consider in seedbed site selection.	<ul style="list-style-type: none"><li>➤ Importance of factors such as suitability for reproduction, pest and disease profile, topography, drainage, fertility, weed spectrum and rotation requirements outlined.</li><li>➤ The effect of inappropriate environments on reproduction and shifts in genetic make up stated, as well as importance of avoiding plots that previously hosted similar crops, steep slopes, livestock and human tracks, poor drainage, and sites close to seed stores.</li></ul>	Plenary/Group discussions.
4.1.2. Discuss the characteristics of a good seedbed for quality seed production.	<ul style="list-style-type: none"><li>➤ Key characteristics of a good seedbed for seed production demonstrated including uniformity in soil characteristics: good soil physical structure, texture, moisture level, nutrient levels, tilth; low gradient, and low weed pressure.</li></ul>	Self assessment test
4.1.3. State measures for achieving a good seedbed	<ul style="list-style-type: none"><li>➤ Measures to achieve a suitable seedbed namely: land preparation, timing of preparation, weed, pest and disease management and site selection outlined.</li></ul>	Self assessment test

## The Small-Scale Seed Production Training Programme

**Sub Module 4.2****Outline Seed Production Practices in Relation to Cross-pollinated, Semi-self pollinated, Self-pollinated and Vegetatively propagated crops.**

Element/Outcome	Performance Criteria	Assessment Instruments and Procedures
4.2.1. Define cross, semi-self self-pollinated and vegetatively propagated crops.	<ul style="list-style-type: none"> <li>➤ Crop pollination types described and illustrated with local examples.</li> </ul>	Plenary/Group discussion
4.2.2. Relate the pollination character to seed production.	<ul style="list-style-type: none"> <li>➤ The implications on siting of seed crops, need for promotion of pollination, and pollination agents outlined.</li> <li>➤ Physical and biological pre-requisites for vegetative structures to be used as seed outlined.</li> <li>➤ Vegetative seed structures necessary for successful seed production explained.</li> </ul>	Self assessment test
4.2.3. Prepare vegetative seeds for planting.	<ul style="list-style-type: none"> <li>➤ Adherence to set criteria such as seed size, number of buds, number of leaves, and laid down procedures such as cutting and disinfection, demonstrated.</li> </ul>	Self assessment test
4.2.4. Distinguish self-pollinating and vegetatively produced crops from semi-self pollinating and cross pollinated crops in relation to seed production.	<ul style="list-style-type: none"> <li>➤ Seed crop types are contrasted in relation to isolation, requirements for pollination and ease of maintenance of variety purity.</li> <li>➤ Their relative strengths and weaknesses are stated.</li> </ul>	Group practical exercise

## Module 4

### The Small-Scale Seed Production Training Programme

#### Sub Module 4.3

#### Outline Requirements and Procedures for planting and establishment

Element/Outcome	Performance Criteria	Assessment Instruments and Procedures
4.3.1. Discuss the importance of good establishment and growth to the achievement of large quantities of high quality pure seeds	➤ An understanding of the influence of good stands on seed yields, development of variety characteristics, seed set and development demonstrated.	Plenary/Group discussion
4.3.2. Explain the modifications of commercial agronomic practices to suit seed crop requirements.	➤ Modifications in cultivation, plant spacing, seed rates, planting dates, planting patterns, harvest dates, storage and their effects on yields and yield losses, seed appearance, germination and seedling vigour explained.	Group written exercise

**Sub Module 4.4****Discuss Soil Fertility and Water Management in Seed Production**

Element/Outcome	Performance Criteria	Assessment Instruments and Procedures
4.4.1. Analyze the importance of soil fertility management in seed production.	➤ The importance of nutrient types, rates, placement, evenness, timing of application on seed quantity and quality discussed.	Plenary/Group discussion
4.4.2. Explain the importance of excessive humidity, moisture stress, and water logging conditions on seed quantity and quality.	➤ The impact of soil moisture conditions on yields, early senescence, and full development of variety characteristics (to enable roguing and decontamination) is stated.	Self assessment test
4.4.3. Discuss methods of rectifying the constraints in 4.4.2	➤ An appreciation of different options for rectifying the constraints stated in 4.4.2. demonstrated.	Plenary/Group discussion

## Module 4

### The Small-Scale Seed Production Training Programme

#### Sub Module 4.5

#### Outline Procedures for Decontamination and Weeding in Seed Crops

Elements/Outcomes	Performance Criteria	Assessment Instruments and Procedures
4.5.1. Justify decontamination and roguing in seed production.	➤ At least 5 sources of contamination stated, decontamination and roguing defined and their use in achieving genetic and physical purity outlined.	Plenary/group discussion.
4.5.2. Analyze methods used to minimize roguing	➤ Cultural methods to minimize contamination of seed and seed crops from volunteer weeds, genetically impure seeds, inadequate isolation, equipment, livestock/ human/ bird traffic and water explained.	Plenary/Group discussion
4.5.3. Describe procedures for roguing	➤ Procedures for roguing crops outlined.	
4.5.4. State the requisite skills for individuals who rogue seed crops.	➤ An understanding of regulated or adopted standards for roguing seed types, causes and symptoms of crops morphological deviations from typical characteristics, skills in roguing demonstrated.	Self assessment test
4.5.5 Analyze the negative effects of weeds in seed crops.	<ul style="list-style-type: none"> <li>➤ Influence of common weeds, prohibited and injurious weeds explained.</li> <li>➤ What constitutes a weed is explained.</li> </ul>	Self assessment test
4.5.6 Relate timing and methods of weed control to seed crop requirements.	➤ The need for proper timing and appropriate control practices for prohibited weeds analyzed.	Self assessment test

**Sub Module 4.6****Discuss Major Aspects of Pest and Disease Management in Seed Crops.**

Element/Outcome	Performance Criteria	Assessment Instruments and Procedures
4.6.1. Explain the reasons for controlling pests and diseases.	<ul style="list-style-type: none"> <li>➤ Influence of pests (such as rodents, birds, harmful insects) and diseases on seed quantities and seed quality (physical purity, germination) discussed.</li> <li>➤ Pests and diseases which have major influence on seed quality stated.</li> </ul>	Plenary/group discussions
4.6.2. Outline control measures for major seed crop pests and diseases	<ul style="list-style-type: none"> <li>➤ Appropriate management practices to control pests and diseases in seed crops outlined using examples from various crops.</li> </ul>	Plenary/group discussions

## Module 4

### The Small-Scale Seed Production Training Programme

#### Sub Module 4.7

#### Discuss Harvesting, Conditioning and Processing in Seed Crops

Element/Outcome	Performance Criteria	Assessment Instruments and Procedures
4.7.1. Determine harvest/field maturity for various seed crop types.	<ul style="list-style-type: none"><li>➤ Timing of harvesting with the view to achieving maximum seed quality and yield explained.</li><li>➤ Harvest maturity distinguished from physiological maturity for various seed crops.</li></ul>	
4.7.2. Discuss hand harvesting and machine harvesting for seed crops.	<ul style="list-style-type: none"><li>➤ Hand harvesting and machine harvesting discussed, highlighting the advantages and disadvantages of each method.</li></ul>	Plenary/Group discussion
4.7.3. Describe seed conditioning	<ul style="list-style-type: none"><li>➤ Appropriate selection to remove off-types, drying, shelling, cleaning, treating, packaging described in several crop examples.</li></ul>	Plenary/Group discussion



## The Small-Scale Seed Production Training Programme

**Sub Module 4.8****Apply the Different Procedures used in the Storage of Seed Crops**

Element/Outcome	Performance Criteria	Assessment Instruments and Procedures
4.8.1. Explain the objectives and methods of storing seed	<ul style="list-style-type: none"> <li>➤ The purpose of storing seed in relation to: <ul style="list-style-type: none"> <li>- basic seed,</li> <li>- short-term storage</li> <li>- seed security explained.</li> </ul> </li> <li>➤ Different methods of storing different seed crops outlined.</li> </ul>	
4.8.2. Analyze factors that influence viability and vigour in storage.	<ul style="list-style-type: none"> <li>➤ The interplay of physical factors (temperature and moisture), biological factors (seed history, pests including rodents, fungi, bacteria, viruses, pathogens), chemical factors (seed treatment) that affect seed germination and vigour discussed.</li> </ul>	Plenary/group discussions
4.8.3. Analyze factors that determine storability of seed	<ul style="list-style-type: none"> <li>➤ Factors existing prior to storage that subsequently affect seed storability explained.</li> </ul>	Plenary/group discussions
4.8.4. Outline damage caused by storage pests and diseases and procedures for controlling them.	<ul style="list-style-type: none"> <li>➤ An outline of the damage caused by storage pests and diseases on seed quantity and quality and possible control measures presented.</li> </ul>	

## Module 4

### The Small-Scale Seed Production Training Programme

#### Sub Module 4.9

#### Facilitate the Bulking of FSV seed by Small-scale Farmers using seed gardens

Element/Outcome	Performance Criteria	Assessment Instruments and Procedures
4.9.1. Describe seed gardens and their uses	➤ Knowledge of the concept and purpose of seed gardens demonstrated, including seed bulking, variety purity maintenance of both seed and vegetative propagated material, maintaining seed free from diseases.	Plenary/Group discussion
4.9.2. Explain procedures and precautions taken when bulking FSV	➤ Access to pure/basic seed, adherence to quality standards, estimation of seed demand, versus availability of basic seed included in the outline.	Plenary/Group discussion
4.9.3. Facilitate appropriate procedures for off-season seed production in seed gardens for specific crops.	➤ Procedures for off-season seed production demonstrated including identification of appropriate sites, estimation of seed demand, consideration of isolation requirements, agronomic specifications.	

# Module 4

## Instructor's Manual

### Sub Module 4.1

#### Discuss Seedbed Selection Procedures (15 minutes)

##### Elements/Outcomes

4.1.1 Outline factors to consider in seedbed site selection.

4.1.2 Discuss the characteristic of a good seedbed for quality seed production.

4.1.3 State measures for achieving a good seedbed.

Activities	Material Media and Equipment	Time
1. Show transparency on factors considered for seedbed site selection whilst clarifying those factors meant to aid pollination, those aimed at preventing contamination, those for achieving high quality and yield, and those that are socio-economic.	<ul style="list-style-type: none"><li>➤ Transparency/ Handout 4.1.1</li><li>➤ Chalk board.</li></ul>	5 minutes
2. Discuss seedbed characteristics that influence seed quality and yield, and provide those missed.	<ul style="list-style-type: none"><li>➤ Chalk Board</li></ul>	5 minutes
3. Explain transparency 4.1.3 with options for creating a good seedbed and how these options contrast with those for conventional crops.	<ul style="list-style-type: none"><li>➤ Transparency/ Handout 4.1.3</li></ul>	3 minutes
4. Solicit feedback from trainees.		2 minutes

## Module 4

### The Small-Scale Seed Production Training Programme

#### Instructor's Manual

#### Sub Module 4.2

#### Outline Seed Production Practices in Relation to Cross-pollinated, Semi-self pollinated Self-pollinated and Vegetative Propagated Crops (22 minutes)

##### Elements/Outcomes

- 4.2.1 Define cross, semi-self self-pollinated and vegetatively propagated crops.
- 4.2.2 Relate the pollination character to seed production.
- 4.2.3 Prepare vegetative seeds for planting.
- 4.2.4 Distinguish self-pollinating and vegetatively produced crops from semi-self pollinating and cross pollinated crops in relation to seed production.

Activity	Material Media and Equipment	Time
1. Give handout 4.2. (covering cross pollination types and implications for seed production) and refer trainees to Figure 4.2.1. illustrating crop pollination types. Highlight and discuss key distinguishing features and behaviour.	➤ Handout 4.2.	3 minutes
2. Explain the importance and challenges of the pollination character when producing seed.	➤ Figure 4.2.1 in handout 4.2.	5 minutes
3. Draw attention of trainees to Figure 4.2.1. and show them distinguishing features of vegetatively produced crops (Handout 4.2.).	➤ Practical exercise ➤ Vegetative seeds.	2 minutes
4. Facilitate trainees to select and prepare planting seeds from each category of vegetatively propagated material provided.		10 minutes
5. Conduct a question and answer session on the distinction, advantages and disadvantages of self-pollinating, vegetatively produced and cross-pollinated crops in relation to seed production.	➤ Question and answer session, flipchart	2 minutes

**Sub Module 4.3****Outline Requirements And Procedures For Planting And Establishment (13 minutes)****Elements/Outcomes**

- 4.3.1. Discuss the importance of good stand establishment and growth to the achievement of large quantities of high quality pure seeds.
- 4.3.2 Explain the modifications of commercial agronomic practices used in grain production to suit seed crop requirements.

Activities	Material Media and Equipment	Time
1. Introduce Transparency 4.3.1, which states the importance of good establishment and growth in seed crops.	➤ Transparency 4.3.1/Handout	3 minutes
2. Facilitate group work to explain how the stated crop husbandry practices translate into increased quantities of higher quality pure seeds. Elicit other suggestions on mechanisms explaining impact of agronomic practices with groups using flip charts in turn.		10 minutes

## Module 4

### The Small-Scale Seed Production Training Programme

#### Instructor's Manual

#### Sub Module 4.4

#### Discuss Soil Fertility and Water Management in Seed Production. (8 minutes)

##### Elements/Outcomes

4.4.1 Analyze the importance of soil fertility management in seed production

4.4.2 Explain the impact of excessive humidity, moisture stress and water logging conditions on seed quantity and quality.

4.4.3 Discuss methods of rectifying the constraints mentioned in 4.4.2.

Activity	Material Media and Equipment	Time
1. Invite suggestions from trainees on how each of the following factors influence seed quantities and quality: nutrient elements, rates, placement, uniformity of application and timing of application may influence seed quantities and quality. Moderate responses by providing feedback using Transparency 4.4.1.	➤ Transparency 4.4.1	3 minutes
2. Conduct a multiple choice test on the importance of preventing moisture stress in seed crops, as well as ways to deal with excessive humidity and waterlogged soils.	➤ Multiple choice test.	4 minutes
3. Conduct a question and answer session aimed at clarifying any misunderstanding and identifying methods for increasing and/or conserving soil moisture.	➤ Transparency 4.4.2/Handout 4.4.	1 minute

**Sub Module 4.5****Outline Procedures For Decontamination And Weeding In Seed Crops (9 minutes)****Elements/Outcomes**

- 4.5.1 Justify decontamination and roguing in seed production.
- 4.5.2 Analyze methods used to minimize roguing in seed crops.
- 4.5.3 Describe procedures for roguing.
- 4.5.4 State the requisite human skills needed for roguing.
- 4.5.5 Analyze the negative effects of weeds in seed crops.
- 4.5.6 Relate timing and methods of weed control to seed crop requirements.

Activity	Material Media and Equipment	Time
1. Refer to Handout 4.5 outlining sources of seed crop contamination and briefly explain each source.	➤ Handout 4.5/ Transparency 4.5.1.	1 minute
2. Facilitate a class discussion based on Transparency 4.5.2 analyzing ways to minimize roguing.	➤ Oral discussion based on Transparency 4.5.2	2 minutes
3. Lead trainees through the rest of the Handout 4.5 highlighting major aspects, using Transparencies 4.5.3 and 4.5.4.	➤ Handout 4.5	6 minutes

## Module 4

### The Small-Scale Seed Production Training Programme

#### Instructor's Manual

#### Sub Module 4.6

#### Discuss Major Aspects of Pest and Disease Management in Seed Crops (7 minutes)

##### Elements/Outcomes

4.6.1 Explain the reasons for controlling pest and diseases.

4.6.2 Outline the management practices for major seed crop pests and diseases.

Activities	Material Media and Equipment	Time
1. Explain key aspects defining crop pests and diseases.	➤ Transparency Handout	1 minute
2. Explain reasons for controlling pests and diseases in seed crops and explain each reason in turn. Ask trainees to seek clarification	➤ Transparency 4.6.1 Handout	3 minutes
3. Conclude this section by illustrating control practices using examples of common pests and diseases as shown in Transparency 4.6.2. Ask trainees to evaluate whether there would be such a need in grain crops.	➤ Transparency 4.6.2 Handout	3 minutes



**Sub Module 4.7****Discuss Harvesting, Conditioning, Processing In Seed Crops  
(8 minutes)****Elements/Outcomes**

4.7.1 Determine harvest/field maturity for various seed crop types.

4.7.2 Discuss hand harvesting and machine harvesting for seed crops.

4.7.3 Describe seed conditioning

Activities	Material Media and Equipment	Time
1. Show Transparency 4.7.1 and explain further, the definitions on field/harvest maturity and physiological maturity.	➤ Transparency 4.7.1	1 minute
2. Compare the strengths and weaknesses of hand harvesting and machine harvesting. Discuss with trainees appropriateness of each approach for small-scale seed production.	➤ Handout 4.7	1 minute
3. Guide trainees through Handout 4.7 on seed conditioning and processing highlighting key aspects and clarifying questions. Also use visuals 4.7.3 (a), (b), (c), (d), and (e).	➤ Handout 4.7	5 minutes
4. Invite questions from trainees for clarification.		1 minute

## Module 4

### The Small-Scale Seed Production Training Programme

#### Instructor's Manual

#### Sub Module 4.8

#### Apply The Different Procedures Used In The Storage Of Seed Crops (6 minutes)

##### Elements/Outcomes

4.8.1 Explain the objectives and methods of storing seed.

4.8.2 Analyze factors that influence viability and vigour in storage.

4.8.3 Analyze factors that determine storability of seed

4.8.4 Outline damage caused by storage pests and diseases and procedures for controlling them.

Activities	Materials Media and Equipment	Time
1. Discuss the objectives and methods of seed storage and give explanations.	➤ Transparency 4.8.1/Handout	1 minute
2. Using Transparency 4.8.2, outline the interplay of physical, biological and chemical factors that influence seed viability and vigour in storage	➤ Transparency 4.8.2/Handout	2 minutes
3. Facilitate discussion to suggest methods by which farmers can reduce the negative contribution of each factor, whether before or during storage.	➤ Chalkboard/ Handout 4.8.4	3 minutes

**Sub Module 4.9****Facilitate The Bulking Of FSV Seed By Small-Scale Farmers using Seed Gardens (7 minutes)****Elements/Outcomes**

- 4.9.1 Describe seed gardens and their uses.
- 4.9.2 Explain procedures and precautions taken when bulking Farmer Selected Varieties (FSV).
- 4.9.3 State purposes of off-season seed production for next season.
- 4.9.4 Analyze appropriate guidelines for off-season seed production in seed gardens for specific crops

Activities	Materials Media Equipment	Time
1. Facilitate plenary discussion on: <ul style="list-style-type: none"> <li>❖ Purposes of off-season seed gardens, stating their experiences, crops involved and whether seed gardens were improved or traditional seed gardens.</li> <li>❖ Procedures and precautions taken when bulking FSV. Ask trainees to contribute other procedures and precautions.</li> <li>❖ Management options for off-season seed gardens based on the outline in Transparency 4.9.3</li> </ul>	➤ Flip Chart	4 minutes

Module 4

The Small-Scale Seed Production Training Programme

**Intentionally left blank**

# Module 4

## Trainee Manual/Instruction Sheet

### Sub Module 4.1

#### Discuss Seedbed Selection Procedures (15 minutes)

##### Elements/Outcomes

4.1.1 Outline factors to consider in seedbed site selection.

4.1.2 Discuss the characteristic of a good seedbed for quality seed production.

4.1.3 State measures for achieving a good seedbed.

Activities	Materials Media and Equipment	Time
1. Observe on Transparency 4.1.1 factors to consider when siting seedbeds. Note on paper the factors that aid pollination, those that are aimed at preventing contamination, those that ensure high yields and quality and those for socio-economic purposes. Self-evaluate when instructor categorizes the factors on chalkboard.	➤ Transparency 4.1.1	5 minutes
2. In response to the instructor's question, suggest seedbed characteristics that influence seed quality and yield. Note those characteristics that you omitted by looking at those further provided by your instructor.	➤ Chalk Board	5 minutes
3. View transparency 4.1.3, which states the available options for erecting an ideal seedbed for seed production. Reflect by contrasting these options with those appropriate for conventional crops.	➤ Transparency 4.13	5 minutes

## Module 4

### The Small-Scale Seed Production Training Programme

#### Trainee Manual

#### Sub Module 4.2

#### Outline Seed Production Practices in Relation to Cross-pollinated, Semi-self pollinated, Self-pollinated and Vegetative Propagated Crops (22 minutes)

##### Elements/Outcomes

- 4.2.1 Define cross, semi-self, self-pollinated and vegetatively propagated crops.
- 4.2.2 Relate the pollination character to seed production.
- 4.2.3 Prepare vegetative seeds for planting.
- 4.2.4 Distinguish self-pollinating and vegetatively produced crops from semi-self pollinating and cross pollinated crops in relation to seed production.

Activity	Material Media and Equipment	Time
1. Refer to handout 4.2 and Figure 4.2.1 for an illustration of crop pollination types. Note the distinguishing features.	➤ Handout 4.2	3 minutes
2. Also note the implications for isolation of seed crops from potential contaminant crops, and requirements for special planting patterns of male and female plants.	➤ Figure 4.2.1	5 minutes
3. Again view Figure 4.3.2 in Handout 4.2 and note the major distinguishing features of vegetatively produced crops.	➤ Handout 4.2.	2 minutes
4. Select and prepare vegetative material provided for planting .	➤ Vegetative seeds	10 minutes
5. Participate in a question and answer session on the distinction, strengths and weaknesses of cross pollinating, self pollinating and vegetatively produced crops noting relatively higher stability of self pollinating and vegetatively produced crops. Compare answers from other trainees to the answers you have	➤ Flipchart	2 minutes

**Sub Module 4.3****Outline Requirements And Procedures For Planting and Establishment (13 minutes)****Elements/Outcomes**

- 4.3.1 Discuss the importance of good stand establishment and growth to the achievement of large quantities of high quality pure seeds.
- 4.3.2 Explain the modifications of commercial agronomic practices used in grain production to suit seed crop requirements.

Activities	Materials Media and Equipment	Time
1. View Transparency 4.3.1 which states the importance of good stand establishment and growth in seed crops.	➤ Transparency 4.3.1	3minutes
2. Besides the stated mechanisms in Transparency 4.3.1 which explain impact of seed crop husbandry practices on seed quantity and quality, suggest other ways in which these agronomic practices influence seed.	➤ Transparency 4.3.2	10 minutes

## Module 4

### The Small-Scale Seed Production Training Programme

#### Trainee Manual

#### Sub Module 4.4

#### Discuss Soil fertility and Water Management in Seed Production. (8 minutes)

##### Elements/Outcomes

- 4.4.1 Analyze the importance of soil fertility management in seed production
- 4.4.2 Explain the impact of excessive humidity, moisture stress and water logging conditions on seed quantity and quality.
- 4.4.3 Discuss methods of rectifying the constraints mentioned in 4.4.2.

Activity	Material Media and Equipment	Time
1. In response to the instructor's invitation, suggest how some nutrient elements, rates, placement, evenness of application, timing of application may affect seed quantities and quality. Follow the arguments from other trainees and evaluate them in light of moderations by the instructor.	➤ Plenary discussion	3 minutes
2. Evaluate the impact of excessive humidity, water logging and moisture stress on seed crops as asked in the multiple choice test and relate it to the impact of nutrient and fertility management.	➤ Multiple choice test	4 minutes
3. Participate in a question and answer session aimed at clarifying misunderstandings and identifying methods for increasing and conserving soil moisture stress.	➤ Question and answer session	1 minute



**Sub Module 4.5****Outline Procedures For Decontamination And Weeding In Seed Crops (9 minutes)****Elements/Outcomes**

- 4.5.1 Justify decontamination and roguing in seed production.
- 4.5.2 Analyze methods used to minimize roguing in seed crops.
- 4.5.3 Describe procedures for roguing.
- 4.5.4 State the requisite human skills when roguing.
- 4.5.5 Analyze the negative effects of weeds in seed crops.
- 4.5.6 Relate timing and methods of weed control to seed crop requirements.

Activity	Materials Media and Equipment	Time
1. Follow the clarifications being given by your instructor.	➤ Handout 4.5	1 minute
2. Participate in the class discussion based on Acetate 4.5.2, which indicates how to minimize roguing requirements in seed crops.	➤ Acetate 4.5.2	2 minutes
3. Refer to Handout 4.5 and note core issues on procedures for roguing and negative effects of weeds as highlighted by the instructor.	➤ Handout 4.5	6 minutes

## Module 4

### The Small-Scale Seed Production Training Programme

#### Trainee Manual

#### Sub Module 4.6

#### Discuss major aspects of Pest and Disease management in seed crops (7 minutes)

#### Elements/Outcomes

4.6.1 Explain the reasons for controlling pest and diseases.

4.6.2 Outline the management practices for major seed crop pests and diseases.

Activity	Materials Media and Equipment	Time
1. Observe Transparency 4.6.1 displayed showing the key aspects defining crop pests and diseases, and reasons for controlling them.		1 minute
2. Analyze the methods of controlling pests and diseases in seed crops. Suggest whether there would be such a need for commercial/grain crops		6 minutes

**Sub Module 4.7****Discuss Harvesting, Conditioning, Processing In Seed Crops  
(8 minutes)****Elements/Outcomes**

4.7.1 Determine harvest/field maturity for various seed crop types.

4.7.2 Discuss hand harvesting and machine harvesting for seed crops.

4.7.3 Describe seed conditioning

Activity	Material Media and Equipment	Time
1. View transparency 4.7.1 and note the differences between field/harvest maturity and physiological maturity.	➤ Transparency 4.7.1	1 minute
2. Based on the strengths and weaknesses of hand and machine harvesting identified by the instructor, reflect on and suggest what would be most appropriate for small-holder seed production, giving reasons.	➤ Handout 4.7	1 minute
3. Refer to handout 4.7 and reflect on how each procedure in seed conditioning and processing further upgrades seed quality. Ask questions where you are not clear.		6 minutes

## Module 4

### The Small-Scale Seed Production Training Programme

#### Trainee Manual

#### Sub Module 4.8

#### Apply The Different Procedures Used In The Storage Of Seed Crops (6 minutes)

##### Elements/Outcomes

4.8.1 Explain the objectives and methods of storing seed.

4.8.2 Analyze factors that influence viability and vigour in storage.

4.8.3 Analyze factors that determine storability of seed

4.8.4 Outline damage caused by storage pests and diseases and procedures for controlling them.

Activity	Materials Media and Equipment	Time
1. View transparency 4.8.1, which states the objectives and methods of storage. Follow the explanations given on factors influencing seed viability and how the factors may interact.	➤ Transparency 4.8.1	1 minute
2. View Transparency 4.8.2	➤ Transparency 4.8.2	1 minute
3. Reflect on whether smallholder seed producers can influence suitability of seed for storage and success of seed storage. On being invited, share your views with other trainees.	➤ Chalkboard	3 minutes

**Sub Module 4.9****Facilitate The Bulking Of FSV Seed By Small-Scale Farmers Through Seed Gardens (7 minutes)****Elements/Outcomes**

- 4.9.1 Describe seed gardens and their uses.
- 4.9.2 Explain procedures and precautions taken when bulking Farmer Selected Varieties (FSV).
- 4.9.3 Analyze appropriate guidelines for off-season seed production in seed gardens for specific crops.

Activity	Material Media and Equipment	Time
1. In response to an invitation from your instructor, share your experience with seed gardens and crops involved. Also indicate whether these gardens were improved or not.	<ul style="list-style-type: none"> <li>➤ Flipcharts</li> <li>➤ Markers</li> </ul>	2 minutes
2. Contribute other procedures and precautions when bulking FSV.	<ul style="list-style-type: none"> <li>➤ Transparency 4.9.2</li> <li>➤ Chalkboard</li> </ul>	2 minutes
3. Contribute to the oral discussion on management options for off-season seed gardens.		3 minutes

Module 4

The Small-Scale Seed Production Training Programme

**Intentionally left blank**

### Notes on how to produce quality seed through use of appropriate agronomic practices

#### 4.1 Introduction

To achieve maximum crop yields, the starting point is to use high quality seed in establishing the crop. As long as appropriate agronomic practices are observed, high seed quality will ensure optimum quantities of planted seed germinate and emerge to meet the targeted stand densities. In addition, the crop from quality seed will grow unhindered by diseases or other weaknesses introduced with the seed, thus achieving the yield potential for the variety.

High quality seed is achieved if agronomic practices used to produce it are appropriate. These practices cover the whole cycle starting from seed planted, site selection, seedbed preparation, soil and moisture management, weed, pest and disease management, seed conditioning and storage. The way each of these aspects are handled will affect all seed quality aspects: genetic, analytical, physiological and sanitary, as well as amounts produced. Very often, the recommended practices for producing grain crops in specific crops either have to be modified, or followed more closely when producing seed.

This handout details agronomic procedures relevant when producing seed. The recommendations presented here are general in nature. Therefore, some of the recommendations have to be modified when dealing with crop specific situations.

##### 4.1.1 Factors to consider when selecting sites for seed production

Any site chosen to grow seed crops has to meet some minimum criteria. The environment at the site has to allow the crop to reproduce, i.e. flower, set seed, and allow that seed to develop, fill and develop to physiological maturity. In some instances, climatic elements such as temperature and rainfall, as well as photoperiod, prevent crop plants from setting seed. If reproduction is poor, this could favour plants with a skewed genetic make-up to flower in greater proportion, thus causing a shift in the genetic make-up of the variety. So, select sites where all plants fully reproduce, to reduce the risk of shifts in genetic make-up.



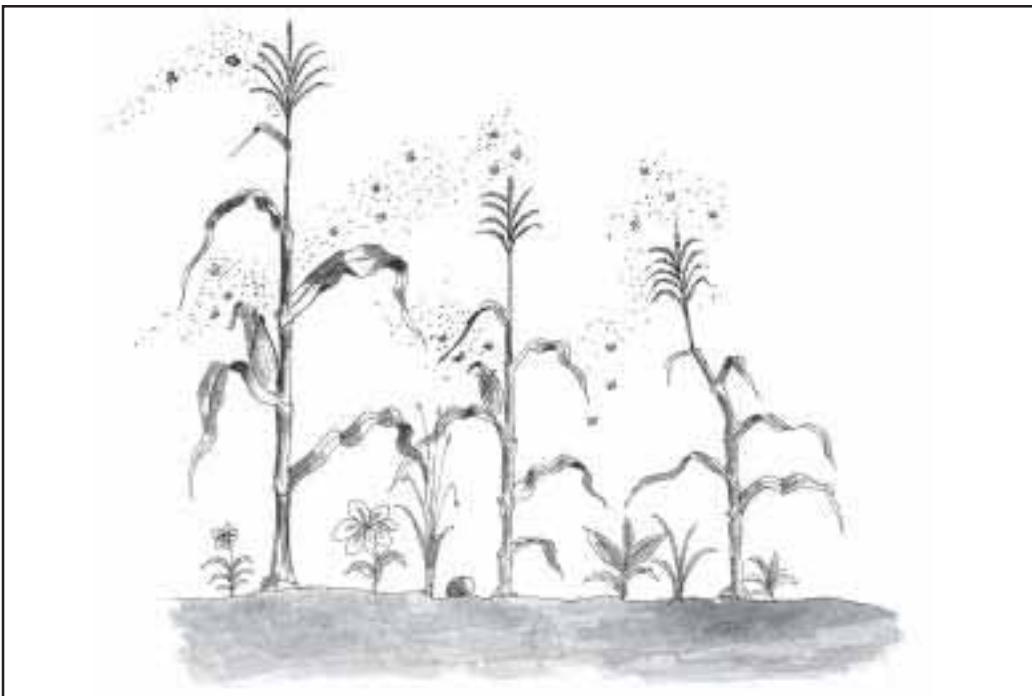
4.1.1(a) Avoid sites where seed will not fully reproduce

## Module 4

### The Small-Scale Seed Production Training Programme

#### Notes

Since seed has to be free from pests and diseases as part of the quality requirement, and seed yields have to be optimized, the site identified should have low to nil weed, pest and disease pressure, depending on the crop type, seed category, pest and disease type.



4.1.1(b) Avoid sites with high weed, pest and disease pressure

It is difficult to distinguish off-types for roguing when crop growth is uneven. Consequently, sites on steeply sloping land, as well as those with poor drainage should be avoided since they create uneven and sometimes poor growth. Prefer those with high, evenly spread fertility.

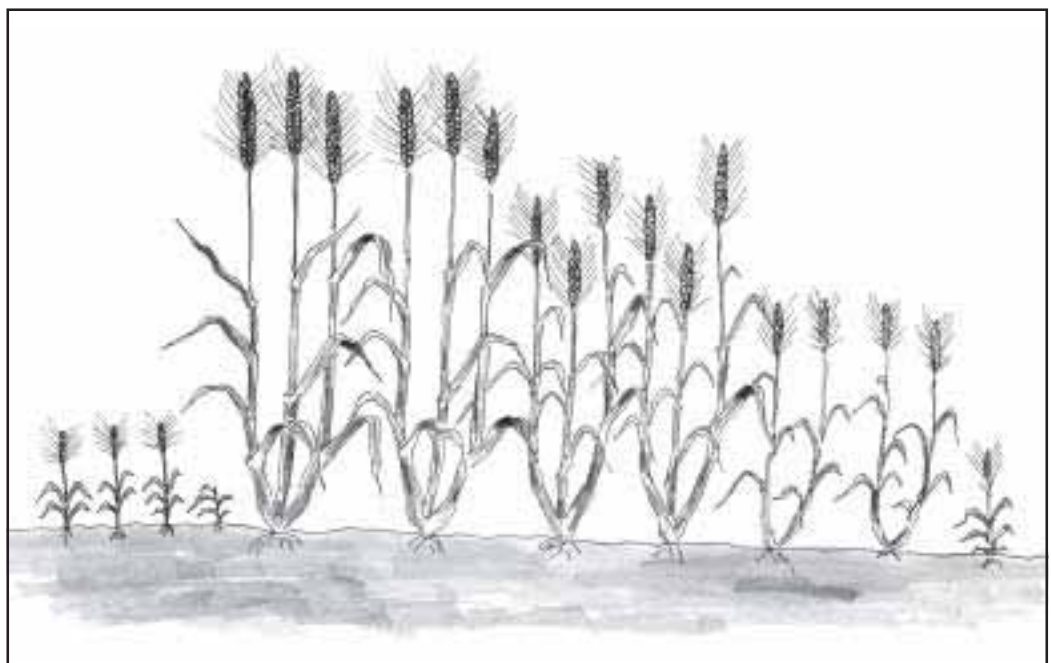


4.1.1(d) Avoid swampy land





4.1.1(d) Avoid sites on sloping land



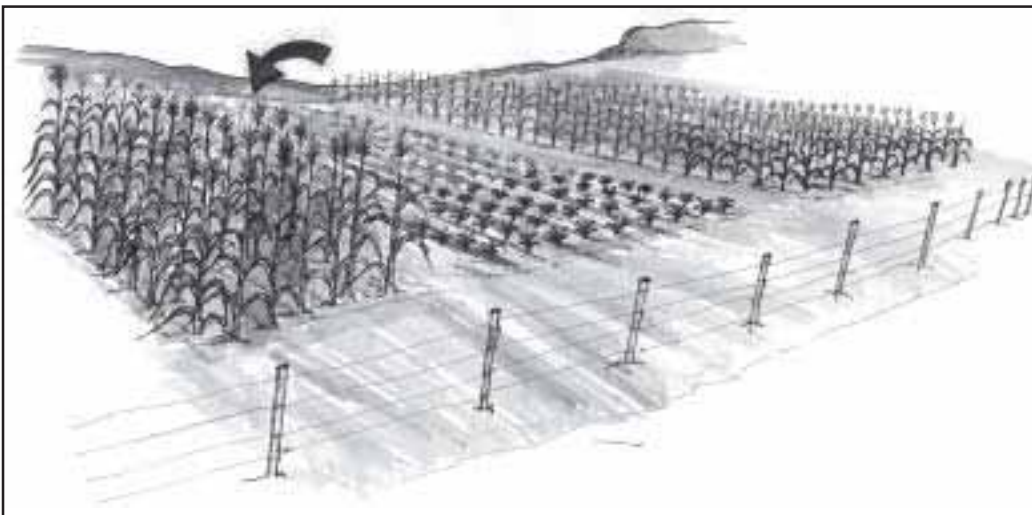
4.1.1(e) Avoid sites with uneven fertility

## Module 4

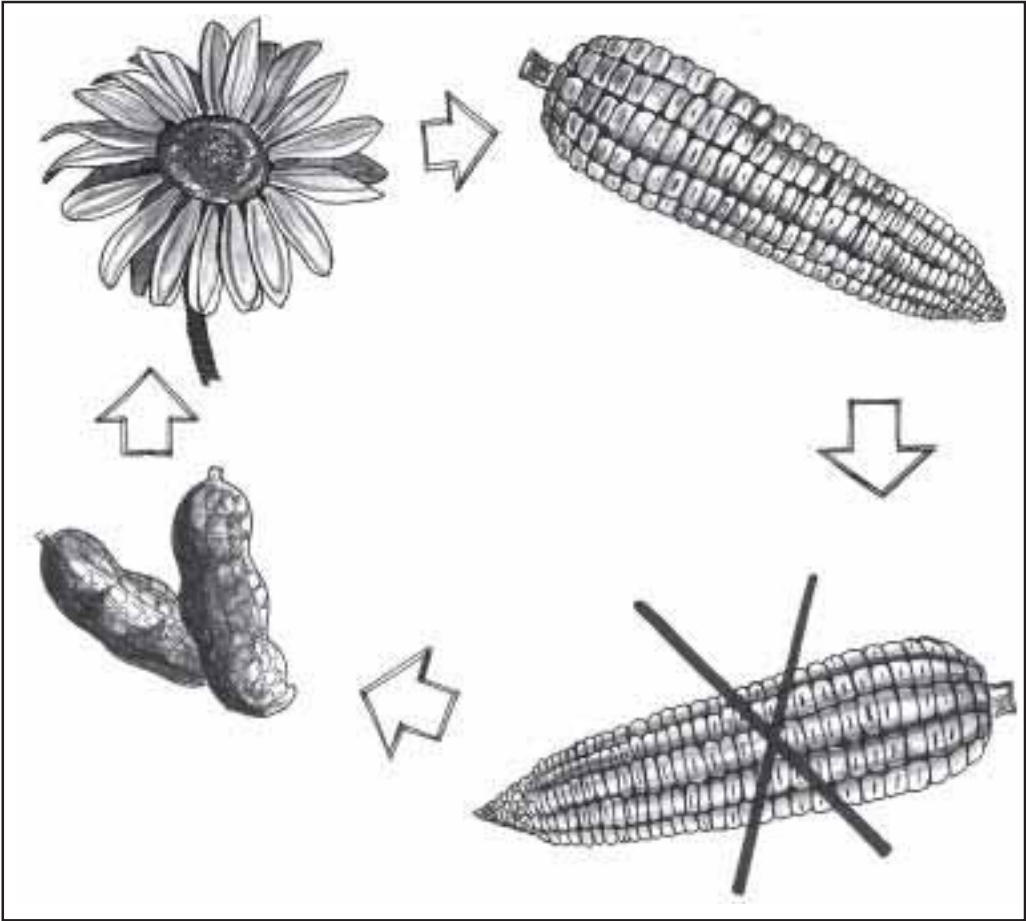
### The Small-Scale Seed Production Training Programme

#### Notes

Plots that previously hosted similar crops have to be avoided, to reduce the risk of contaminating the current variety with the previously grown varieties emerging from volunteer plants. Rotations will also prevent disease build-up. For example, Common Bacterial blight of common beans accumulates in the soil. Normally, field sites are given a 12 months break, but this has to be doubled for basic seed. Rotational considerations can, however, be relaxed if the variety is similar to the one previously grown, subject to other rotation requirements being met. Also, in instances where differences in varieties grown in rotation are very distinct, such as flowering stages and morphology, these differences would permit identification and subsequent roguing of off-types to prevent contamination.



4.1.1(f) Avoid sites close to contaminant crops



4.1.1(g) Avoid sites that previously hosted similar crops

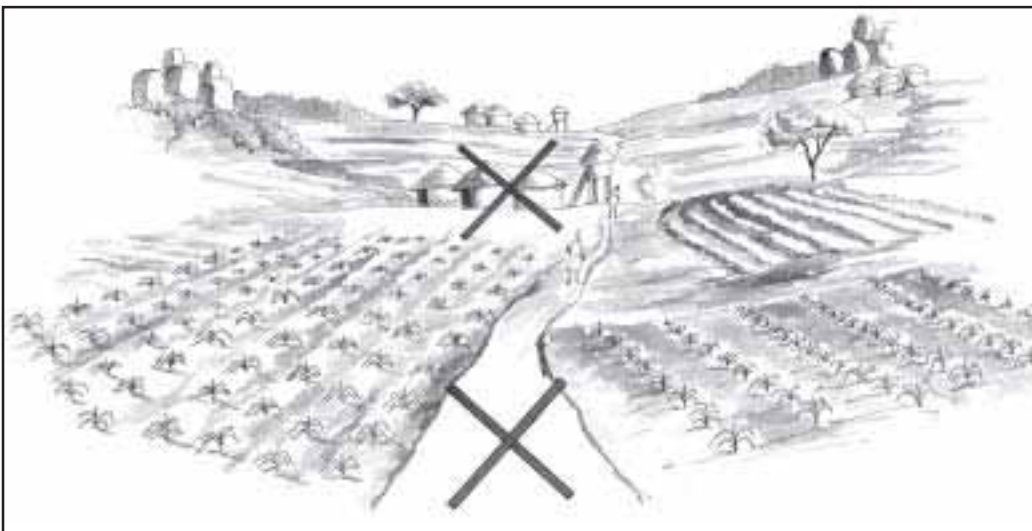
## Module 4

### The Small-Scale Seed Production Training Programme

#### Notes

Contamination of varieties is also preventable if sites chosen are adequately isolated from potential contaminant crops. This prevents genetic contamination, physical admixtures, and spread of diseases. However, isolation distances may be reduced if other protection measures are instituted. For instance, many border rows could be planted around the seed rows. In cases where large fields are used as alternatives to large isolation distances, only the centre of the field is harvested for seed. Additionally, barriers such as windbreaks assist in reducing isolation distances. Livestock may carry contaminant pollen and seed, humans may steal, and both may damage soil structure. Siting plots away from livestock and human tracks and sites close to seed stores are, therefore, further ways to reduce variety contamination, thus maintaining genetic purity.

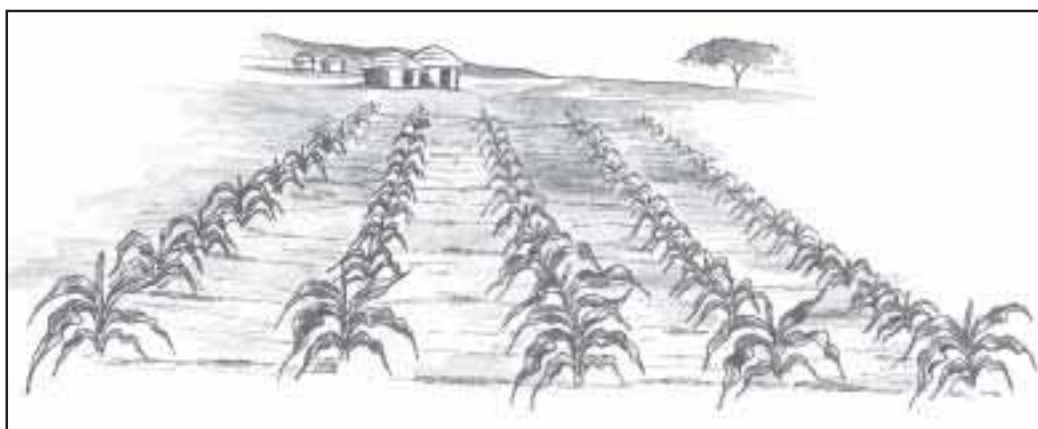
Finally, choose sites that allow access for bringing inputs and moving seed harvests out.



4.1.1(h) Avoid sites close to tracks and stores

### 4.1.2 Preparation of the seedbed

Once a site has been identified, it is important to plough it early, probably one month before establishing the seed crop. Early ploughing will ensure that all residue rots down, allowing seed crops to grow well once planted. Weeds will also germinate and grow adequately in the intervening period, and these could be destroyed before crop establishment. Such early weed control practices thus reduce risk of contamination later.



4.1.2(a) Land ploughed early, about a month before seed crop.



4.1.2(b) Land ploughed late, immediately before seed crop

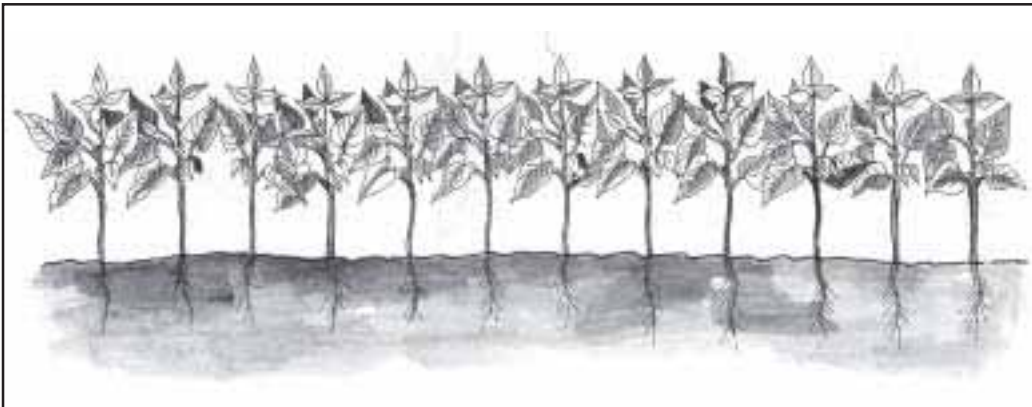
## Module 4

### The Small-Scale Seed Production Training Programme

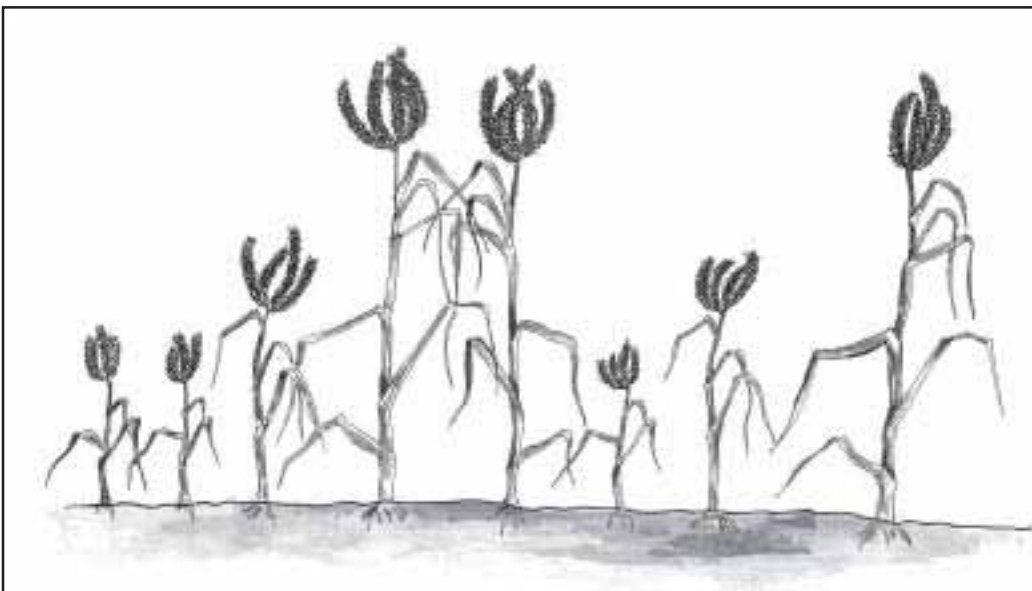
#### Notes

#### 4.1.3 Factors to consider when ploughing a seed-bed

Ploughing should be even, so that seed germination and growth of the crop is uniform, permitting easy spotting of off-types and diseased plants. Ploughing depth should allow adequate burial of crop residues and weeds. Disc and harrow to achieve fine tilth. Fine tilth increases soil-seed contact, and reduces failure of germination. Failure to germinate can also be reduced if minimum tillage is avoided.



4.1.3(a) Even ploughing depth



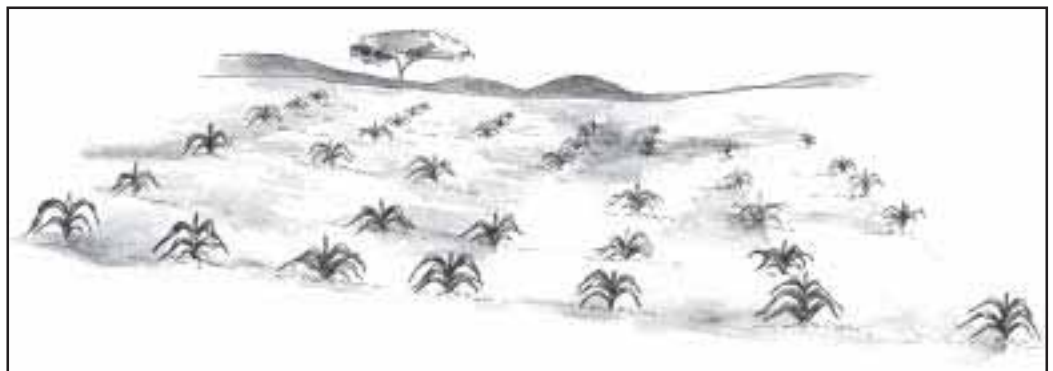
4.1.3(b) Uneven ploughing depth

Module 4  
The Small-Scale Seed Production Training Programme

Notes



4.1.2(c) Fine tilth

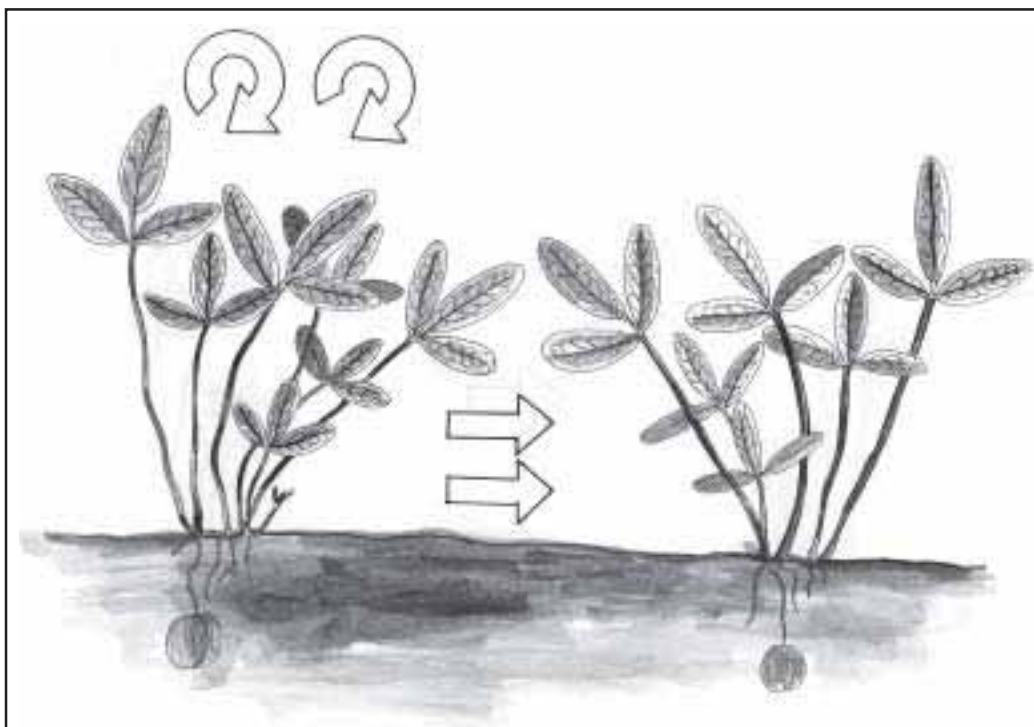


4.1.2(d) Uneven tilth

## 4.2 The influence of pollination types on seed production practices

### 4.2.1 Crop Pollination types

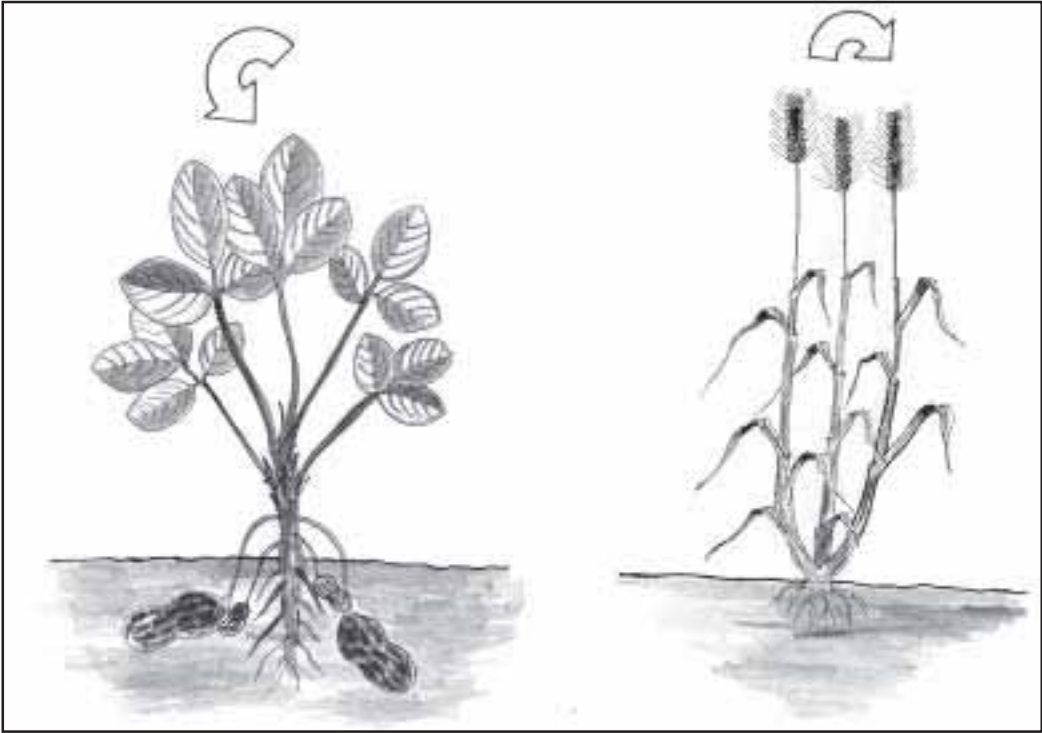
In self pollinating crops, and under natural conditions, 95 % of flowers are pollinated from the same plant. Examples are Finger millet (*Eleusine coracana*), Wheat (*Triticum aestivum*) and Groundnut (*Arachis hypogaea*). In contrast, more than 50 % fertilization in cross-pollinating crops is from one plant to another. Cross-pollinating types are maize (*Zea mays*), pearl millet (*Pennisetum typhoides*) and sunflower (*Helianthus annuus*). Pollination in maize and pearl millet is aided by wind, whereas in sunflower insects act as pollination agents.



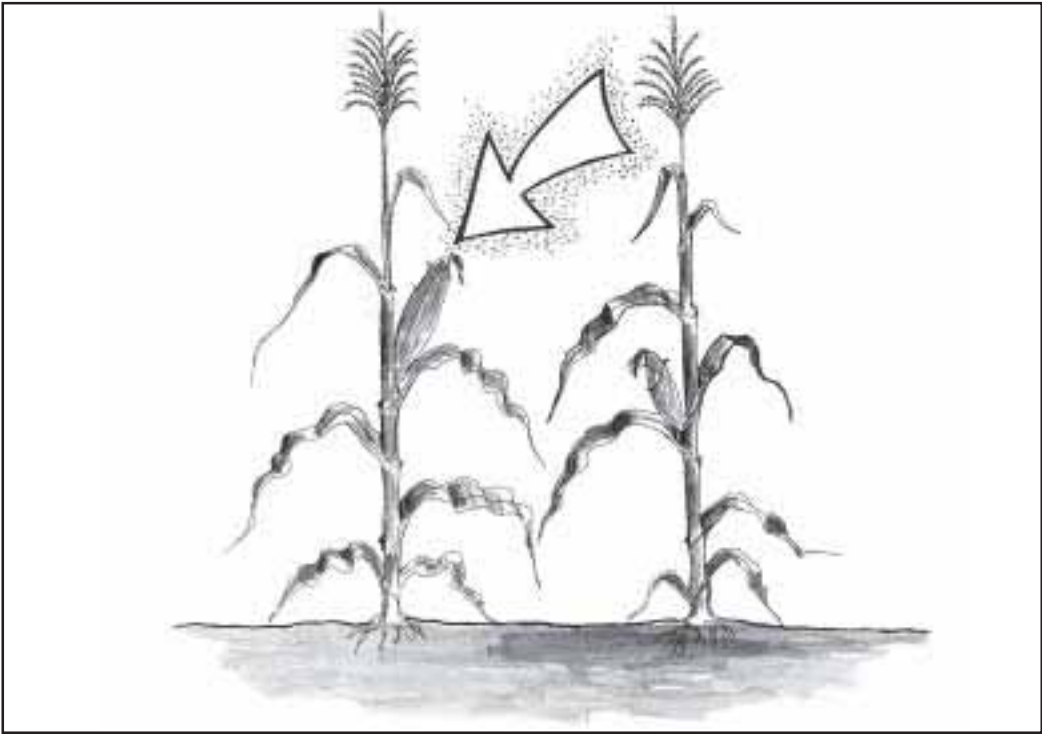
4.2.1(a) Semi self-pollinated crop

Between the two extremes are found semi-cross pollinating crops. These normally have a natural out-crossing percentage of 5-50 %. Under normal climatic conditions, semi-cross pollinating crops self-fertilized. Despite this, isolation distances have to be longer than for self-pollinating crop types since chances of out-crossing are too high. In fact, recommended isolation distances for semi-cross pollinating types are similar to cross-pollinating types. Pollination can either be by wind (sorghum) or insects (cowpea *Vigna unguiculata*, pigeonpea *Cajanus cajan*, bambara nuts *Voandzeia subterranea*).





4.1.2(b) Self pollinating crops



4.2.1(c) Cross pollinating crops

## Module 4

### The Small-Scale Seed Production Training Programme

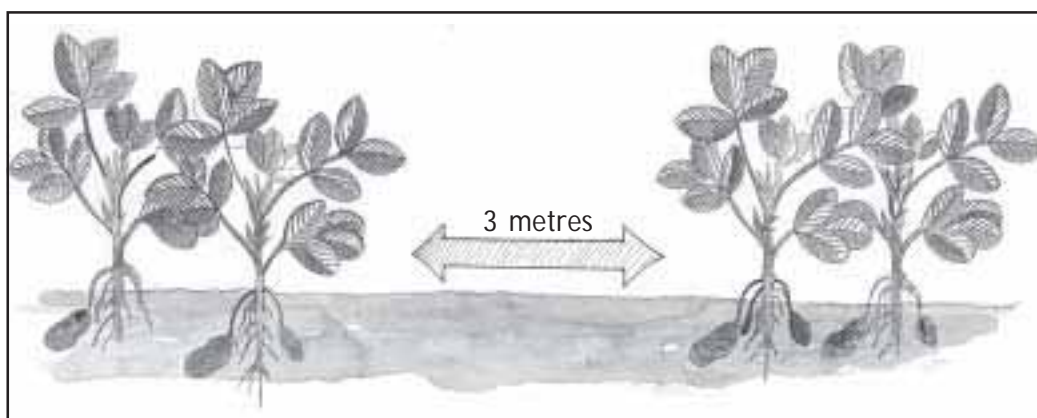
#### Notes



4.2.1(d) Vegetatively propagated crop

### 4.2.2 Relationship between the pollination character and seed production.

Whether a crop is cross-pollinated, semi-cross or self-pollinated has implications on isolation distance. The minimum isolation distances for self-pollinated seed crops from possible contaminant crops are commonly only five metres, whereas semi-cross and cross-pollinated seed crops have to be separated by at least 100 metres and 300 metres, respectively. In addition, the type of pollination agent has to be taken into consideration in finally settling for an isolation distance. Insects as agents tend to fly long distances when flowers become scarce. In contrast, wind cannot carry large amounts of pollen except for short distances. Accordingly, if insect-pollinated, the isolation distances tend to be 600 metres, twice longer than for wind-pollinated crops.



4.2.2. a Isolation for self-pollinating crops

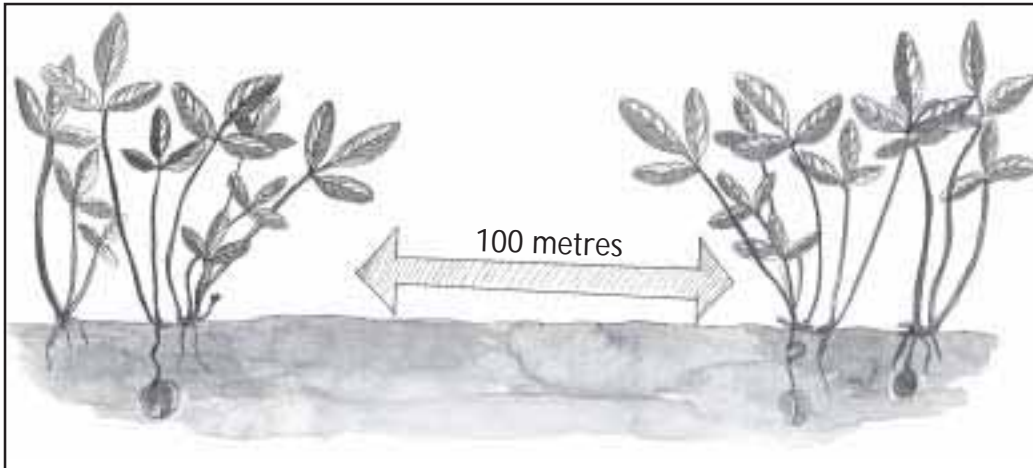
Other management implications are that: when crops are wind pollinated, wind-breaks, natural barriers such as mountains, and boarder rows can be useful modifications that further reduce risk of contamination, hence, isolation distance. For insect-pollinated crops, spraying during flowering requires a selection of chemicals that are friendly to insect-pollinators; or else no spraying should take place.

Time isolation can substitute for spatial isolation. For maize varieties, time isolation of six weeks can substitute for isolation using space.

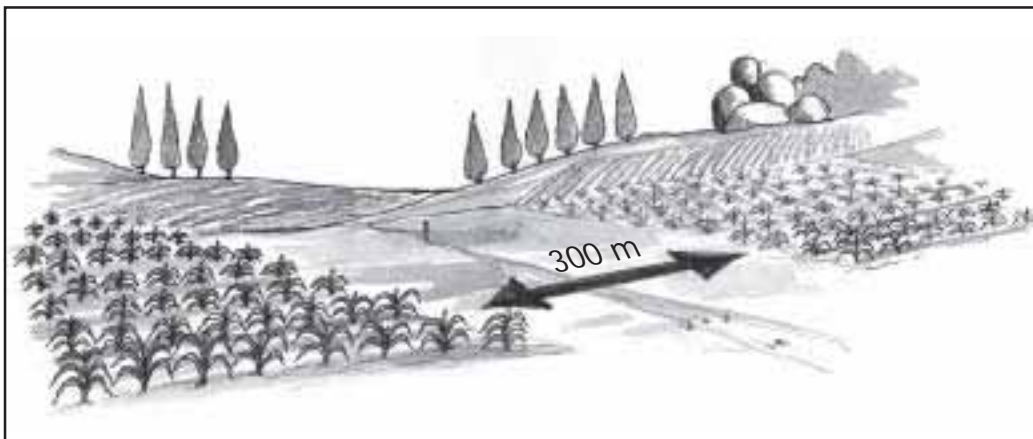
## Module 4

### The Small-Scale Seed Production Training Programme

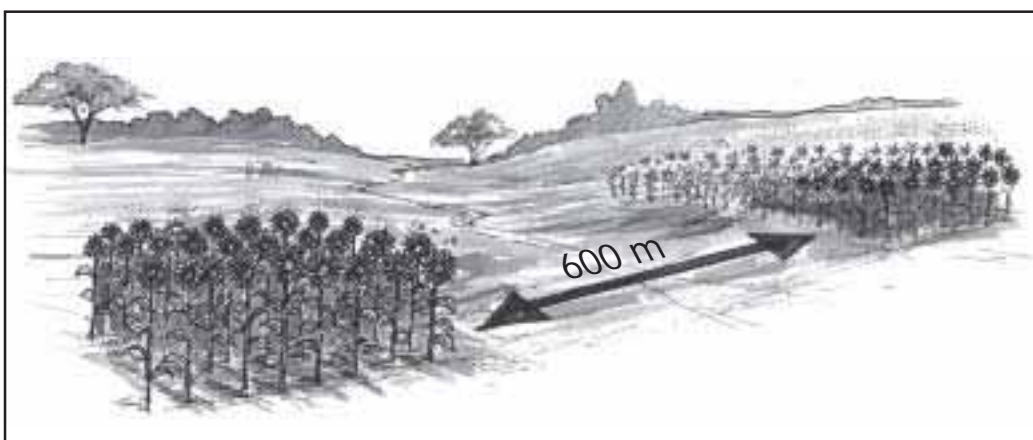
#### Notes



4.2.2(b) Isolation for semi-cross pollinated crops



4.2.2(c) Isolation for cross-pollinated crops with wind as pollination agent



4.2.2(d) Isolation for cross-pollinated crops with insects as pollination agents

### 4.3 Procedures for planting and establishment

#### 4.3.1 Importance of good establishment and growth in seed production

Good stand establishment and growth are more critical when growing seed crops than grain crops. Apart from influencing seed quality and yield, good stands will determine the development of variety characteristics, and the setting of seed.

It may not always be possible to have practices that achieve both high quality crop seeds and maximum yield, resulting in the trading-off of yield for the more critical seed quality. Yield optimization may, therefore, be a more appropriate term.

Distinct, uniform and stable (DUS) variety morphological and physiological characteristics are used in the field as indicators of genetic purity, and off-types from the norm are routinely removed based on these two parameters. There is inconsistent development of variety characteristics if soils have inherent or introduced variation in physical and chemical characteristics, or if crop stand densities, weed pressure and other factors such as the climatic environment are uneven.

Below are a number of available options for achieving high quality crop seed and maximizing yields, whilst facilitating other related practices such as roguing, seed processing, protection and storage.

#### 4.3.2 Modifications of practices to suit requirements for seed crops

Choose good seed

Choice of seed should be from healthy plants grown at locations that offer optimum conditions for seed production. For example, Irish potato seed tubers are ideally produced at altitudes above 2 000 m where cool conditions exclude virus-transmitting aphids. Some viruses, pests and diseases are seed-borne (Table 4.3.2), implying that when the preceding seed crop is infected, the subsequent crop is in turn infected.



4.3.2 Choose good seed for seed crops.

## Module 4

### The Small-Scale Seed Production Training Programme

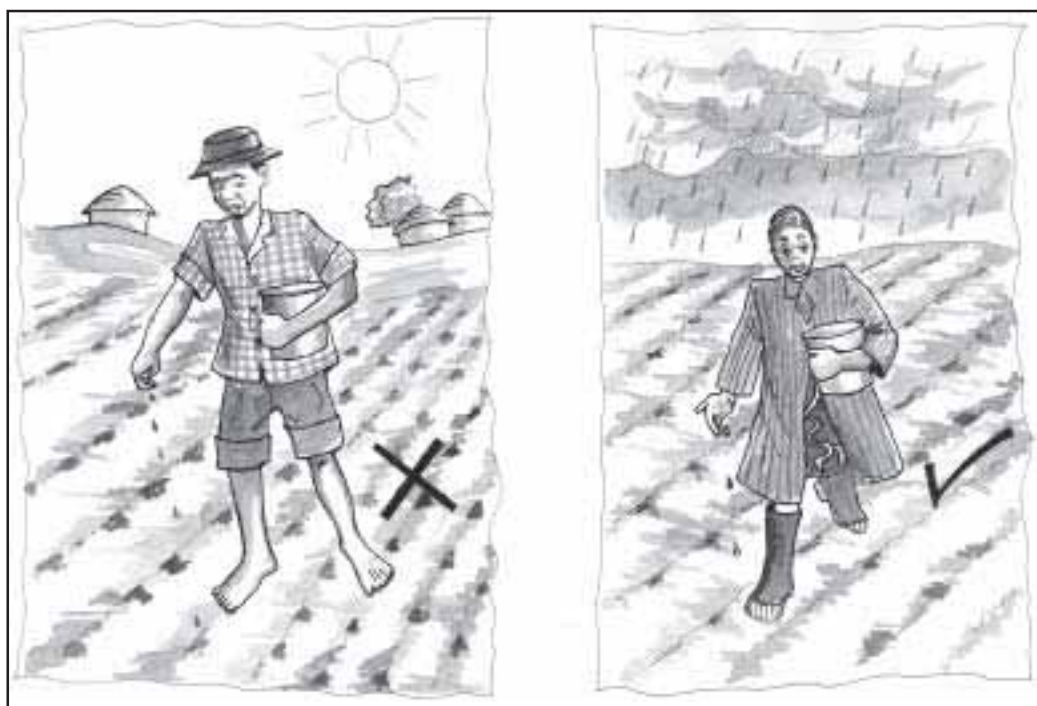
#### Notes

Table 4.3.2. A selection of major seed-transmitted diseases

Crop	Disease
Maize	Diplodia rot ( <i>Diplodia</i> spp.)
Pearlmillet	Ergot ( <i>Claviceps microcephala</i> )
Sorghum	Antracnose ( <i>Colletotricum graminicola</i> )
Wheat	Smut ( <i>Ustilago</i> spp.)
Bean	Anthrachnose ( <i>Colletotricum lindemuthianum</i> )
Cowpea	Cowpea wilt ( <i>Fusarium oxysporum</i> )
Groundnut	Rosette virus
Soyabean	Wildfire ( <i>Pseudomonas tabaci</i> ) Stem rot ( <i>Sclerotinia sclerotiorum</i> )
Irish potato	Late blight ( <i>Phytophthora infestans</i> ) Rhizoctonia ( <i>Rhizoctonia solani</i> ) Verticillium wilt
Sweet potato	Internal cork virus Stem rot( <i>Fusarium oxysporum</i> )

#### Time planting accurately

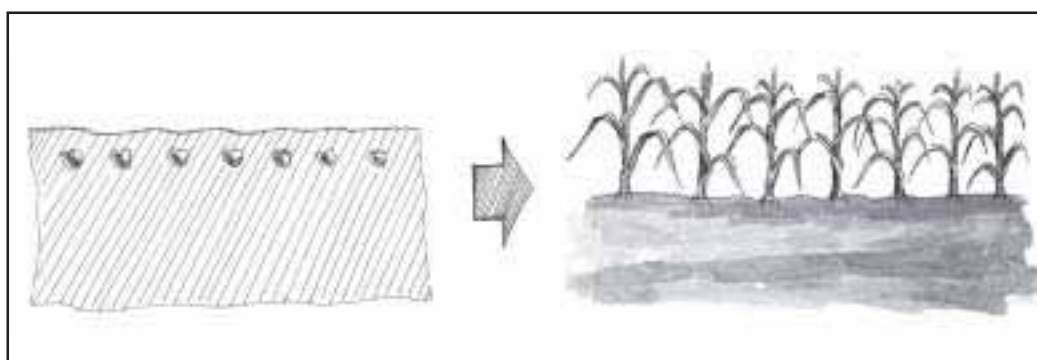
Planting early with the first rains ensures vigorous crops, with better resistance to, or escape from pests and diseases. Pests and diseases are commonly more prevalent in the later parts of the wet season. At the same time, timing of planting has to allow harvesting of the seed crop to coincide with drier and sunny conditions. Excessive wetness and overcast weather during harvesting may reduce seed quality due to blemishes and rotting, hence must be avoided, unless drying facilities are available. Solar dryers commonly recommended for food processing in small-scale farming produce excessive heat which is damaging to seed. Excessive temperatures during seed ripening in the field are also damaging. If wet season conditions are not ideal, the more expensive off-season seed production under irrigation may have to be considered.



4.3.2(b) Time planting dates accurately

### Planting depth

Use the recommended planting depth for the crop so that seed germinates on time, and the crop grows vigorously. Seed planted at greater depth takes longer to emerge hence delays in reaching maturity. Using this principle, you can vary planting depth thus influencing crop growth duration so as to synchronize pollination. Seed placement has to be accurate for even germination and achievement of optimum population.

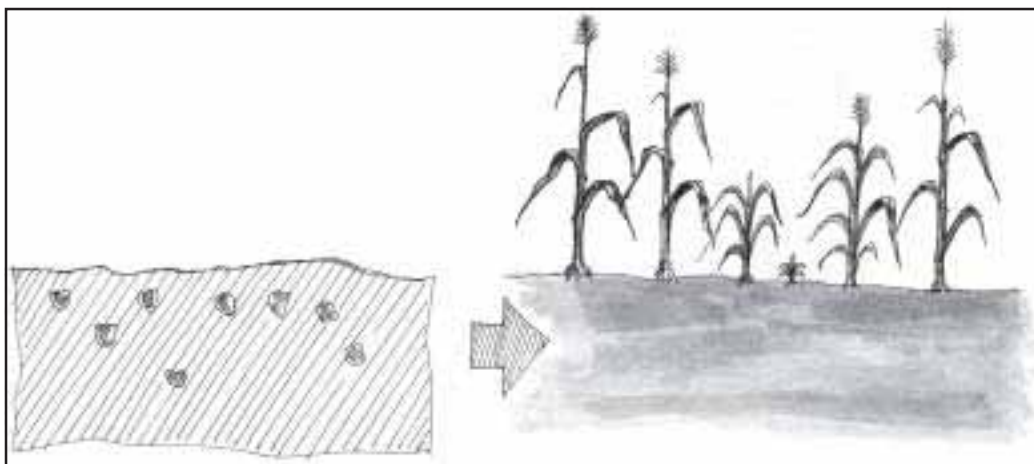


4.3.2(c) Place seed evenly

## Module 4

### The Small-Scale Seed Production Training Programme

#### Notes



4.3.2(d) Uneven placement results in non-uniform seed emergence and growth.

#### Plant populations

When populations are higher than optimum, individual plants compete, resulting in excessively small seeds that may not be viable. Besides, excessive populations increase susceptibility to diseases, as well as higher vegetative growth leading to higher harvesting costs. Lower than optimum populations may result in reduced seed yield and increased tillering in crops such as millets, resulting in uneven ripening.

It is recommended that seed crops are grown in rows so that inspection for off-types, roguing, pest and disease scouting, and weeding are made easier. Row planting also reduces disease spread. It is common to use wider spacing and 10-15 % lower population densities in seed production than is used for crop production since this increases the penetration of sunlight and wind, thereby minimizing disease incidences. In addition, plants develop fully, which allows full expression of plant characteristics to aid identification of desirable plants and off-types, besides giving rise to well-filled seeds and subsequently higher seed yields.



4.3.2(e) Plant seed crops in rows



For vegetatively propagated crops such as sweet potatoes and cassava, reduced spacing gives rise to many stems thereby facilitating faster multiplication.



4.3.2(i) Time harvesting dates accurately

## Module 4

### The Small-Scale Seed Production Training Programme

#### Notes

#### **4.4.1 Soil fertility and water management in seed crops**

The need for high seed quality demands higher soil fertility and management than is necessary for grain crops, where maximization of yield is the major objective.

The site identified for seed production generally has to be fertile and well drained, at the same time have the ability to supply adequate moisture. Nitrogen application has to be moderate and preferably split, since it is required throughout the growth of the crop. If nitrogen is too excessive, vegetative growth becomes rank, causing problems in field inspections and roguing, and increasing harvest and processing costs. Furthermore, when growth is rank, seeds become too soft and unable to withstand harsh conditions in storage and in the seedbed.

Unlike nitrogen that is required throughout the growing season, phosphorus is required in greater quantities during early growth. Phosphorus has major influence on fruiting and seed development. Accordingly, all phosphorus has to be applied at sowing, together with potassium. Phosphorus and potassium give rise to the development of hardy seeds that are more resistant to diseases.

Other individual nutrient elements may be critical in some crops and not others. For instance, calcium deficiencies in groundnut will cause pops-empty groundnut pods.

#### **4.4.2 Importance of soil moisture levels and air humidity**

Adequate soil moisture is critical for seed production. Both soil moisture stress and waterlogged soil causes low seed yields, early senescence (premature maturity) resulting in insufficiently developed seed. It is also very difficult to identify off-types during decontamination and roguing when seed crops are under moisture stress. On the other hand, excessive air humidity may disrupt pollination and pollen shading, causing poor fertilization. Such effects of excessive air humidity are evident in seed maize crops.

#### **4.5 Procedures for decontamination and weeding in seed crops**

The purity of seed in relation to analytical, genetic, sanitary and physiological quality aspects is constantly at risk of contamination during the field production period. It is recommended to use preventative measures as these are often cost-effective, leaving curative measures as a last resort.

### 4.5.1 Sources of contamination

Seed could be genetically impure even before it is planted into the seed plots. Decontamination of such seed could be by roguing off-types when the seed is out-planted. Volunteer weeds from previous crops may contaminate seed crops if left to grow and flower. In addition, inadequate isolation brings seed crops into contact with pollen from other crops, risking cross-fertilization. Similarly, equipment, livestock and human traffic, birds and water can carry contaminant pollen or seed, resulting in admixtures of seeds with varying genetic make-up.



4.5.1 There are several sources of seed contaminants

By using appropriate isolation distance, protective border rows and other barriers and timing of planting, you may prevent contamination. Also, cleaning equipment before and after use, blocking livestock and human traffic, screening the entrance of irrigation canals, and clearing around seed plots potentially eliminates genetic and mechanical contamination.

However, some pollen and seed may escape such safety nets and succeed in fertilizing seed crops, resulting in off-types. Once this happens, seed crops can be decontaminated by roguing these off-types before harvesting. In addition, roguing of diseased plants enhances sanitary quality, particularly in controlling seed-borne diseases.

## Module 4

### The Small-Scale Seed Production Training Programme

#### Notes

#### **4.5.2 Methods to minimize roguing**

Select land carefully by avoiding fields previously sown to the same crop since this could leave behind seeds or plant parts which subsequently form volunteer plants. In addition, avoid lower levels of slopes if upper sections are planted to a related crop, and also lands crossed by roads, animal trails or those near warehouses. Plough early, and destroy all emerging weeds before planting your seed crop.

#### **4.5.3 Timing and procedures for roguing**

When to rogue

Roguing should be done at critical stages when visual identification of off-types is possible, but before genetic contamination occurs. The best period for roguing varies across crops. Usually, roguing is timed to coincide with the vegetative development phase, flowering, post-flowering, and pre-harvest. At the vegetative development stage as well as at flowering, it is easy to pick plants that deviate from specific genotype descriptors. Variation could be in root and stem form, general plant appearance and plant type, plant height, colour, hairiness and duration of phases particularly period to maturity.

Inspections at post-flowering and pre-harvest can pick differences in maturity, dry down characteristics and reactions to diseases.

Procedures for roguing

Rogue alone or in very small teams to avoid distraction from excessive conversation. Only a narrow zone should be observed at a time, for instance two rows for maize. Start inspections from the edges of the field to avoid skipping sections of the field.

To avoid errors due to tiredness, only rogue for a few hours a day, and since off-types are easiest to identify when the sun's rays are low, rogue in the early morning, or late in the afternoon.



4.5.3(a) Rogue in the morning



4.5.3(b) Rogue in the evening

## Module 4

### The Small-Scale Seed Production Training Programme

#### Notes

#### **4.5.4 Skills required for individuals to rogue**

To rogue properly, it is necessary to be thoroughly knowledgeable on variety identification characteristics, common diseases and insects. Tolerance levels for contamination of specific crops also have to be known, so that one either condemns or keeps the seed crop. Common weeds, particularly the prohibited and injurious ones, should also be well known. Knowledge on crop abnormalities, whether caused by nutritional deficiencies, temperature extremes, or moisture stress, is important in separating off-types from pure varieties. Each crop has its own methodologies deemed adequate for field sampling, and these have to be mastered. Finally, it is necessary to be skilled in writing accurate and complete field reports, including at individual small-scale farmer level.

#### **4.5.5 Weeds in seed crops**

Any unwanted plant species growing in a crop is referred to as a weed. Weeds in seed crops may contaminate seed, and may be sources of pests and diseases. Weeds also reduce seed yield by competing with seed crops for nutrients, water and light. Roguing is made harder, and harvesting becomes more difficult when fields are weedy, which ultimately raises costs. Based on the above, it is more critical to keep seed crops weed clean than grain crops, particularly if the weeds are related to the seed crops. There is the possibility that cross-fertilization may occur between crops and related weeds. For instance, 'wild sorghum', *Sorghum halepense*/ *Sorghum verticilliflorum*, may cross with sorghum. This weed is, therefore, prohibited in seed crops. Other weeds prohibited in most seed crops include starbur (*Acanthospermum* spp.), alectra (*Alectra vogellii*), wild oats (*Avena* spp.), lantana (*Lantana camara*), striga (*Striga* spp), and *Xanthium* spp. Some of these species may not necessarily cause genetic contamination, but would either be toxic to humans and livestock, or cause drastic yield reductions if spread.

## **4.6 Major aspects of pest and disease management in seed crops**

### **4.6.1 Reasons for controlling pests and diseases**

Pests and diseases are harmful to the seed, affecting germination, vigour, growth and yield. Whilst diseases arise from bacterial, fungal and viral infections, pests could be insects, rodents, and birds.

When pests feed on seed, they may consume the endosperm and embryos, resulting in loss of seed weight, seed nutrients and germination capacity. Queleas and pigeons reduce the grain and contaminate seed with droppings and feathers. Rodents contaminate seed with urine, excrement, consume and destroy substantial amounts of seed. Other insects, particularly storage pests create heat when they feed, causing hot spots and condensation. Condensation and heat, plus the increased levels of CO<sub>2</sub>, in turn promotes fungal growth, rotting and disease. In some instances, pests will transmit bacteria, viruses and fungal diseases.

### **4.6.2 Control measures for pests and diseases in the field**

Start disease control when the crop is still in the field. This is achieved by roguing diseased plants and removing diseased weeds. Periods with high disease pressure can be avoided by timing of planting and harvesting, or by producing seed off-season. Off-season seed production may, however, entail use of irrigation water.

Cultural procedures which pre-dispose seed to pest and disease attack can be avoided. For instance, risk of aflatoxin is high in groundnut during harvesting. To reduce the risk, avoid damaging the shells. Separate seeds from the plant within 3 days of harvesting. Avoid collecting seed from plants that dried before maturity. In peas, beans and cowpeas, beetles lay their eggs on shells once the seed is mature e.g. bean bruchid (*Acanthoscelides obtectus*), Cowpea beetle (*Callosobruchus maculatus*). Therefore, avoid long delays before harvesting, which, besides exposing the seed to insect attack, results in loss through shattering.

Chemicals can be applied in the field either for preventative or control purposes. Curative chemical seed treatment after harvesting is applicable for fungus diseases, but is often not effective for bacterial diseases. Instead, proper rotations and good seed selection are the best options for controlling bacterial seed borne diseases. For chemicals to be used, they need to be highly effective against the pest or disease, relatively harmless to plants and humans, easy to use, stable for relatively long periods, and inexpensive. Care should, however, be taken when controlling pests with chemicals in insect-pollinated crops such as sunflower, for the chemical may harm the insect-pollinator.

## **4.7 Harvesting, conditioning and processing in seed crops**

### **4.7.1 Harvesting**

Physiological maturity is reached when the seed has completed its development and seed moisture content starts to drop. In general for most crops, seed germination and vigour attributes (physiological quality) is highest at physiological maturity.

Field maturity marks the stage when a seed crop can be harvested. Typically, physiological maturity occurs several weeks before field maturity. Seed crops may not be harvested at the onset of physiological maturity due to high seed moisture levels. Harvest handling at this stage would damage seed, and drying would present problems. Seed is, therefore, kept on the plant until moisture levels decline. In maize, physiological maturity is marked by the development of a black layer on the hilum. Whilst maize physiological maturity is reached when moisture levels are 30-35 %, at harvest maturity, levels would have declined to 20-25 %.

Once harvest maturity is reached, early removal of the seed crops from the field is recommended since this ensures maximum seed yield before rainfall, insect and rodent damage, stem and ear rots, bird damage and shattering. Early harvesting also results in less seed blemishes, less exposure to damaging temperatures, and higher germination percentage and vigour.

In some crops, timing of harvesting is difficult. An example is groundnut where if seed is harvested too early, seeds shrivel. If harvesting is delayed, many gleanings remain in the soil.

### **4.7.2 Equipment for harvesting seed crops**

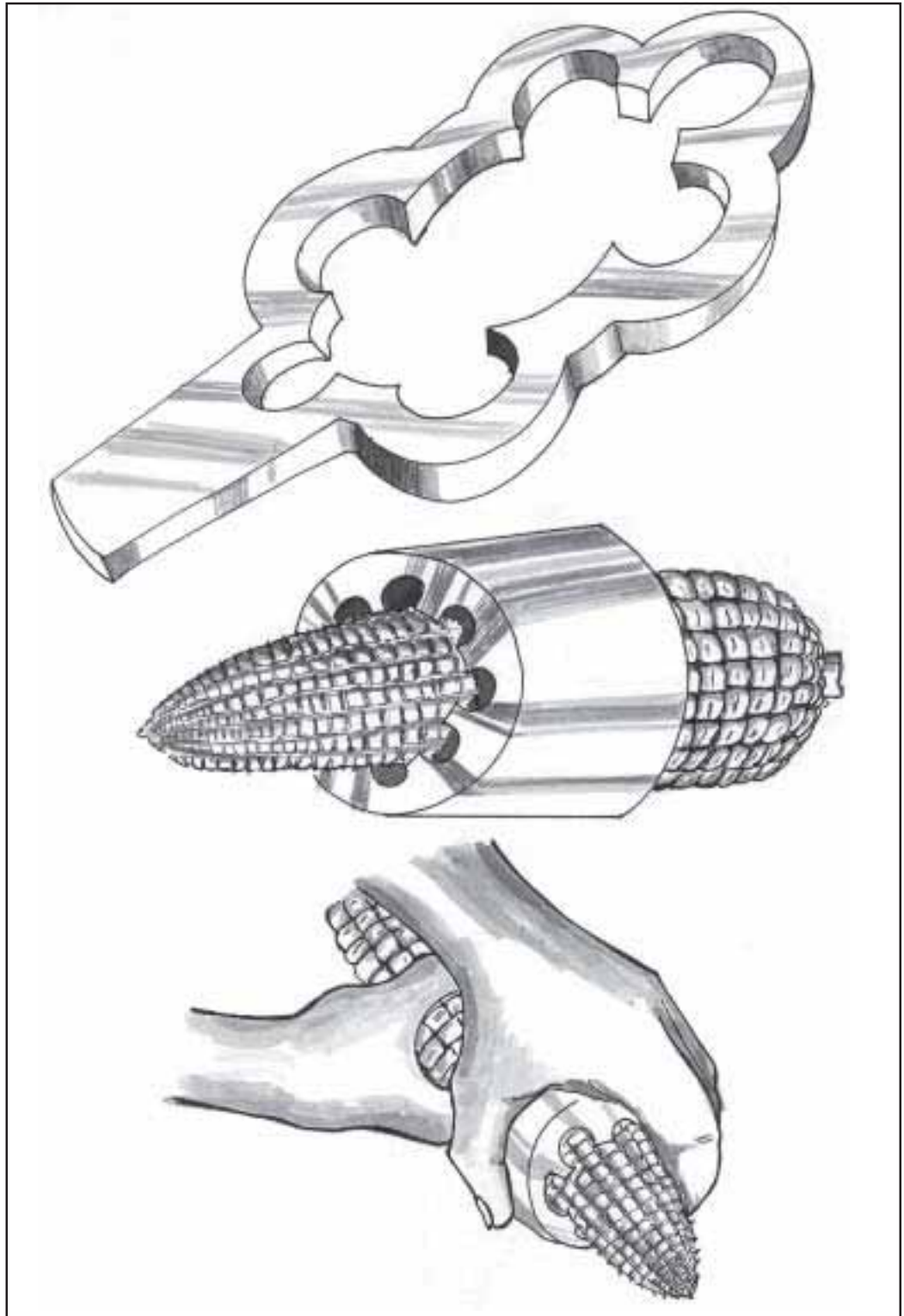
Hand harvesting, as opposed to machine harvesting, is usually the only feasible option in small-scale seed production schemes. This is possible for small seed crops, and despite being slower, does in fact result in higher seed quality. Contamination from seed admixtures are less likely with hand harvesting, unlike machine harvesting particularly if machines are not thoroughly cleaned after harvesting of each crop type or variety.

### **4.7.3 Seed conditioning**

Seed conditioning involves the whole process of selection of harvested material to remove off-types, natural or artificial drying, shelling, cleaning, sizing, treating, bagging and packaging.

Timing of shelling or threshing is crucial as shelling over-dry seed leads to cracking, whilst shelling at high seed moisture levels damages the seed coat.





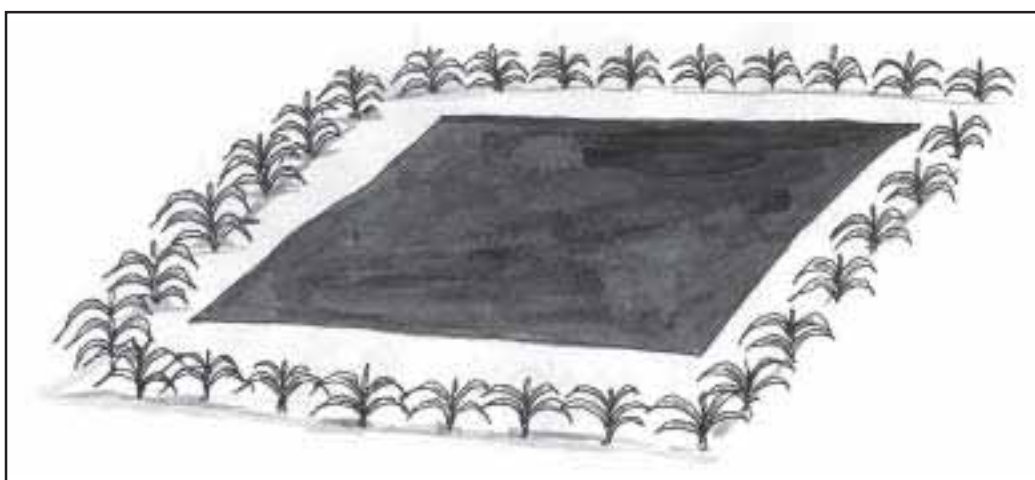
4.7.3 Hand-held shellers are very effective in minimizing seed damage

## Module 4

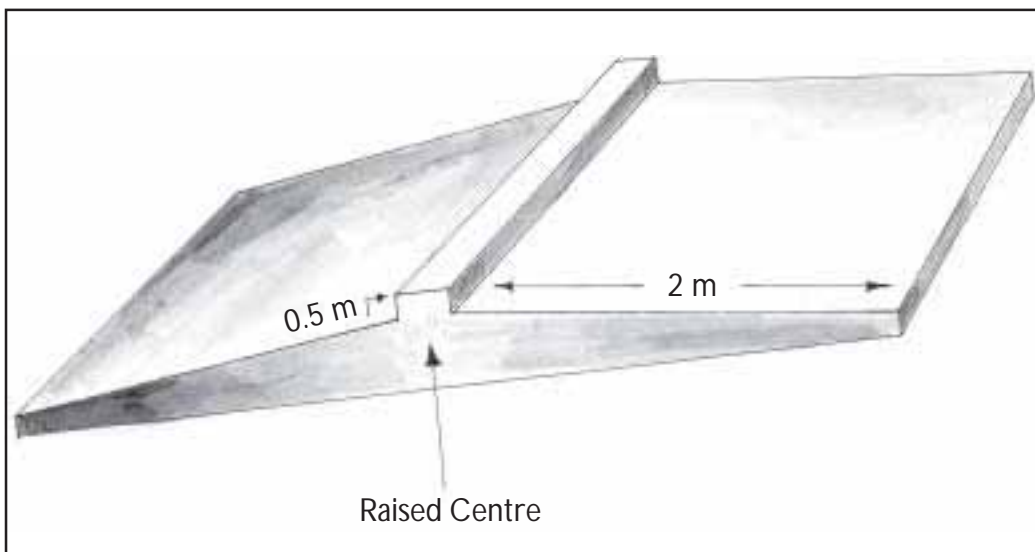
### The Small-Scale Seed Production Training Programme

#### Notes

Whilst drying must be done quickly, exposure to excessively high temperatures when drying damages the seed, particularly if the seed still has high moisture content. Avoid exposing seed to direct sunlight. Artisanal drying methods include use of plastic sheeting, sun dryers and concrete patios. Use cribs and racks when possible to improve ventilation. Where a floor is used, the seed has to be turned regularly which ensures uniform drying. Concrete floors are a very efficient method and can be improved by raising the centre.

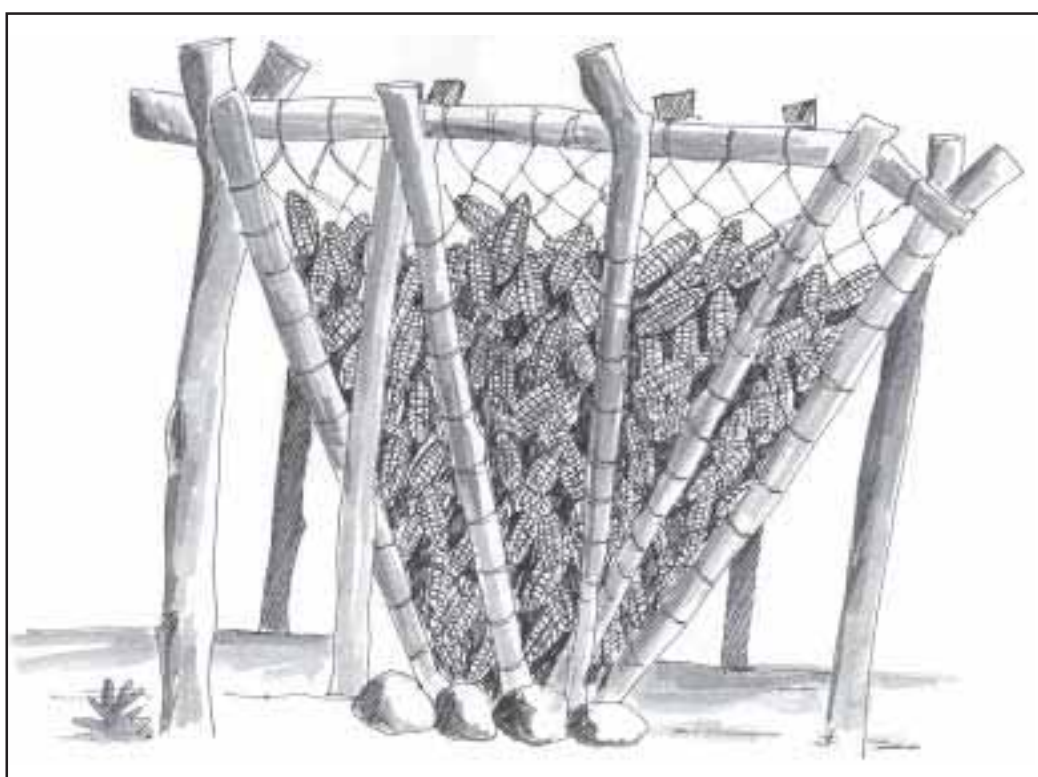


4.7.3(b) Black plastic for drying seed



4.7.3(c) Concrete floor with raised centre for seed drying

Cribs are recommended where there is a high risk of rainfall after harvesting. Traditional drying has the advantages of being simple and cheap. However, inadequate drying may occur due to low ventilation and unsuitable ambient humidity. Drying rate under these methods can be too rapid, resulting in seed discolouration, wrinkling and 'case hardening'. Exposure to pests and diseases could be excessive. In addition, these methods often require daily handling, leading to some losses.



4.7.3(d) Traditional crib for seed drying.

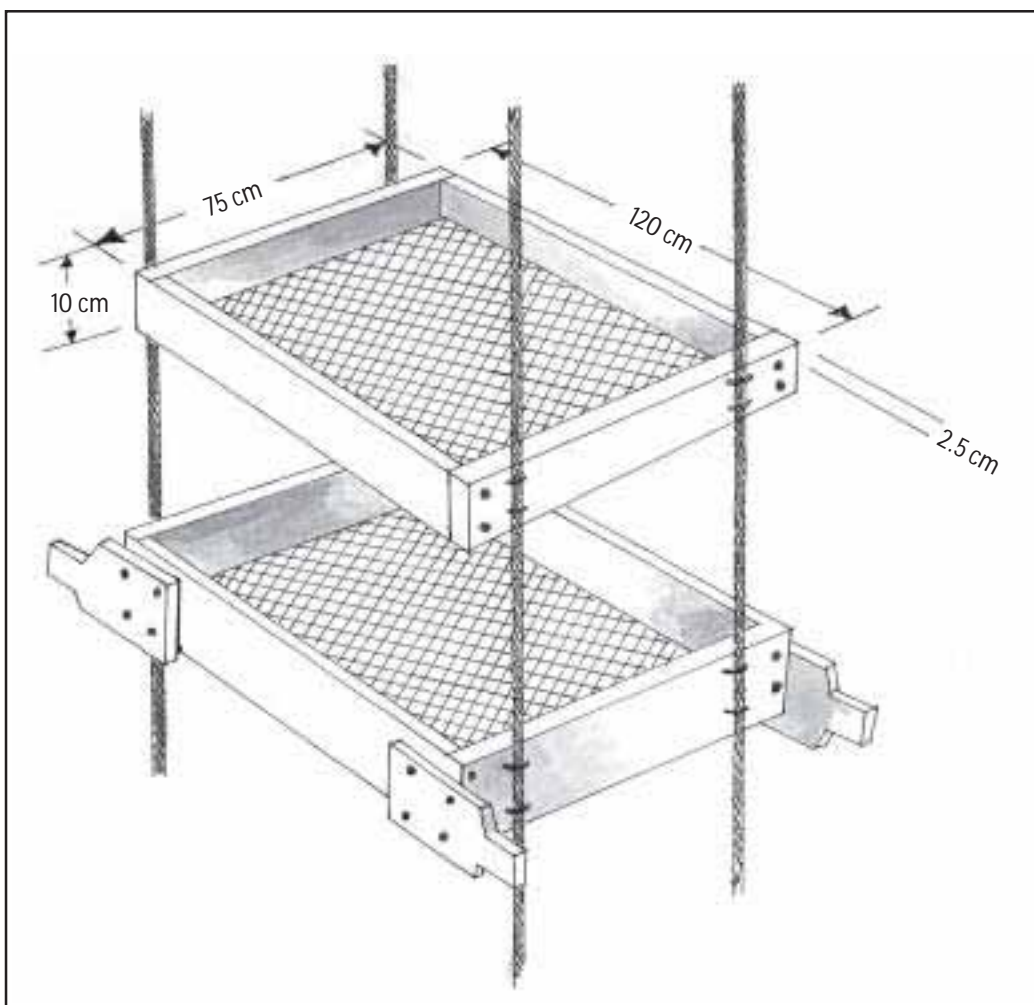
## Module 4

### The Small-Scale Seed Production Training Programme

#### Notes

#### Seed cleaning

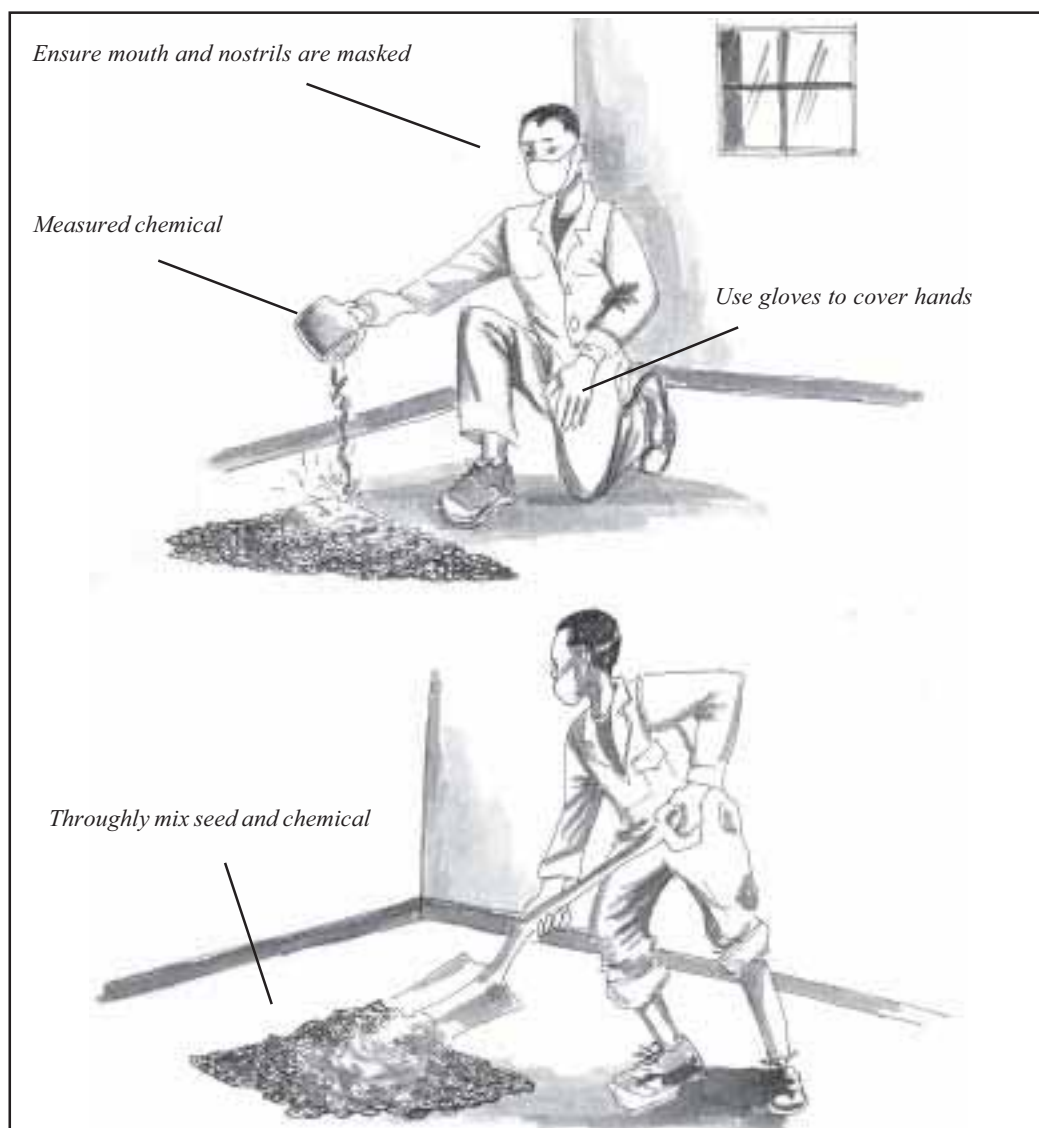
The purpose of seed cleaning is to remove foreign matter. This can be done by setting two screens one above the other, each with holes of different sizes. The upper screen retains large debris, the lower one retains seed but allows small particles to fall through. The process of seed cleaning is often combined with seed sizing or classification using appropriately sized screens. Classification is based on a number of parameters, shape, weight, thickness, coarseness. The chosen parameter depends on agronomic needs such as ease of germination or machine requirements.



4.7.3(e) Coupled screens for seed cleaning

### Seed dressing

Seed treatment to protect against pests and diseases in storage can be done manually using a cylindrical treater. The seed and pesticide (either insecticide or fungicide) are placed inside, and two people turn the treater until the seed is evenly covered with the pesticide. Pesticides include Captasan, Thiram which control storage fungi. *Aspergillus* are common storage fungi, but *Penicillium* may attack to a lesser extent. Actellic (pirimiphos methyl) is commonly used insecticide, and it is very effective. When applying pesticides, ensure use of recommended dosages.

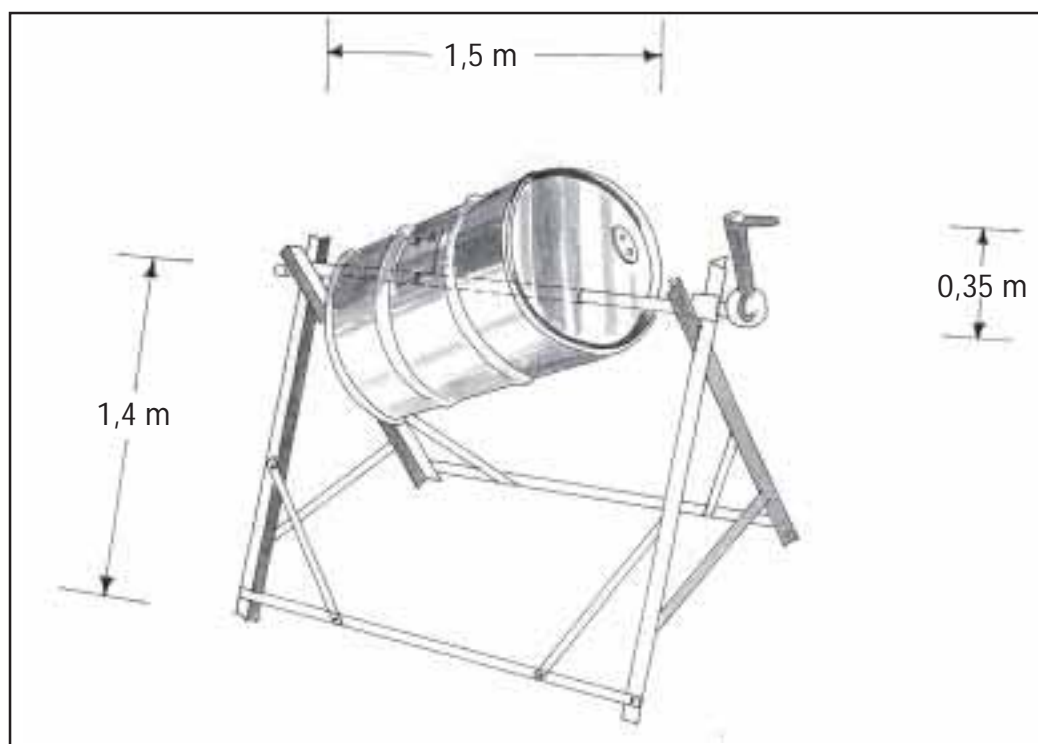


4.7.3(f) Seed dressing

## Module 4

### The Small-Scale Seed Production Training Programme

#### Notes



4.7.3(g) Seed treatment drum

## **4.8 Storage of seed crops**

### **4.8.1 Objectives of seed storage**

The aim of seed storage is to prolong the life of seed until planting time. Any methods that reduce the rate of deterioration will extend the period of seed viability. This means that seed aging largely depends on environmental conditions under which it is stored and not the time elapsed per se, explaining why seed deterioration is often referred to as physiological aging.

The intended period of seed storage depends on end-use of the seed. Seed storage could be short-term, 1-9 months until the next cropping season. Seed security storage is commonly medium-term storage, 9 -18 months; to guard against disasters such as drought and famine which may result in seed production failures. Long-term storage of basic seed can be for a number of years going beyond 5 years and mainly as a source of pure genotypes to replace contaminated varieties.

### **4.8.2 Factors that influence viability and vigour in storage**

The main influencing factors in physiological aging are moisture and temperature. Moisture and heat promote metabolic processes which use up stored seed reserves, and creates toxic wastes, causing reduced seed vigour. In general, a one percent reduction in seed moisture content (between 44 %-4 %), or a drop in storage temperature by five degrees Celsius (between 0 °C and 50 °C) will double the storage life of dry seed.

Temperature, relative humidity and water content also influence proliferation of pests and diseases. Insects prefer warmth and water. Generally for insects, the optimum temperature is 30 °C and RH is 40-80 %. Reproduction is inhibited below 40 % RH. When RH is high, microorganisms increase.

At seed water content below 9%, insects find it difficult to establish, unlike between 10-20 %. Above 17 %, insects are gradually replaced by mould.

### **4.8.3 Factors that influence storability of seed**

Storability of seed depends on seed type, with some seeds being very hard, and therefore, easy to store (orthodox), whilst other seed types very easily lose viability (recalcitrant seeds). Response of seed to storage is also dependent upon handling factors before storage. Some of the factors are stress of seed during development, e.g. mineral deficiencies or restricted moisture; harvest timing, threshing damage and poor seed treatment.

## Module 4

### The Small-Scale Seed Production Training Programme

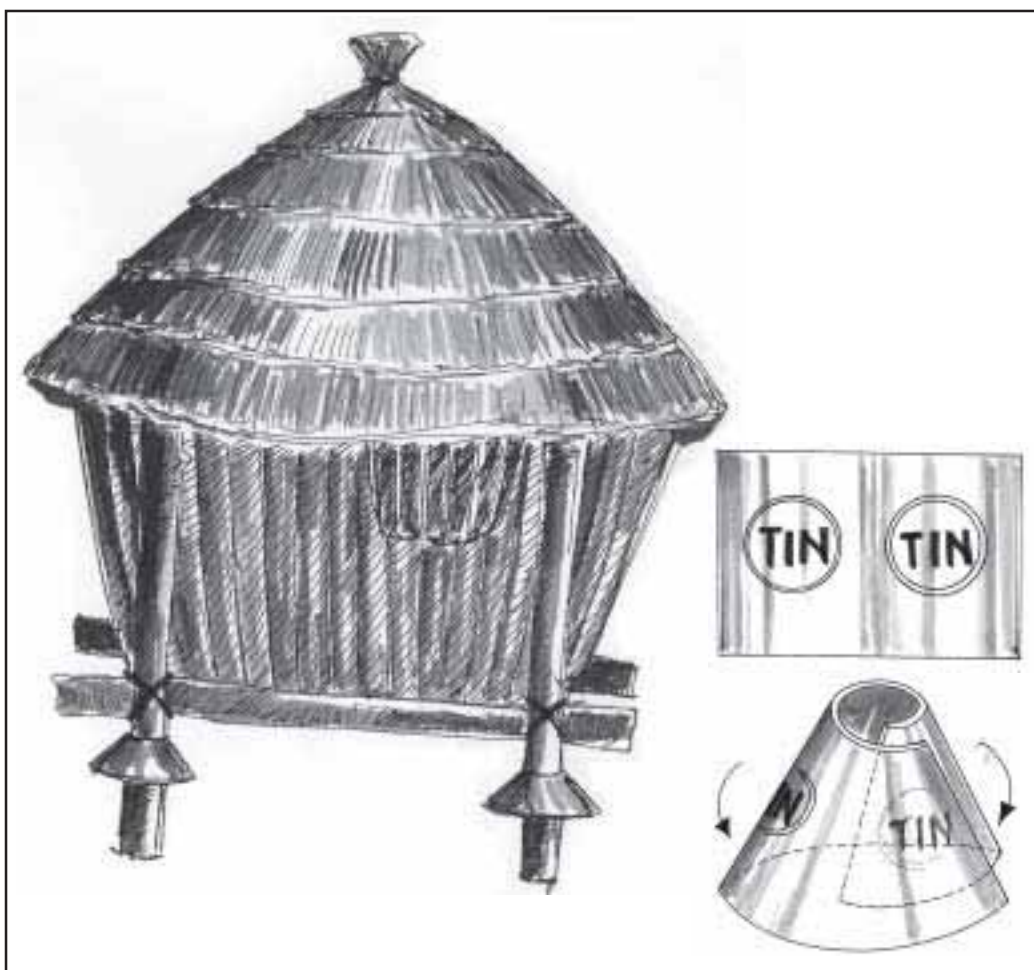
#### Notes

#### 4.8.4 Storage techniques

Effective storage techniques for seed are based on the principles explained earlier, relating temperature and moisture. Therefore, seeds should be dried well and stored under dry conditions. Secondly, overheating of seeds should be avoided.

Avoid seed damage, dampness, or storing poor quality seed since most insects will find it easier to attack when seed is in this weakened state. For instance, maize weevil needs storage temperatures of at least 17 °C or higher, and relative humidity above 70 %.

To control rodents, cleanliness of containers, bags, stores and surroundings is the major deterrent. Avoid openings in walls, floors and the roof in seed stores. Install rodent guards.



4.8.3(a) Install rodent guards

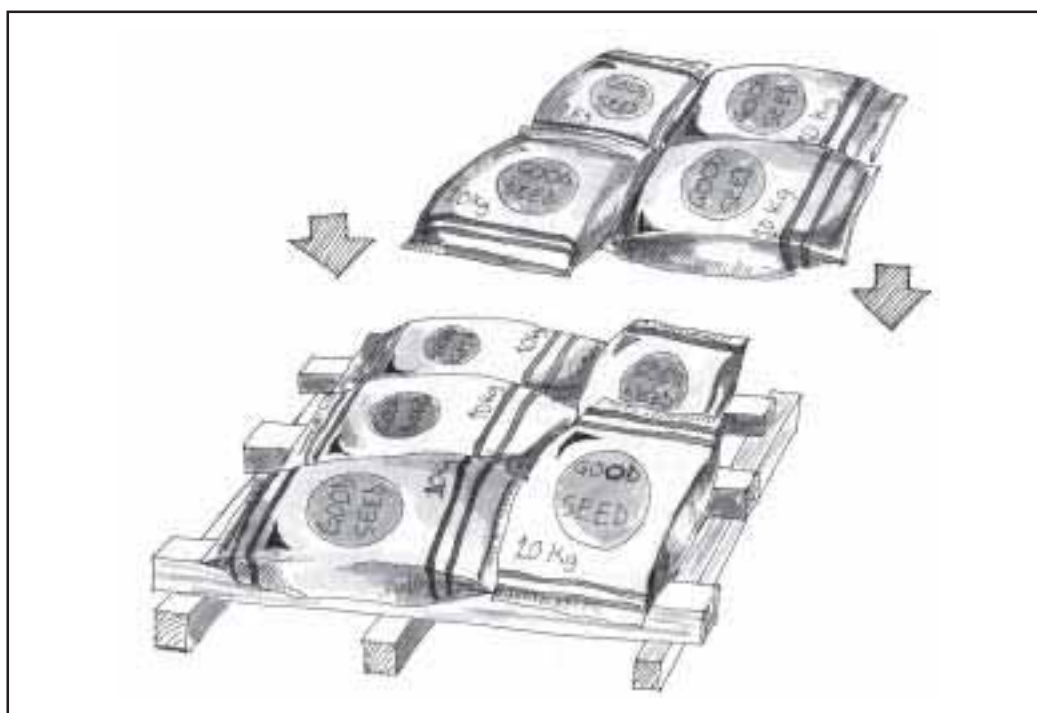


There are a number of local storage methods for individual crops. For groundnut and beans, unshelled seeds store better than shelled. Seeds stored inside kitchen roofs are protected by smoke from the fire-place which prevents weevil attack and high humidity. Maize seed can be preserved in sheaths hung in kitchen roofs over fireplaces. Air-tight containers are common for sorghum, where undetected insects and seed deplete all oxygen, instantly killing all pests. However, storage is only safe when seed is completely dry, below 10-12 % moisture for cereals before sealing. In another example, bruchid damage can be prevented in beans and cowpeas when these are mixed with ash. Sorghum does not keep well once threshed, so it is traditionally kept in sheaves.

#### Seed packing

Paper bags or material that allows maintenance of adequate seed moisture content are recommended. Plastic bags should never be used, since these raise seed temperature, which causes rapid deterioration of seed germination and vigour.

Shelled seed can be placed in metal silos or bags. Sacks have to be stacked properly and stored in well-ventilated places. In addition, the bags have to be placed on platforms raised at least 20 cm from the ground to avoid seepage of moisture. Seed has to be kept between 11-12 % moisture.



4.8.3(b) Seed can be stored in bags

## **4.9 Bulking of Farmer Selected Varieties (FSV) using seed gardens**

### **4.9.1 Use of seed gardens**

Seed gardens are used for production of high quality seed that is ready for planting immediately after harvesting, avoiding the requirement for storage facilities, unless there is excess seed.

Seed gardens enhance seed security, defined as the ability for farmers to have sufficient quantities of the required seed types and quality when needed. Seed gardens are easier if confined to traditional and improved varieties of open and self-pollinated crop varieties since there are often negotiable seed supply systems for such crops.

Seed gardens can be used in areas of unimodal rainfall, where the seed garden is established in the off-season, a dry season period, so that seed is available at the beginning of the following rainy season. Reduced disease incidence characterizes off-season planting, mostly due to reduced relative humidity, which enhances likelihood of producing high quality seed. Since few crops are grown in this period, it is easy to achieve the required isolation distances.

However, during off-season, increased pest problems such as rodent, livestock and wild animal damage occur, since relatively fewer crops are grown over this period, creating crop islands. Security from thieves is also of critical importance in seed gardens. In addition, lower temperatures over this period may cause delayed germination, slower plant growth rate and frost damage.

In bimodal rainfall zones, where there are short and long rains, seed gardens are best established in the short growing season to avoid need for planting in the main growing season.

### **4.9.2 Procedures for setting up seed gardens**

Farmers can establish seed gardens as groups or individually.

The first step is for farmers to select the crops and varieties for the main season. The crops could include maize OPVs, sorghum, pearl millet, finger millet and grain legumes, cowpeas, beans, and bambara nut. The selected varieties should be able to mature in the dry season or in the short rains, and be of good quality.

Another requirement for the sustainability of such farmer-based seed multiplication systems is a regular and reliable source of parent seed stock (basic seed), preferably a public sector institution or NGO, to maintain a replacement rate of 2

to 3 years at most. This allows maintenance of quality and avoids disease build up. Adequate technical back-up is also necessary.

Generally, the seed garden must be small to ensure good management and adequate fencing. However, the size of the seed garden will vary depending on the area the farmer intends to grow in the main season, and whether some seed will be marketed or traded. Other factors include the size of arable lands available, access to draft power for field operations, ability to fence the seed garden, amount of available water, nearness of the water source, quality of water and suitability for irrigation. Sometimes ground water in sodic soils may be too salty for use. Generally, water that can raise common vegetables is acceptable for field crops.

Location is critical for a number of reasons: it must be near the irrigation water source, the location must be frost-free, the soil must be reasonably fertile, and it must be a safe place where the crops can be easily monitored and chances of theft minimized. Better management is likely if seed gardens are near villages. For the same reason, it is ideal to cluster several individual seed gardens together.

**Intentionally left blank**

### 4.0 Introduction

❖ High quality seed is critical for maximizing crop yields.  
Influences:

- ◆ Stand density
- ◆ Vigour.
- ◆ Disease levels.
- ◆ Purity of variety thus realization of yield potential.

❖ High Seed quality achieved by following appropriate agronomic practices during:

- ◆ Site selection
- ◆ Seed bed preparation.
- ◆ Soil and moisture management.
- ◆ Weed, pest and disease management.
- ◆ Seed conditioning.
- ◆ Storage.

❖ Producing high quality seed entails modifying recommended practices for producing grain crops.

## 4.1 Seedbed Selection Procedures

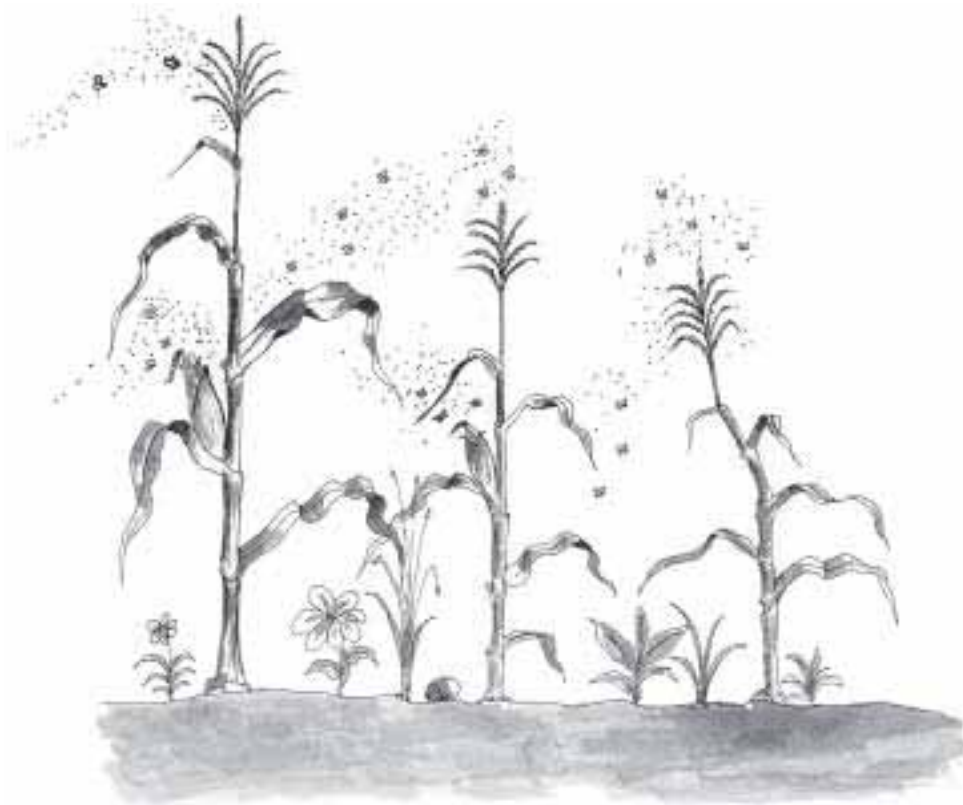
### 4.1.1 Factors to consider when selecting sites for seed production.

Avoid sites:

- ❖ Where seed plants will not fully reproduce.



- ❖ With high weed, pest and disease pressure



❖ On sloping land



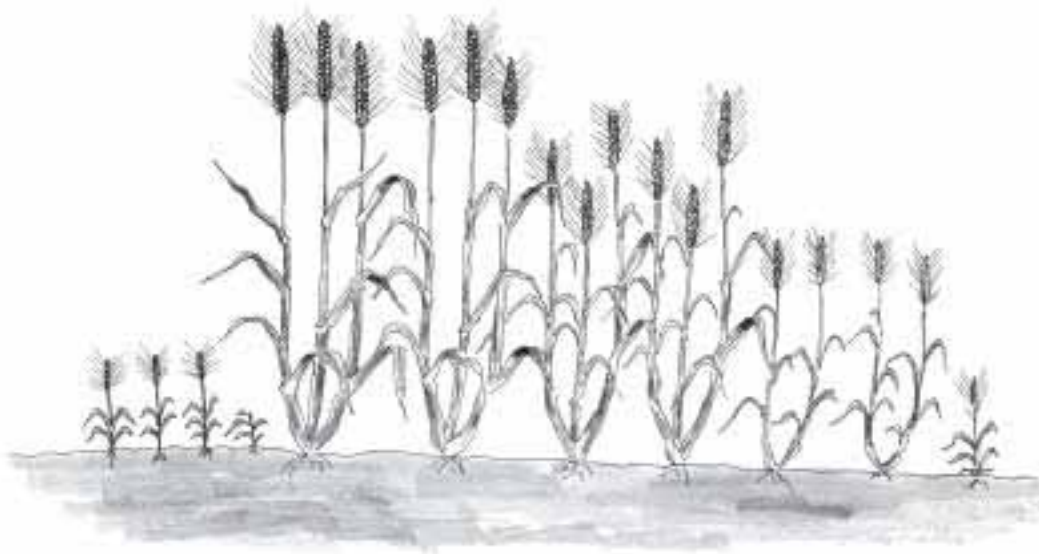
❖ On swampy land



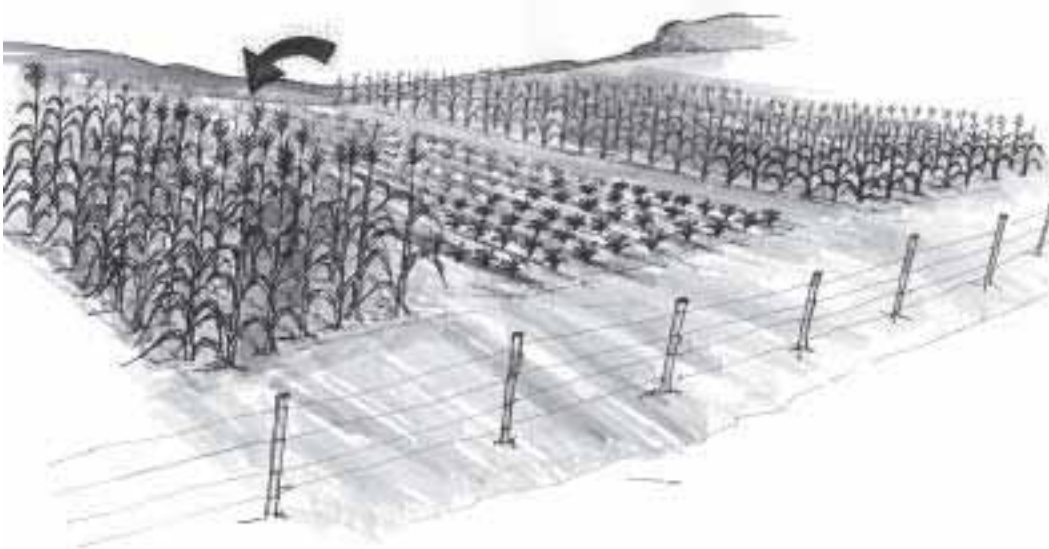
### 4.1.2 Factors to consider when selecting sites for seed production

#### Avoid sites:

- ❖ With uneven fertility

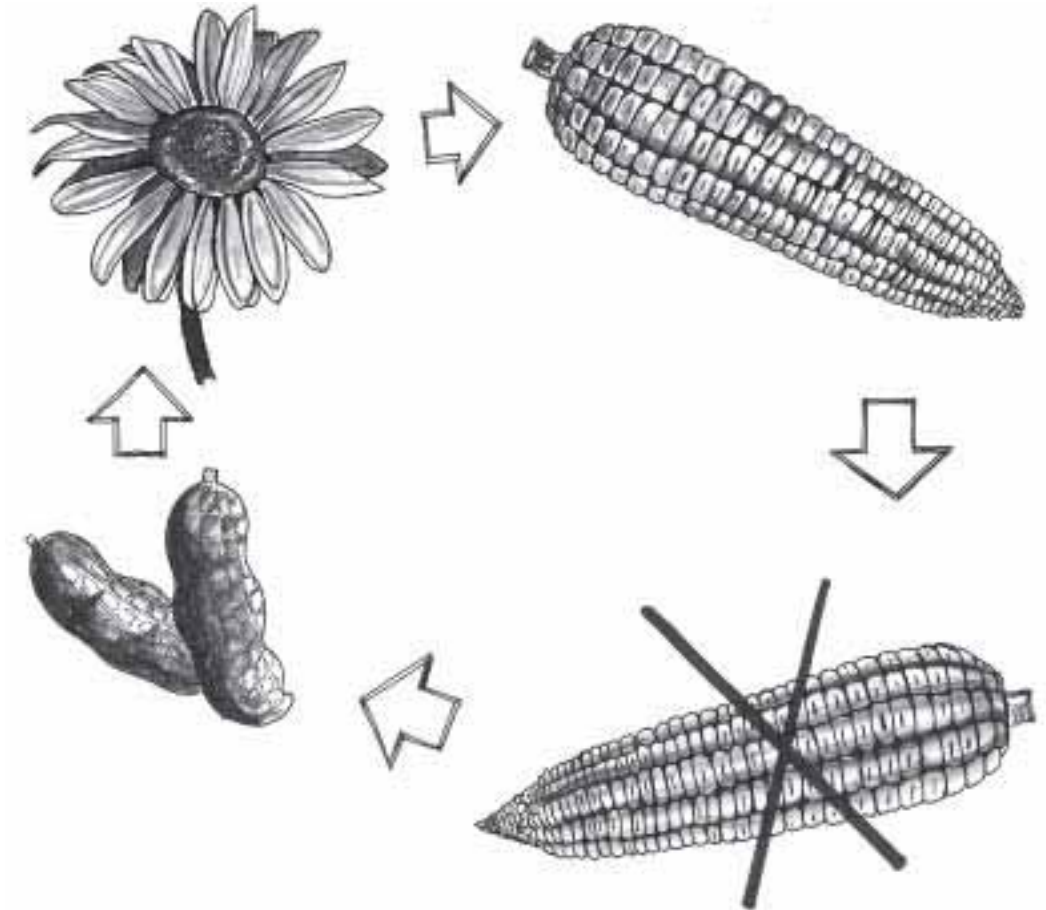


- ❖ Close to contaminant crops

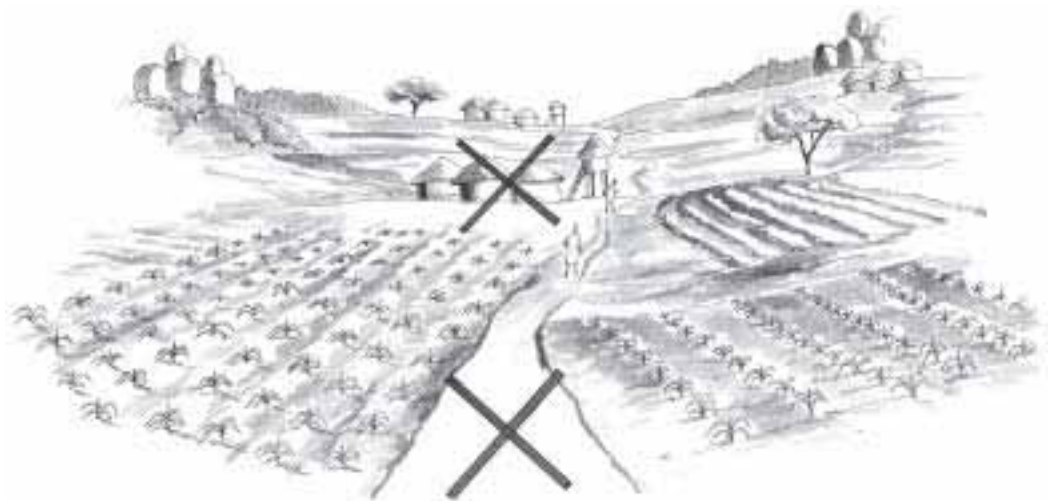




- ❖ That previously hosted similar crops (unless variety was similar)



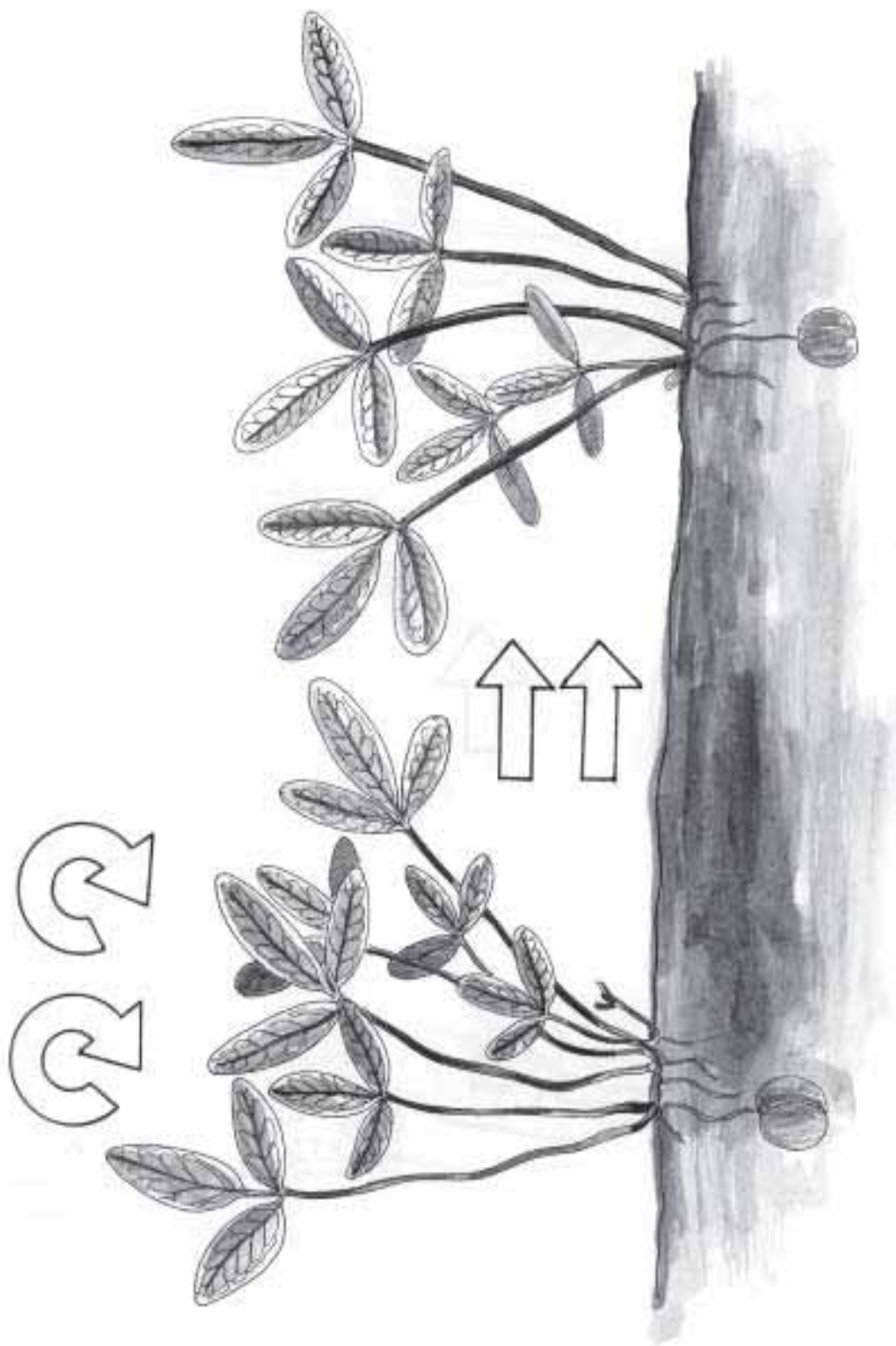
- ❖ Close to tracks and stores



### 4.1.3 Preparation of the seedbed

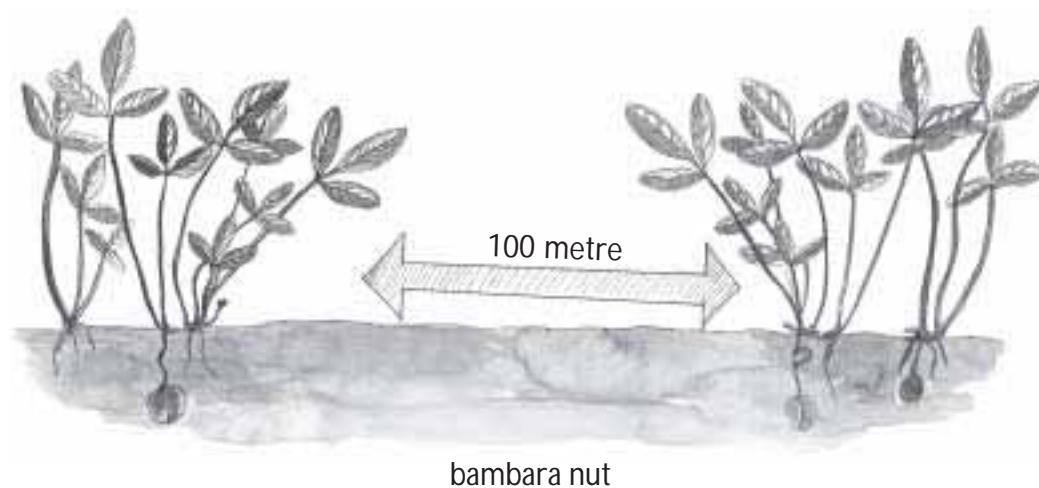
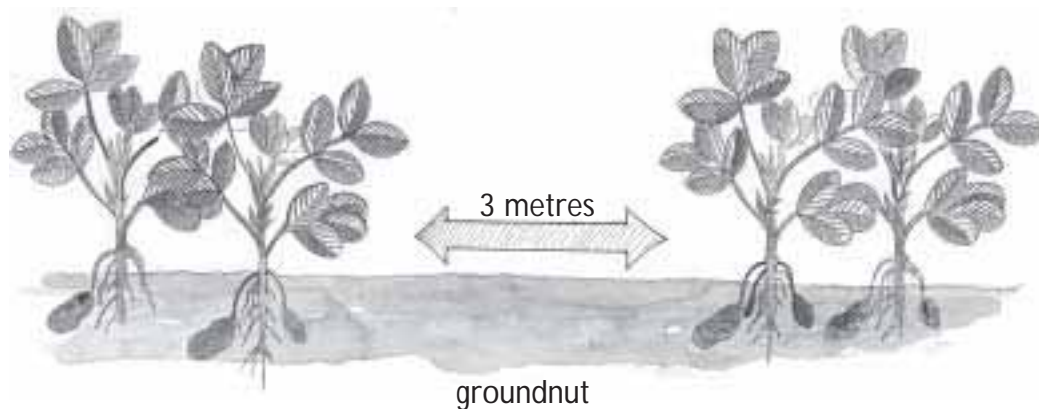
- ❖ Plough about a month before planting seed crop.
  - ◆ Ensures adequate rotting of debris.
  - ◆ Enables growth and subsequent destruction of weeds.
  - ◆ Reduces the risk of seed contamination by weeds.
  
- ❖ Use even depth when ploughing
  - ◆ Guarantees uniform crop.
  - ◆ Facilitates easy identification of off-types.
  - ◆ Increases synchrony of pollination.
  
- ❖ Disc and harrow to achieve fine soil tilth, avoid excessive tillage
  - ◆ Increases seed-soil contact.
  - ◆ Reduces failure of germination.

### 4.2.1. Cross Pollinating Types

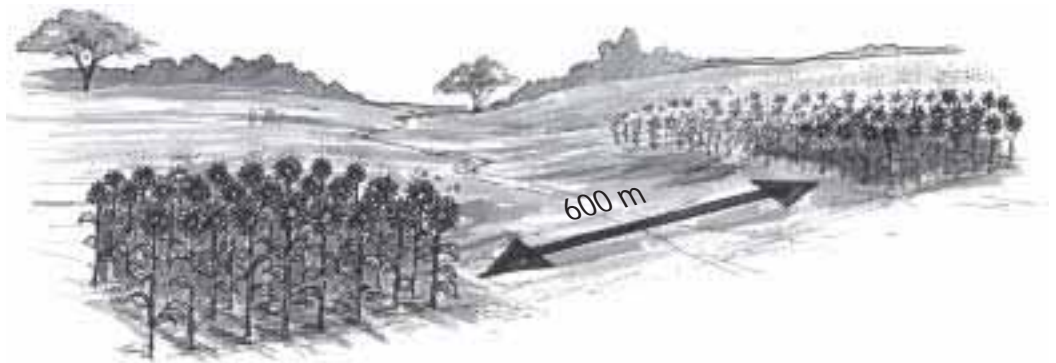
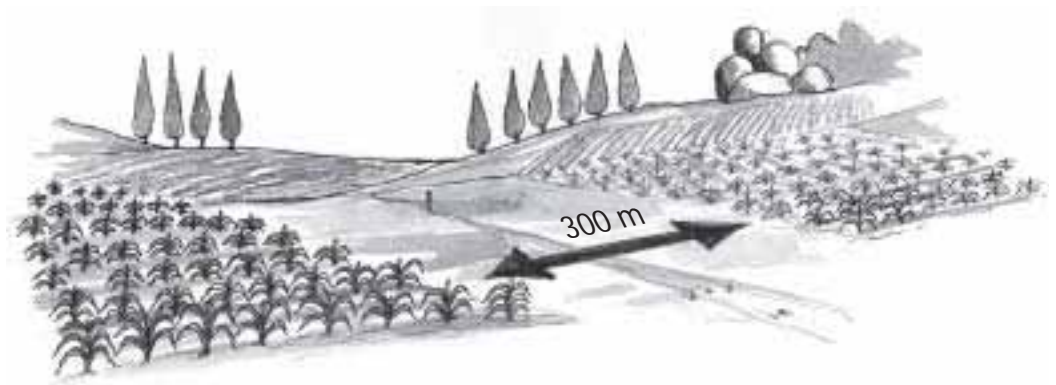


### 4.2.1 The influence of pollination types on seed production practices.

❖ Influence of pollination types on isolation distances



- ❖ Interaction of pollination types with pollination agent. Implications on management



### **4.3.1 Importance of good establishment and growth in seed production**

- ❖ More critical for seed crops.
- ❖ Implications on seed quality and yield.
- ❖ Influences development of variety characteristics, setting of seed.
- ❖ Trade off yield for quality.

### **4.3.2 Modifications of agronomic practices to suit requirements for seed crops.**

- ❖ Choose good seed
  
- ❖ Time planting accurately.
  
- ❖ Place seed at recommended planting depth.
  
- ❖ Use appropriate plant populations.

**Table 4.3.2 A selection of major seed – transmitted diseases**

Crop	Disease
Maize	Diplodia rot ( <i>Diplodia</i> spp.)
Pearlmillet	Ergot ( <i>Claviceps microcephala</i> )
Sorghum	Antracnose ( <i>Colletotricum graminicola</i> )
Wheat	Smut ( <i>Ustilago</i> spp.)
Bean	Anthrachnose ( <i>Colletotricum lindemuthianum</i> )
Cowpea	Cowpea wilt ( <i>Fusarium oxysporum</i> )
Groundnut	Rosette virus
Soyabean	Wildfire ( <i>Pseudomonas tabaci</i> ) Stem rot ( <i>Sclerotinia sclerotiorum</i> )
Irish potato	Late blight ( <i>Phytophthora infestans</i> ) Rhizoctonia ( <i>Rhizoctonia solani</i> ) Verticillium wilt
Sweet potato	Internal cork virus Stem rot( <i>Fusarium oxysporum</i> )



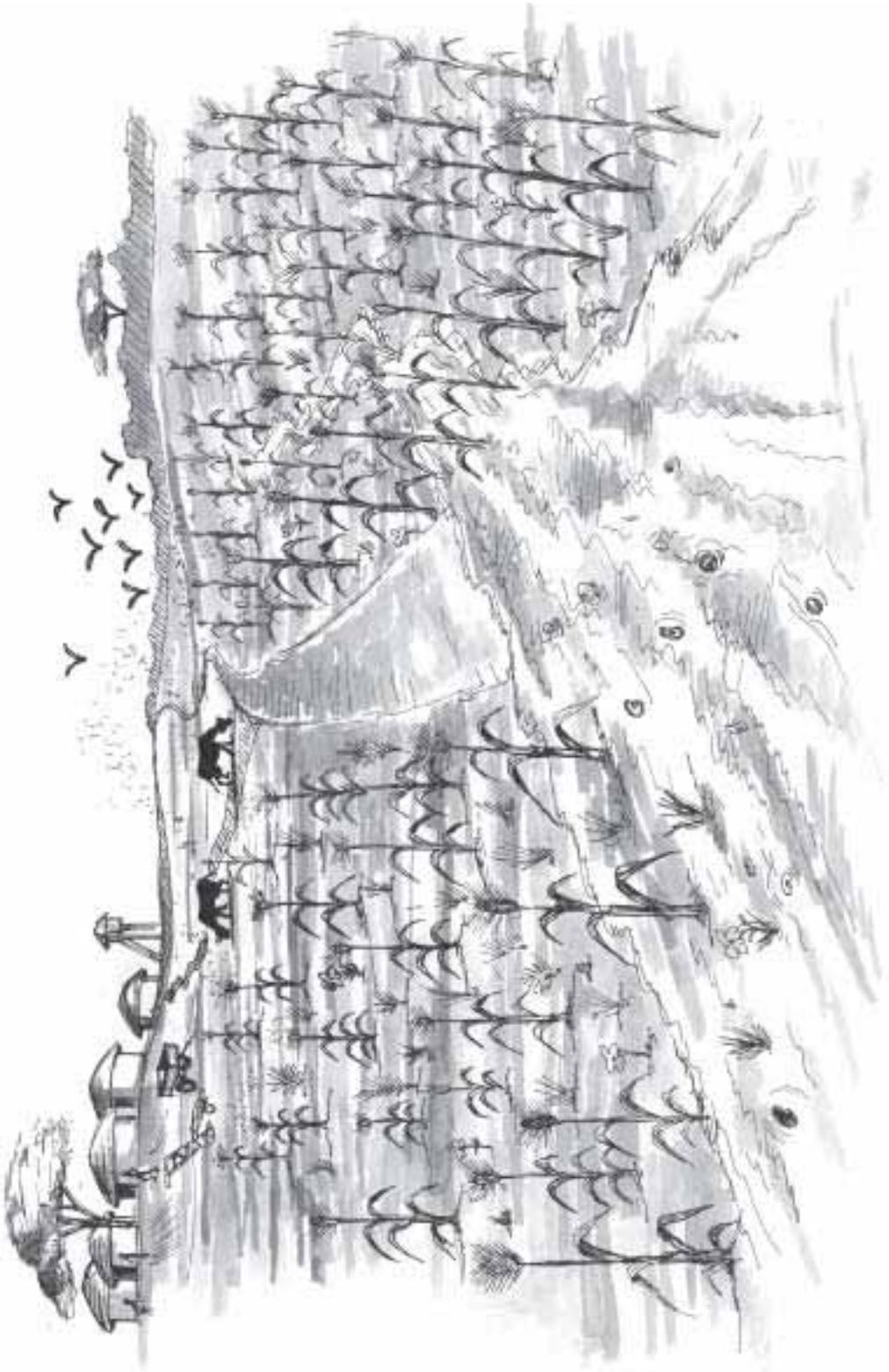
#### **4.4.1 Importance of adequate soil nutrients as needed at all times**

- ❖ Choose fertile and well-drained sites.
  
- ❖ Apply moderate N.
  
- ❖ Spread N application.
  
- ❖ Apply P and K at sowing.
  
- ❖ Provide other nutrients as needed by specific crops.

#### **4.4.2 Importance of soil moisture levels and air humidity.**

- ❖ Adequate soil moisture.
  
- ❖ Moderate air humidity, not too low, nor too high.

**4.5.1 Sources of contamination**



### **4.5.2 Methods to minimize rouging**

- ❖ Avoid fields previously sown to same crop, unless variety is similar.
  
- ❖ Avoid lower levels of slopes if upper levels have similar crop.
  
- ❖ Avoid lands crossed by roads, animal trails or near seed warehouses.
  
- ❖ Plough early, destroy weeds.

### **4.5.3.a When to rogue**

- ❖ Critical stages before genetic contamination.
  
- ❖ Stages vary across crop types.
  
- ❖ Roguing may be at vegetative development, flowering, post flowering, pre-harvest.

### **4.5.3.b Procedures for rouging**

- ❖ Rogue alone.
  
- ❖ Restrict to narrow zones at a time.
  
- ❖ Start from plot edges.
  
- ❖ Restrict to a few hours a day, early morning or late afternoon.

#### **4.5.4 Skills for individuals to rogue**

Thorough Knowledge on;

- ❖ Variety characteristics, common diseases and pests.
  
- ❖ Tolerance levels for contamination.
  
- ❖ Common prohibited or injurious weeds.
  
- ❖ Crop abnormalities.
  
- ❖ Report writing skills.

#### **4.6.1 Reasons for controlling pests and diseases.**

- ❖ Affects germination, vigour, growth, development.
- ❖ May consume endosperm, embryos.
- ❖ Causes heat, condensation.
- ❖ Transmit bacteria, viruses, diseases.

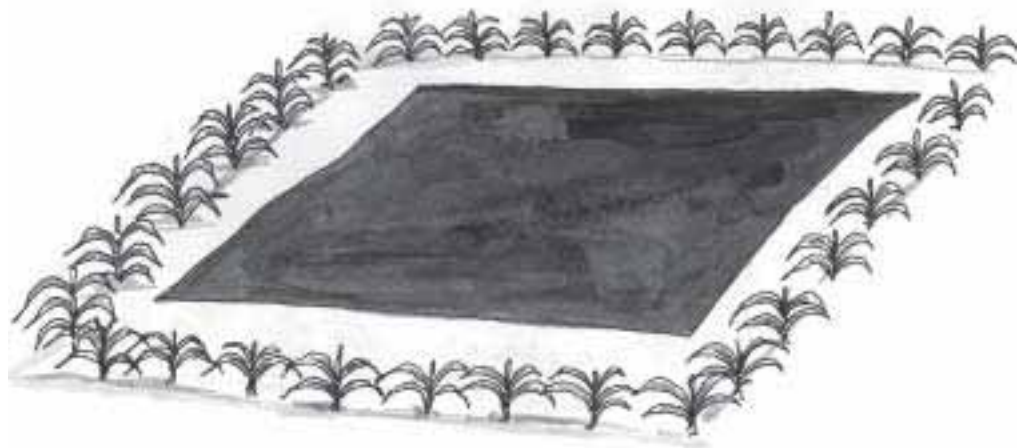


### **4.6.2 Control measures for pests and diseases in the field.**

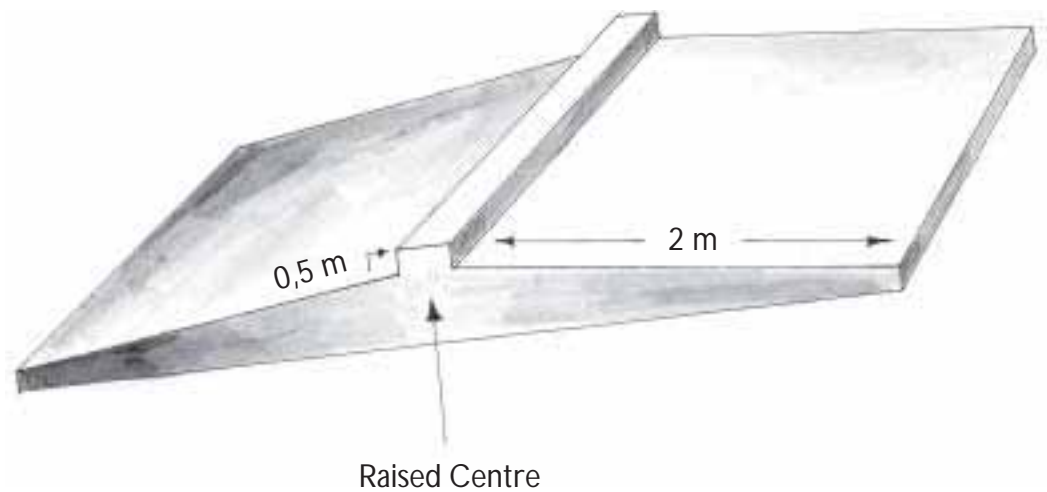
- ❖ Rogue diseased plants.
  
- ❖ Avoid periods of high disease incidence.
  
- ❖ Wherever possible, produce seed off-season.
  
- ❖ Avoid cultural practices that pre-dispose to pest and disease attack.
  
- ❖ Use chemicals wherever possible.

### **4.7.1 Seed harvesting**

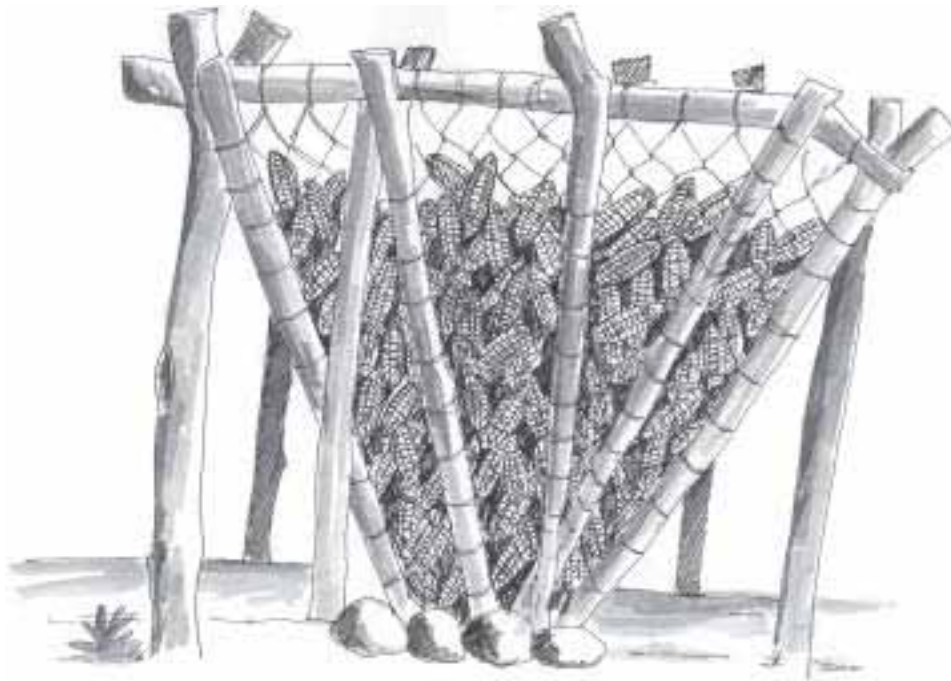
- ❖ Physiological maturity: occurs when seed has completed its development and when moisture levels start dropping.
  
- ❖ Physiological quality higher at this stage.
  
- ❖ Field maturity occurs weeks after physiological maturity.
  
- ❖ Harvest early.
  
- ❖ Time harvesting accurately.



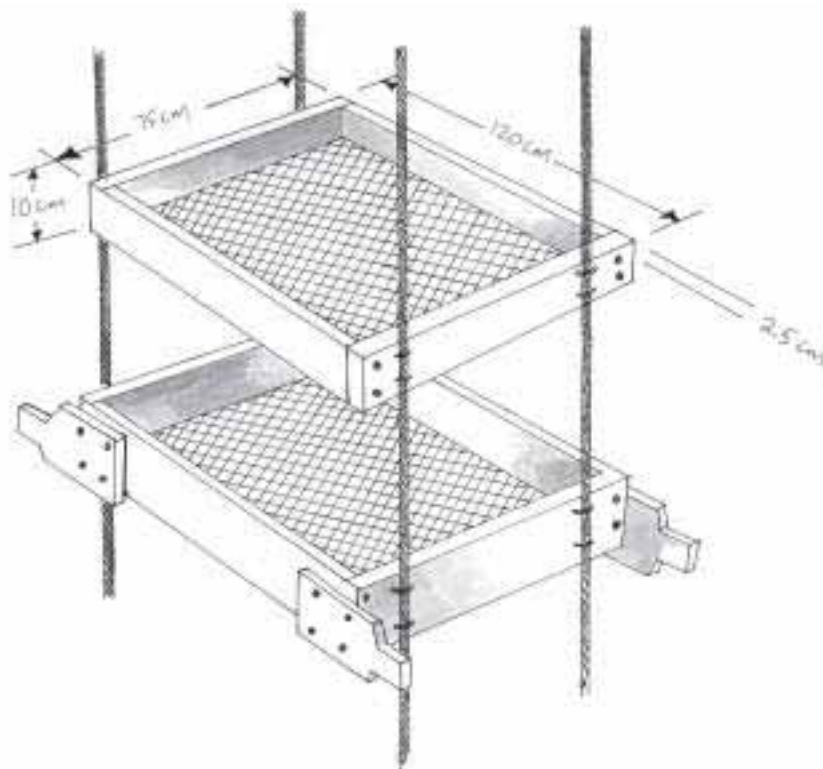
**4.7.3(b) Black Plastic for drying**



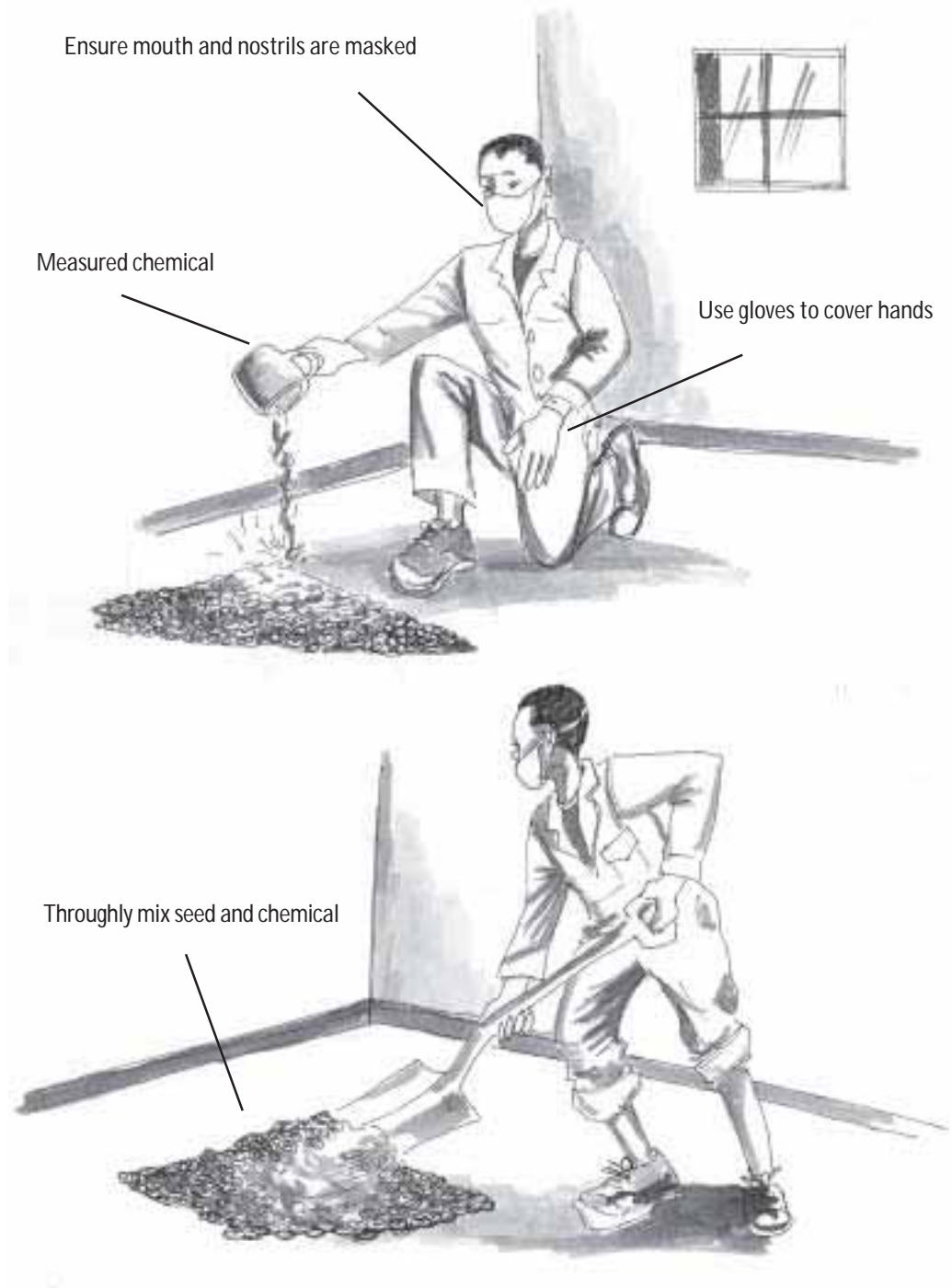
**4.7.3(c) Concrete floor with raised centre**



**4.7.3(d) Traditional crib for seed drying**



**4.7.3(e) Coupled screens for seed cleaning**

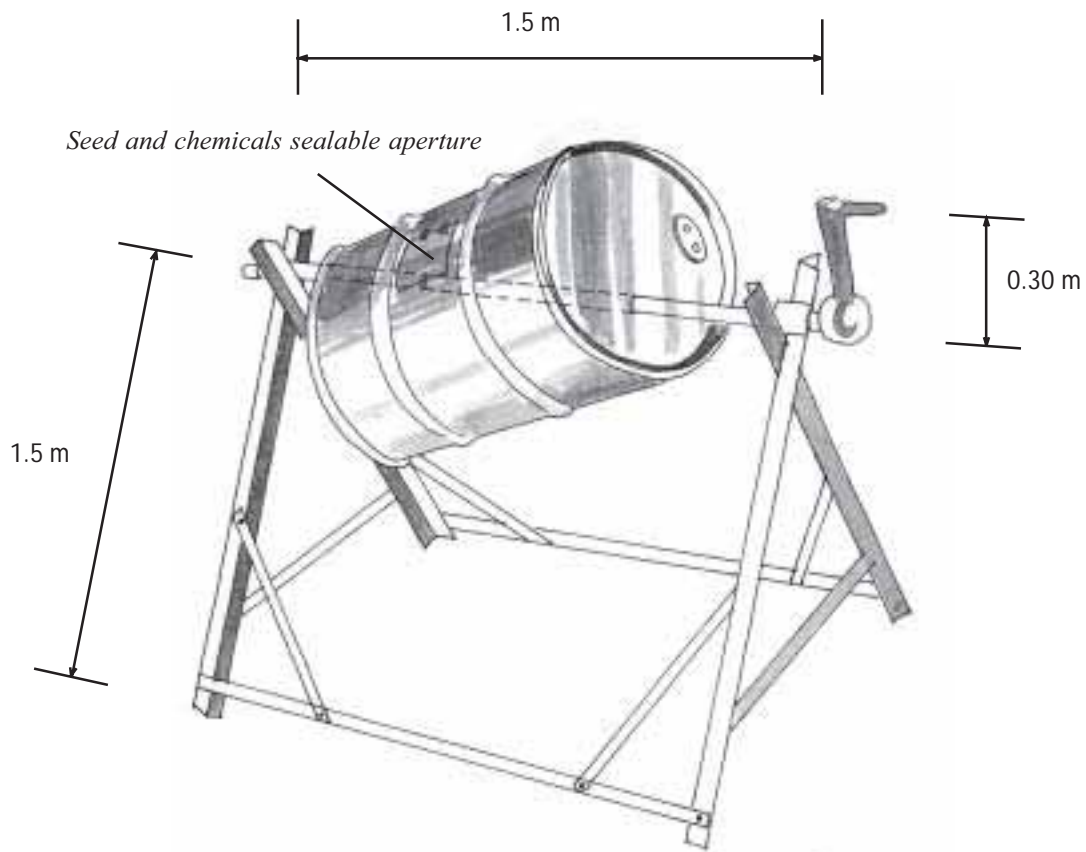


### 4.7.3(f) Seed Treatment

Module 4

The Small-Scale Seed Production Training Programme

Transparency



**4.7.3(g) Seed Treatment drum**

## 4.8.2 Factors that influence viability and vigour in storage

### ❖ Moisture

- ◆ 1% reduction in seed moisture (44%-4%) doubles storage life.
- ◆ Below 9%, insects struggle to establish, above 17%, moulds proliferate.

### ❖ Temperature

- ◆ 5 degrees Celsius drop in temperature ( $0^{\circ}\text{C}$  –  $5^{\circ}\text{C}$ ) doubles life of dry seed
- ◆ Optimum temperature for insects  $30^{\circ}\text{C}$

### ❖ RH

- ◆ Optimum RH for insects 40-80%

### **4.9.3 Guidelines for setting up seed gardens.**

- ❖ Set them up as groups or individuals.
- ❖ Select crops and varieties well.
- ❖ Ensure reliable source of parent seed stock.
- ❖ Keep it small.
- ❖ Choose appropriate location.
- ❖ Site must be fertile, and frost-free.



# Module 4

## Self Assessment Test

Choose the correct answer for each question

- 4.1.1. Which of the following factors is not true when selecting sites for seed production?
- a. Crops should flower and fully set seed at the chosen site.
  - b. Site should have low weed, pest and disease pressure.
  - c. Site should have previously hosted similar crops.
- 4.1.2. When preparing land for seed production:
- a. Plough deeply in areas with weedy patches.
  - b. Use hand hoes.
  - c. Leave coarse tilth for infiltration of rain water.
- 4.2.1. In cross-pollinating crops, more than 50% fertilization is from
- a. One plant to another.
  - b. The same plant growing the flowers.
  - c. One plant type to another.
- 4.2.2. When plants are insect-pollinated as opposed to wind-pollinated, isolation distance is
- a. Increased
  - b. Decreased
  - c. Maintained

## Module 4

### The Small-Scale Seed Production Training Programme

#### Self Assessment Test

4.3.2. Seed crops are often planted

- a. At populations 10-15% lower than for crop production.
- b. At wider spacing than is used for grain crops.
- c. In rows.
- d. All the above

4.4.1. Nitrogen management in seed crops involves

- a. Application of large doses just before planting the crop.
- b. Using straight fertilizer sources which only supply the nitrogen nutrient elements.
- c. Providing additional amounts when soil conditions are dry, to compensate for reduced growth.
- d. Splitting the amounts throughout the growth cycle of the seed crop.

4.5.2. Which of the following is among the correct procedures when roguing?

- a. Start inspections in the centre of the field, to determine the general proportion of off-types.
- b. Rogue in large teams to avoid missing off-types.
- c. Rogue in the early morning, or late afternoon.

4.6.2. Match the following:

- |   |             |
|---|-------------|
| 1. Insects may consume  | (a) shells  |
| 2. When a seed crop is still in the field, rogue diseased             | (b) embryos |
| 3. Rodents contaminate  | (c) plants  |
| 4. Beetles which cause post-harvest damage, usually lay their eggs on | (d) seed    |

- 4.7.1. Physiological maturity is reached when:
- Seed is completely developed and will not grow in size.
  - Seed crops have been exposed to a very dry weather spell.
  - Seed moisture contents starts to drop.
  - Any of the above happens.
- 4.7.2. Seed conditioning covers
- Drying
  - Sizing
  - Cleaning
  - Packaging
  - All of these.
- 4.8.2. Which factor influences viability and vigour of seed after storage?
- Temperature
  - Moisture
  - Relative humidity
  - All of these.
- 4.8.3. Every time you store seed
- Dry it well
  - Choose high quality seed
  - Install rodent guards
  - Do all the above.

## Module 4

### The Small-Scale Seed Production Training Programme

#### Self Assessment Test

4.9.1. What purpose do seed gardens serve

- a. Production of high quality seed.
- b. Avoidance of the need for storage.
- c. Faster multiplication of basic seed.
- d. All of these.

**Answer Key to Self Assessment Test**

- 4.1.1. c.
- 4.1.2. b.
- 4.2.1. a.
- 4.2.2. a.
- 4.3.2. d.
- 4.4.1. d.
- 4.5.2. c.
- 4.6.2. 1 b  
2 c  
3 d  
4 a
- 4.7.1. a.
- 4.7.2. e
- 4.7.3. e
- 4.8.2. d
- 4.8.3. b.
- 4.9.1. d.

Module 4

The Small-Scale Seed Production Training Programme

**Intentionally left blank**

# Module 5 - Contents

## Module 5 Facilitate maintenance of pure crop varieties by small-scale farmers

Sub-Modules .....	5- 1
Sub Module 5.1	
Explain seed quality and varietal purity .....	5- 2
Sub Module 5.2	
Apply the concept of isolation in space and time to different seed crop types. ....	5- 3
Sub Module 5.3	
Facilitate off-season seed production in seed gardens. ....	5- 4
Sub Module 5.4	
Assist farmers to establish seed villages. ....	5- 5
Sub Module 5.5	
Demonstrate variety viability testing and validation after long-term storage. ....	5- 6
Instructor 's Manual .....	5- 7
Sub Module 5.1	
Explain seed quality and varietal purity (1hr 9 minutes) ....	5- 7
Sub Module 5.2	
Apply the concept of isolation in space and time to different seed crop types (12 minutes) .....	5-12
Sub Module 5.3	
Facilitate off-season seed production in seed gardens (39 minutes) .....	5-13
Sub Module 5.4	
Assist farmers to establish seed villages (48 minutes) .....	5-14
Sub Module 5.5	
Demonstrate variety viability testing and validation after long-term storage (48 minutes) .....	5-15
Trainee Manual .....	5-17
Sub Module 5.1	
Explain seed quality and varietal purity (1hr 9 minutes) ....	5-17
Sub Module 5.2	
Apply the concept of isolation in space and time to different seed crop types (12 minutes) .....	5-20

## Contents - Module 5

### The Small-Scale Seed Production Training Programme

Sub Module 5.3	
Facilitate off-season seed production in seed gardens (39 minutes) .....	5-21
Sub Module 5.4	
Assist farmers to establish seed villages (48 minutes) .....	5-22
Sub Module 5.5	
Demonstrate variety viability testing and validation after long-term storage (48 minutes) .....	5-23
Notes - Maintenance of crop variety purity under local seed provision systems .....	5-25
5.1 Seed Quality and Crop Variety Purity .....	5-25
5.1.1 What is seed quality? .....	5-25
5.1.3 Variety genetic purity in different crop pollination types .....	5-29
5.1.3.1 Open pollinated varieties .....	5-29
5.1.3.2 Hybrids .....	5-30
5.1.3.3 Synthetic Varieties .....	5-30
5.1.3.4 Self-Pollinating Varieties .....	5-30
5.1.4 Causes of loss of variety genetic purity .....	5-31
5.1.5 Techniques for variety genetic purity maintenance .....	5-32
5.1.6 Determination of genetic purity at Household level .....	5-33
5.2 The concept of isolation in space and time in different seed crop types .....	5-34
5.2.1 Isolation in space or by distance .....	5-34
5.2.2 Isolation in time .....	5-35
5.3 Off-season seed production in seed gardens. ....	5-37
5.3.1 Seed garden .....	5-37
5.3.2 Factors considered in planning an effective off-season seed garden. ....	5-38
5.4 The concept of a seed village .....	5-39
5.5 Importance of variety viability testing .....	5-41
5.5.1 Measurement of seed viability .....	5-41
Transparency .....	5-43



Module 5 - Contents

The Small-Scale Seed Production Training Programme

5.1.1	The basic Seed Quality Aspects .....	5-43
5.1.3	Variety Genetic Purity In Different Crop Pollination Types .....	5-44
5.1.4	Causes Of Loss in Variety Genetic Purity .....	5-45
5.1.6	Techniques For Variety Purity Maintenance .....	5-46
5.1.7	Determination Of Varietal Purity .....	5-47
5.2	The Concept Of Isolation In Space And Time In Different Seed Crop Types .....	5-48
5.3.2	Important Factors In Planning Off-Season Seed Gardens .....	5-49
5.4	The concept of a seed village .....	5-50
	Self Assessment Test .....	5-51
	Answer Key to Self Assesment Test .....	5-52

Contents - Module 5

The Small-Scale Seed Production Training Programme

## FACILITATE MAINTENANCE OF PURE CROP VARIETIES BY SMALL-SCALE FARMERS

### Purpose

The module is intended for agricultural extension agents and rural development officers from public, community based, private and non-governmental organisations working with farmers involved in seed production. The module will develop understanding and skills of extension agents on maintenance of pure crop varieties by small-scale farmers through isolation techniques, use of seed gardens and seed villages.

### Sub-Modules

- 5.1 Explain seed quality and varietal purity
- 5.2 Apply the concept of isolation in space and time to different seed crop types.
- 5.3 Facilitate off-season seed production in seed gardens.
- 5.4 Assist farmers to establish seed villages.
- 5.5 Demonstrate variety viability testing and validation after long-term storage.

**Sub Module 5.1**

**Explain seed quality and varietal purity**

Element/Outcome	Performance Criteria	Assessment Instruments and Procedures
5.1.1. Explain seed quality.	➤ The criteria to determine seed quality explained in terms of physical purity, genetic purity, seed health, viability, % germination and moisture content expected.	Plenary/Group discussion
5.1.2. Define varietal purity	➤ Definition to include distinctiveness, uniformity and stability.	Plenary/Group discussion
5.1.3. Explain varietal purity for different crop varieties	➤ Varietal purity discussed in terms of genetic make-up for OPVs, hybrids and mixed varieties.	Written test
5.1.4. Explain the causes of loss/deterioration of varietal purity	➤ Factors leading to loss of variety purity including long term storage, chemical damage, irradiation and physical contamination explained	Plenary/Group discussion
5.1.5 Differentiate between varieties and identify a contaminated variety.	➤ Off types in a variety identified using varietal features of genetically pure type.	Exercise on the samples given
5.1.6. State the techniques for variety purity maintenance	➤ Procedures for maintaining variety purity clearly outlined.	Plenary/group discussion.
5.1.7. Measure variety purity	➤ Methods of measuring variety purity demonstrated.	Group exercises

## The Small-Scale Seed Production Training Programme

**Sub Module 5.2**

**Apply the concept of isolation in space and time to different seed crop types.**

Element/Outcome	Performance Criteria	Assessment Instruments and Procedures
5.2.1. Explain the concept of isolation in space	➤ The application of isolation in space in terms of minimum distances for self, cross pollinated, vegetatively propagated crops and classes of seed explained.	Written test
5.2.2 Explain the concept of isolation in time	➤ The application of isolation in time interval in self, cross-pollinated, vegetatively propagated crops and classes of seed explained.	Written test
5.2.3. Determine the appropriate isolation measures for a given seed crop type	➤ Isolation measures based on the following criteria: pollination type, seed class selected.	Case study exercise

**Sub Module 5.3**

**Facilitate off-season seed production in seed gardens.**

Element/Outcome	Performance Criteria	Assessment Instruments and Procedures
5.3.1. Define a seed garden	<ul style="list-style-type: none"> <li>➤ Timing of production in defining a seed garden including the importance of factors considered in locating it such as nearness to water source, aspect, soil type stated.</li> </ul>	Plenary/Group discussions Self-assessment test
5.3.2. Explain the concept of off season seed production in seed gardens and assist farmers plan an effective off-season seed garden.	<ul style="list-style-type: none"> <li>➤ Objectives of the concept of off-season seed production in seed gardens outlined.</li> <li>➤ Factors considered in planning an effective off-season seed garden presented (to include climatic requirements, disease and pest prevalence).</li> </ul>	Written test  Group case study exercise

## The Small-Scale Seed Production Training Programme

**Sub Module 5.4****Assist farmers to establish seed villages.**

Element/Outcome	Performance Criteria	Assessment Instruments and Procedures
5.4.1. Explain the concept of a seed village	➤ Objectives of seed production in seed villages outlined	Plenary
5.4.2. Discuss the application of the concept of a seed village in small-scale seed production.	➤ The concept of a seed village is discussed.	Plenary/Group discussion
5.4.3. Assist farmers plan an effective seed village	➤ Ability to apply factors considered in planning a seed village demonstrated.	Case study group exercise

**Sub Module 5.5**

**Demonstrate variety viability testing and validation after long-term storage.**

Elements/Outcomes	Performance Criteria	Assessment Instruments and Procedures
5.5.1. Justify variety viability testing	➤ The importance of variety viability testing explained.	Plenary/Group discussion.
5.5.2. Outline procedures for variety viability testing	➤ Procedures for testing germination explained.	Plenary/Group discussion.
5.5.3. Justify variety validation after long term storage and outline procedures for variety validation	➤ Justification to include checking for physical mixing and genetic changes due to out-crossing. ➤ Test for variety validation to include grow out plots	Plenary/Group discussion. Field demonstration Written test



# Module 5

## Instructor's Manual

### Sub Module 5.1

#### Explain seed quality and varietal purity (1hr 9 minutes)

##### Elements/Outcomes

##### 5.1.1 Explain seed quality

Activities	Materials Media and Equipment	Time
1. Lead a discussion on importance of seed quality.	➤ Chalkboard/ Flipchart	3 minutes
2. Show transparency 5.1.1 which illustrates elements of seed purity namely physical purity, genetic purity, seed health, germination percentage, viability and moisture content.	➤ Transparency 5.1.1 Handout 5.1	2 minutes
3. Conduct question and answer session to clarify issues		3 minutes

**Elements/Outcomes**

5.1.2 Define varietal purity

5.1.3 Explain varietal purity in different crops

5.1.4 Explain causes of poor varietal purity.

Activities	Material Media and Equipment	Time
1. Introduce the subject by plenary/group discussion on the definition of varietal purity and the relationship between varietal purity in the different crop types (Transparency 5.1.2, hybrids and mixed varieties).	➤ Chalkboard/ Flipchart Transparency 5.1.2	2 minutes
2. Instruct participants to read handout section 5.1.4 causes of poor varietal purity.	➤ Handout 5.1.4	5 minutes
3. Ask questions on causes of poor varietal purity.		1 minute
4. Visualize answers given by participants on Transparency 5.1.4.	➤ Flipchart/ Chalkboard Transparency 5.1.4.	3 minutes

## The Small-Scale Seed Production Training Programme

Instructor's Manual

**Elements/Outcomes**

## 5.1.5 Differentiate between varieties and identify a mixed variety

Activities	Material Media and Equipment	Time
1. Lead a discussion on the factors used in characterization of varieties (namely morphological, physiological and performance) using two local examples of a cereal and legume.	➤ Chalkboard/ Handout	4 minutes
2. Organize participants into small groups and give the seed samples to differentiate using characterization factors (maize and bean sample).	➤ Maize/bean sam- ples	8 minutes
3. Evaluate group work by going around.	➤ Evaluation guide with samples.	3 minutes
4. Reconvene the group, summarize and ask trainees where they need clarification.		

## Module 5

### The Small-Scale Seed Production Training Programme

#### Instructor's Manual

#### Elements/Outcomes

##### 5.1.6 State the techniques for varietal purity maintenance

Activity	Materials Media and Equipment	Time
1. Lead a discussion on variety purity maintenance highlighting important issues of isolation by space, time, off-season seed production.	➤ Flipchart/ Chalkboard	5 minutes
2. Refer trainees to handout section 5.1.6 and ask them to read.	➤ Handout 5.1.6	3 minutes
3. Summarize and clarify difficult issues.	➤ Chalkboard/Flip chart	2 minutes

**Elements/Outcomes**

## 5.1.7 Measure varietal purity

Activity	Materials Media and Equipment	Time
1. Explain the various methods of measuring varietal purity.	➤ Flipchart/Chalk Board	10 minutes
2. Facilitate a plenary/group discussion and evaluate by oral questions.	➤ Flipchart	15 minutes

**Sub Module 5.2**

**Apply the concept of isolation in space and time to different seed crop types (12 minutes)**

**Elements/Outcomes**

5.2.1 Explain isolation in relation to varietal purity maintenance

5.2.2 Explain the concept of isolation by space

5.2.3 Explain the concept of isolation by time

Activities	Materials Media and Equipment	Time
1. Show transparency 5.2 with definition of isolation and methods of isolation (space and time).	➤ Transparency 5.2. /Handout 5.2	2 minutes
2. Refer trainees to handout 5.2 on the section of isolation and ask them to read for 5 minutes.	➤ Handout 5.2	5 minutes
3. Discuss the major points on space and time isolation.	➤ Chalkboard/Flip Chart	3 minutes
4. Evaluate by questions to plenary.	➤ Prepared plenary questions	2 minutes

**Sub Module 5.3****Facilitate off-season seed production in seed gardens (39 minutes)****Elements/Outcomes**

5.3.1 Define a seed garden and explain the concept and role of off-season seed production in seed gardens.

Activities	Materials Media and Equipment	Time
1. Introduce the subject by defining a seed garden and outlining the importance of off-season seed production (disease, pest avoidance, isolation)	➤ Chalkboard and Flipchart	3 minutes
2. Lead a discussion on factors to consider in locating a seed garden at village level.	➤ Flipchart/ Chalkboard	8 minutes
3. Conduct plenary/group question and answer session.	➤ Prepared questions.	2 minutes

**Elements/Outcomes**

5.3.2 Assist farmers plan an effective off-season seed production programme

Activities	Materials Media and Equipment	Time
1. Discuss factors considered in planning an effective off-season seed production programme (climatic requirements, disease/pest avoidance, water availability etc) and explain the factors.	➤ Flipchart	5 minutes
2. Facilitate plenary/group discussions and presentation on off-season seed production programme.	➤ Chalkboard/ Flipchart	21 minutes

**Sub Module 5.4**

**Assist farmers to establish seed villages (48 minutes)**

**Elements/Outcomes**

5.4.1 Explain the concept of seed village

5.4.2 Discuss the application of the concept of seed villages in small-scale seed production.

Activities	Materials Media and Equipment	Time
1. Introduce the subject by discussing the importance of a seed village (disease/pest avoidance, isolation etc).		3 minutes
2. Lead a discussion on the application of seed villages in small-scale seed production programme (by forming co-operatives/groups, growing same crop/same variety/one uniform cropping programme) and summarize key points	➤ Flipchart/Chalk Board	10 minutes
3. Conduct oral question and answer session.	➤ Prepared questions	2 minutes

**Elements/Outcomes**

5.4.3. Assist farmers plan an effective seed village

Activities	Materials Media and Equipment	Time
1. Give a case study on existing seed villages and analyze important issues coming out in groups.	➤ Case study	26 minutes
2. Summarize and emphasize important factors in planning a seed village.	➤ Flipchart/Chalk Board	2 minutes
3. Conduct oral question-and-answer session on each presentation.	➤ Flipchart and questions.	5 minutes



**Sub Module 5.5****Demonstrate variety viability testing and validation after long-term storage (48 minutes)****Elements/Outcomes**

5.5.1 Justify variety viability testing

5.5.2 Outline the procedures for variety viability testing.

5.5.3 Identify causes of seed degeneration

Activities	Materials Media and Equipment	Time
1. Lead a discussion on the definition of seed viability, causes of variety degeneration and procedures for determining viability testing; explain procedures.	➤ Handout 5.5	5 minutes
2. Lead a discussion on advantages and disadvantages of each method.		5 minutes
3. Give a self assessment test. Allow trainees to self-evaluate performance.	➤ Self assesment test	15 minutes

## Module 5

### The Small-Scale Seed Production Training Programme

#### Instructor's Manual

#### Elements/Outcomes

5.5.4 Justify variety validation after long-term storage

5.5.5 Outline procedures for variety validation.

Activities	Materials Media and Equipment	Time
1. Discuss the reasons for validation after long-term storage.	➤ Chalkboard.	12 minutes
2. Summarize the key points and conduct a oral question-and-answer session	➤ Flipchart and Key questions	6 minutes

### Sub Module 5.1

#### Explain seed quality and varietal purity (1hr 9 minutes)

##### Elements/Outcomes

##### 5.1.1 Explain seed quality

Activities	Materials Media and Equipment	Time
1. Participate in a group discussion on importance of seed quality.	➤ Transparency 5.1.1	3 minutes
2. Note down the elements of seed quality shown on the Transparency 5.1.1.	➤ Chalk Board	2 minutes
3. Answer questions and seek clarification on any misunderstanding.		3 minutes

##### Elements/Outcomes

##### 5.1.2 Define varietal purity

##### 5.1.3 Explain varietal purity in different crops.

##### 5.1.4 Explain causes of poor varietal purity.

Activities	Materials Media and Equipment	Time
1. Define varietal purity and relate it to different crops i.e. OPVs, hybrids. See Transparency 5.1.2.	➤ Transparency 5.1.2	2 minutes
2. Read handout 5.1.4 then list causes of poor varietal purity.	➤ Handout 5.1.4	5 minutes
3. On invitation give causes of poor varietal purity.		1 minute
4. Note correct answers listed on the board.	➤ Flipchart/ Chalkboard	3 minutes

**Elements/Outcomes**

5.1.5 Differentiate between varieties and identify a mixed variety

Activity	Materials Media and Equipment	Time
1. Participate in the discussion of factors used for characterization of varieties with respect to a cereal and a legume.		4 minutes
2. Characterize the maize and bean samples provided using the criteria in activity 1.	➤ Maize and bean samples	11 minutes

**Elements/Outcomes**

5.1.6 State the techniques for varietal purity maintenance

Activity	Materials Media and Equipment	Time
1. Participate in plenary/group discussion on varietal purity maintenance techniques.		5 minutes
2. Read handout on varietal purity maintenance and note down important points.	➤ Handout	5 minutes

**Elements/Outcomes**

## 5.1.7 Measure varietal purity

Activities	Materials Media and Equipment	Time
1. Note the methods of measuring varietal purity		10 minutes
2. Participate in plenary/group discussions.	➤ Flipchart	15 minutes

## Module 5

### The Small-Scale Seed Production Training Programme

#### Trainee Manual

#### Sub Module 5.2

#### Apply the concept of isolation in space and time to different seed crop types (12 minutes)

##### Elements/Outcomes

5.2.1 Explain isolation in relation to varietal purity maintenance

5.2.2 Explain the concept of isolation by space.

5.2.3 Explain the concept of isolation by time.

Activity	Materials Media and Equipment	Time
1. View Transparency and note key issues.	➤ Transparency 5.2	2 minutes
2. Read section on isolation in handout.	➤ Handout 5.2	5 minutes
3. Participate in group discussion.		3 minute
4. Answer questions asked by the instructor.		2 minute

**Sub Module 5.3****Facilitate off-season seed production in seed gardens (39 minutes)****Elements/Outcomes**

5.3.1 Define a seed garden and explain the concept and role of off-season seed production in seed gardens

Activity	Materials Media and Equipment	Time
1. Take note of the definition of a seed garden and importance of off-season seed production.	➤ Chalkboard	3 minutes
2. Participate in a discussion on factors considered in locating a seed garden.	➤ Flipchart/ Chalkboard	10 minutes

**Elements/Outcomes**

5.3.2 Assist farmers plan an effective off-season seed production programme

Activity	Materials Media and Equipment	Time
1. Note factors considered in planning an effective off-season seed production programme.		5 minutes
2. Facilitate group/plenary discussion then, evaluate cases (off-season seed production) and come up with an off-season seed production programme for the village.	➤ Flipchart	21 minutes

**Sub Module 5.4**

**Assist farmers to establish seed villages (48 minutes)**

**Elements/Outcomes**

5.4.1 Explain the concept of seed villages

5.4.2 Discuss the application of the concept of a seed village in small-scale seed production.

Activity	Materials Media and Equipment	Time
1. Participate in a discussion on the application of seed villages in small-scale seed production and note the key points coming from discussions.		13 minutes
2. Participate in question and answer session.		2 minutes

**Elements/Outcomes**

5.4.3 Assist farmers plan an effective seed village

Activity	Materials Media and Equipment	Time
1. Analyze case study in groups and note important issues from the case.	➤ Flipchart	26 minutes
2. Participate in the question-and-answer session and note important points of planning a seed village from Transparency 5.4.		7 minutes



**Sub Module 5.5****Demonstrate variety viability testing and validation after long-term storage (48 minutes)****Elements/Outcomes**

- 5.5.1 Justify variety viability testing
- 5.5.2 Outline procedures for variety viability testing
- 5.5.3 Identify causes of seed degeneration

Activity	Materials Media and Equipment	Time
1. Take down notes of definition, causes and procedure for viability testing.	➤ Handout 5.5	10 minutes
2. Participate in a discussion on advantages and disadvantages of each method used in seed viability testing.		5 minutes
3. Write test, self evaluate based on the answer key.	➤ Self assesment test	15 minutes

## Module 5

### The Small-Scale Seed Production Training Programme

#### Trainee Manual

#### Elements/Outcomes

5.5.4 Justify variety validation after long-term storage

5.5.5 Outline procedures for variety validation

Activity	Materials Media and Equipment	Time
1. Suggest reasons for validation after long-term storage.		12 minutes
2. Note key points raised and participate in a question-and-answer session.		6 minutes

### **Notes on maintenance of crop variety purity under local seed provision systems**

#### **5.1 Seed Quality and Crop Variety Purity**

To establish a good crop under any farming system, it is essential that the crop be sown from good quality seed. However, for achieving the true performance of a crop under given agroecological conditions, it is necessary that the crop be grown from good quality seed of a genetically pure variety. These handout notes explain how to maintain both seed and variety genetic quality at the highest level under small scale farming systems.

##### **5.1.1 What is seed quality?**

Seed is a necessary input in crop production, and the quality of the seed has a profound influence on the yield of crops. Quality in seeds embraces physical, biological, pathological and genetic attributes that contribute to the final yield of a crop. The four basic aspects that relate to seed quality are:

- ◆ Physiological quality (germination, vigor)
- ◆ Sanitary quality (absence of seed borne diseases)
- ◆ Analytical quality (percentage of good seed in a particular lot)
- ◆ Genetic quality (variety genetic purity and stability)

##### Physiological seed quality

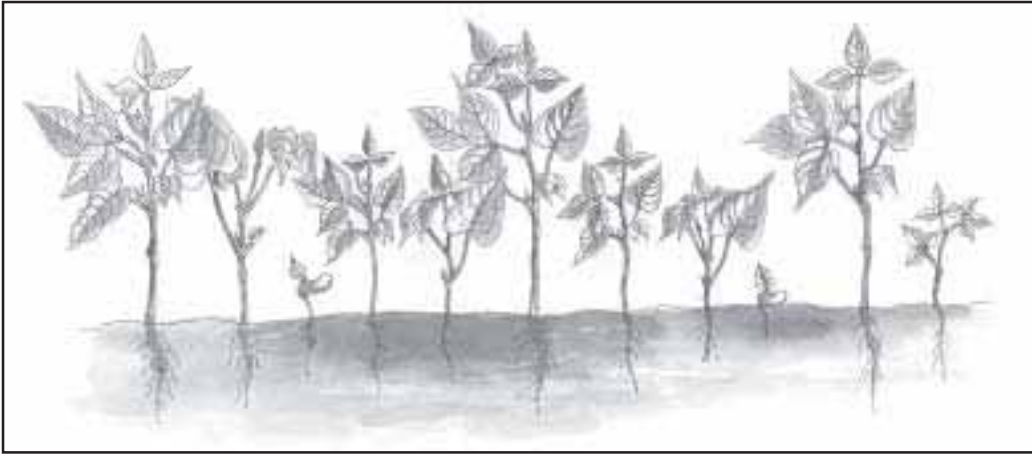
Physiological seed quality refers to the ability of the seed to support all the physiological processes during germination and early seedling development. There are two important aspects of seed physiological quality, which are germination and vigor.

The first basic requirement of a seed once planted under favourable conditions is that it has to germinate at the right time. Secondly, the seedling has to be strong enough to withstand the harsh environmental conditions for the seedling to emerge from the soil. The later aspect relates to what is termed seed vigour. The young root system has to be able to support the plant, the young stem should be able to break through the soil and the first leaves should not die during the first sunny days. This ability of the seed to provide a strong seedling under farming conditions is called vigor.

## Module 5

# The Small-Scale Seed Production Training Programme

### Notes

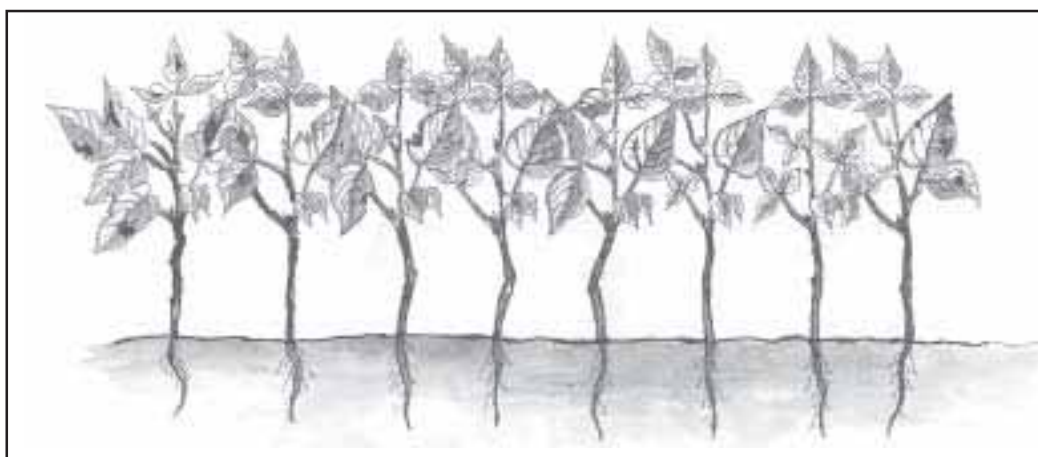


5..1.1(a)Physiological quality affects crop germination and vigour.

Seed of low physiological quality will result in a poor crop development and a low plant density because germination will be low. When the seedlings emerge and are of low vigor they might not develop favourably under the given agroenvironmental conditions, where they could succumb to pests, diseases and weeds.

#### Sanitary seed quality

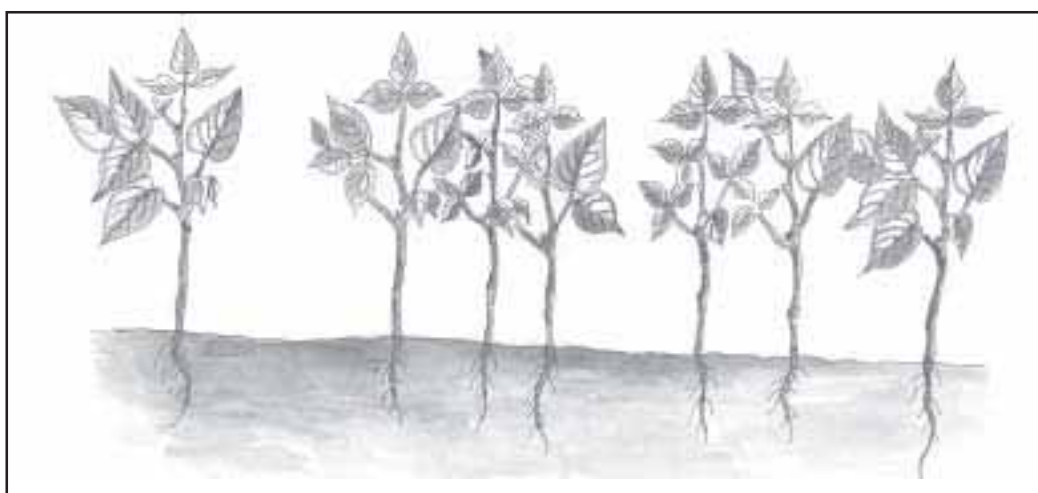
The absence of seed-borne diseases is another important aspect of seed and pests quality. Most diseases that limit crop production spread through spores that are carried from plant to plant by wind, water or animals. Some remain in the soil or plant debris, others survive in weedy host plants during the period of the year when there are no crops in the field. A number of diseases can also be carried in the seed such as bacterial blight in beans, mosaic virus in cucumber, and smut in sorghum. Seed borne diseases could affect both the germination capacity and vigour of the seed resulting in poor crop establishment and development. Absence of such seed-transmitted diseases, and pests is therefore, an important seed quality characteristic.



5.1.1(b) High sanitary quality reduces incidence of crop diseases and pests.

#### Analytical seed quality

Analytical seed quality refers to the physical purity of the seed. Mechanical and manual seed processing often result in some broken seed, other plant debris including soil and small sand particles. Presence of weed seeds in a crop seed lot could result in very serious consequences such as genetic pollution in similar plant species such as sorghum and Sudan Grass.



5.1.1(c) Low analytical quality: you pay more, for less seed

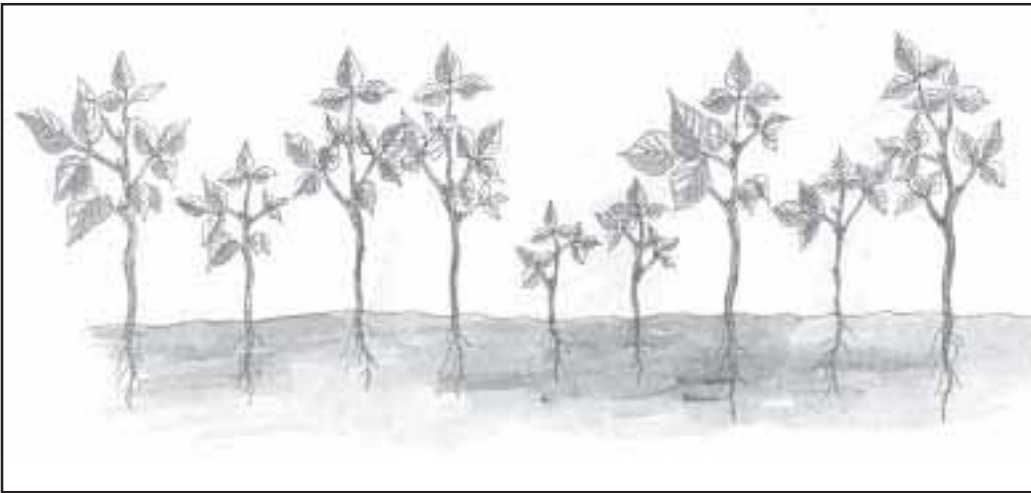
## Module 5

# The Small-Scale Seed Production Training Programme

### Notes

#### Genetic seed quality

Genetic seed quality refers to the genetic make up of seed and whether it is from the same variety gene pool. Crop characteristics such as yield potential, tolerance to environmental stresses, resistance to pests and diseases and crop processing qualities are directly influenced by the genetic make up of the seed. High quality seed should be true to type or genetically pure. It must possess genes only for that particular type of variety.

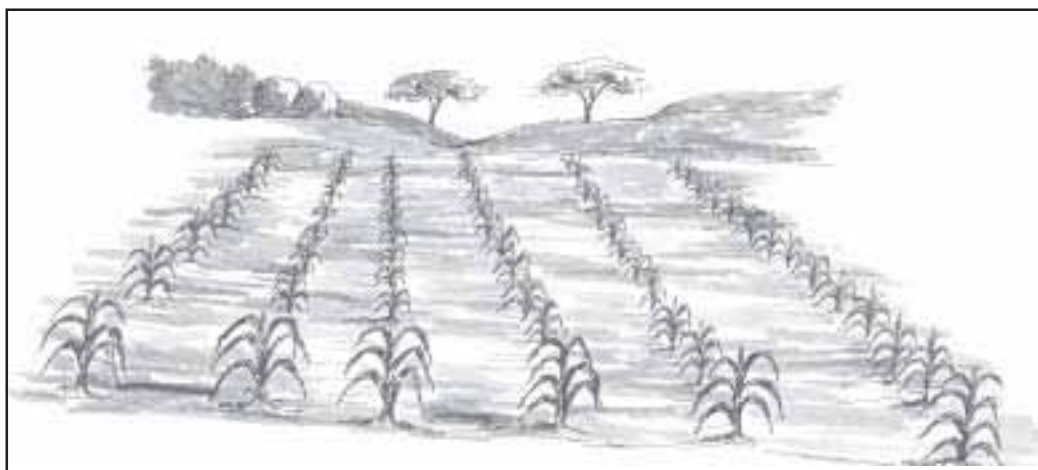


5.1.1(d) Poor genetic seed quality leads to wasted crop variety potential

### 5.1.3 Variety genetic purity in different crop pollination types

Variety genetic purity means that the particular seeds possess genotype that will endear developing plants to have distinctive, uniform and stable verifiable characteristics.

Plants with deviating characteristics in a variety are called off-types. Off-types may show up in a seed crop due to a number of causes including inadequate selection procedures, admixtures or accidental crossing. The presence of off-types results in varieties becoming less uniform and less distinct and therefore impure, which reduces the value of the seed, as well as general performance of the variety.



5.1.3 Pure crop variety stand

#### 5.1.3.1 Open pollinated varieties

These are made up of a definite composite pool of genes. The genes of the variety are allowed to combine over time randomly until a stable composite genotype is established through selecting out those plants that do not conform to the general desired characteristics of the plant population. Although such varieties exhibit some DUS in some characteristics such as crop development, maturity, and grain colour including storage and processing profiles, their gene pool is inherently diverse but stable. In this regard, it is important to know the basic characteristics on which such varieties are defined, for this gives a degree of genetic diversity in the population.

### 5.1.3.2 Hybrids

Hybrid seeds are a product of the first filial generations between pure lines of female and male parents and always breed true producing crops, which inherently meet all DUS criteria in every respect. Hybrid seeds are of interest only in that small-scale farmers use them in their farming systems but will not be part of this curriculum as they are not easy to produce under self help seed provision systems.

### 5.1.3.3 Synthetic Varieties

Synthetic crop varieties are those often associated with modern improved crop varieties. They are generally open pollinated varieties. However, the pre-basic seed is often a product of known genetic material:

- ◆ Crosses between a known open pollinated variety usually used as the female parent crossed as in hybrid seed production with a pure male line to increase hybrid vigour or a certain trait. The pre-basic line is then allowed to grow in isolation as an open pollinated variety until through selecting out undesirable plants a stable variety as in an opv is established.
- ◆ In small-scale farming systems seed from two or more varieties are mixed in a predetermined ratio and planted out in a single crop. Through selection of desired characteristics the seed from the resultant crop is used to produce the next generation of seed. This seed crop is subjected to rigorous deliberate selection pressure until the desired characteristics are established. Then the variety is released to the community. With such varieties, which are open pollinated by nature, it is often difficult to reproduce them if they are lost.

### 5.1.3.4 Self-Pollinating Varieties

Self-pollinating varieties such as field beans and groundnuts often exhibit inherently predictable DUS characteristics, as the crop genotype does not change that easily as the plants fertilise themselves. However, in nature there are no absolutes. Invariably some plants receive pollen from their neighbours or from outside resulting in a change due to pollen mixture. Such fertilisation results in development of a completely different variety, which is often characterised in the next seed generation by a variation in characterisation traits, associated with the parent variety. Often new varieties in self-pollinating crops originate in this manner or through mutation.



#### 5.1.4 Causes of loss of variety genetic purity

There are several causes for loss of variety genetic purity through seed. The main causes at village level and sometimes in commercial seed provision systems are:

1. **Long-Term Storage** Seed of either cereal or other crops will deteriorate genetically over a period of time. Cereal seed can store without suffering gene loss if kept in hermetically sealed bags for up to 10 years, but under other storage conditions, 3-5 years is ideal for the variety to be regenerated before the seed starts to lose some genes in its genome.
2. **Chemical damage** Some chemical seed treatments if wrongly applied, impact negatively on the seed genes altering their sequence (mutations) and hence their expression. It is important that recommendations for seed treatment are followed accurately to avoid the damaging effect of chemical treatment on the seed.
3. **Irradiation** Seed must not be exposed to direct sunlight or other natural or artificial sources of radiation such as the sun which produces intense gamma-rays and ultra-violet rays that might penetrate the seed coat and irreversibly alter the genes in the seed causing gene loss and/or alteration (mutations)
4. **Physical contamination** Loss of genetic purity in seed processing results from seed lots being accidentally being mixed at harvest, processing, cleaning and storage. Care must be taken to keep seed lots separate and cleaning processing areas after each seed lot has passed through.

#### 5.1.5 Techniques for variety genetic purity maintenance

Local seed provision systems are more amenable to production of seed for opv, semi-opv and self-pollinating varieties as these can be handled with relatively easily accessible technology for variety genetic purity maintenance. The suggested techniques for achieving this are as follows:

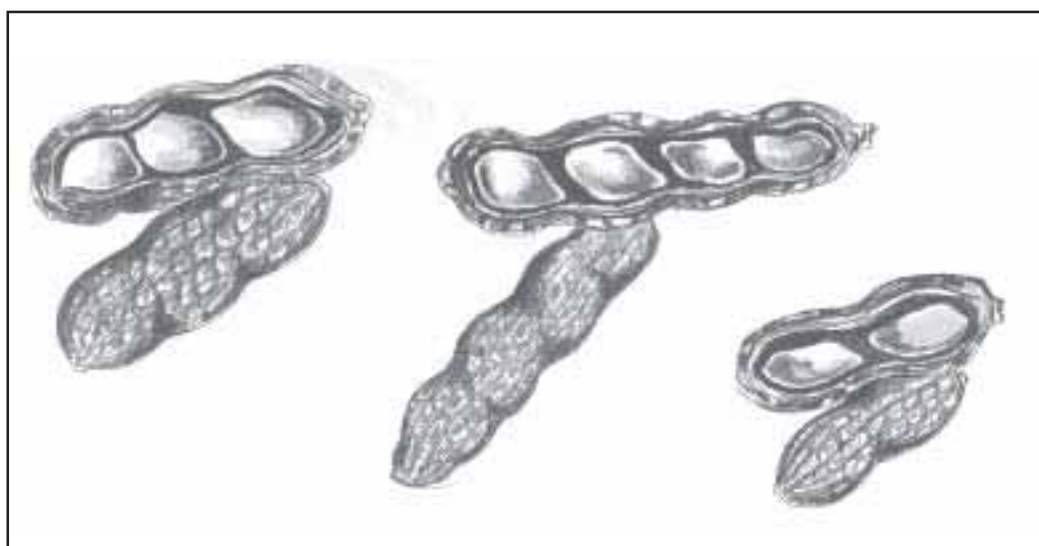
1. **OPVs and Semi-OPVs** Variety genetic purity maintenance is best achieved in growing the generation of seed crop desired in total isolation from other crops or plant species related to the crop in question. Any off-types should be totally removed from the crop and field before pollen shed. This could be achieved through producing the seed during the off-season using seed gardens. Seed crop husbandry techniques should be adhered to closely, such as removal of off-types and diseased plants completely from the crop and field, and regularly monitoring for the same and spraying against pest and diseases should they occur.

2. **Self-Pollinating Varieties** The main threats to variety genetic purity in this class of varieties are systemic fungal, viral and bacterial diseases that are seed borne. Although pollen contamination is possible at random this is not very serious as the off-types might easily be removed. It is important that crops are kept clean at all times from disease, pests and weeds that often are alternative hosts for disease vectors. Although isolation due to pollen contamination is not much of an issue, it becomes important in variety genetic purity maintenance to avoid accidental contamination from related crops either from diseases or errant pollen.
3. **Vegetative Seed** Variety genetic purity maintenance for vegetatively propagated crops are best achieved in areas which reduce pest and weed development. The main threats to variety genetic purity maintenance are systemic diseases often transmitted by pests and/or weeds. Any plants exhibiting strange characteristics should be removed completely from the field. If it appears to be a new variety originating from natural selection or mutation, such a variant should be up rooted and transplanted in isolation from other plants of the desired variety, so as to be evaluated and observed.

### 5.1.6 Determination of genetic purity at Household level

Depending on the plant species it is possible to determine variety purity through:

1. **Seed** Some varieties can be distinguished by looking at the typical seed characteristics such as seed bearing fruiting bodies, colour, shape, texture for example groundnuts, bambara nuts and field beans etc.
2. **Young plants** Seeds from the seed sample are planted and characteristic of the seedlings such as thickness of the primary root, shape of leaves, can be used as distinguishing characteristics.
3. **Full-grown plants** Flower colour, especially if observed during early morning (less than 1 hour after sunrise), mid-day and (less than 1 hour before sunset). Different varieties of leguminous crops exhibit different colour expression during the named day-time periods.



5.1.6 Varieties may be distinguished by looking for typical seed characteristics.

## 5.2 The concept of isolation in space and time in different seed crop types

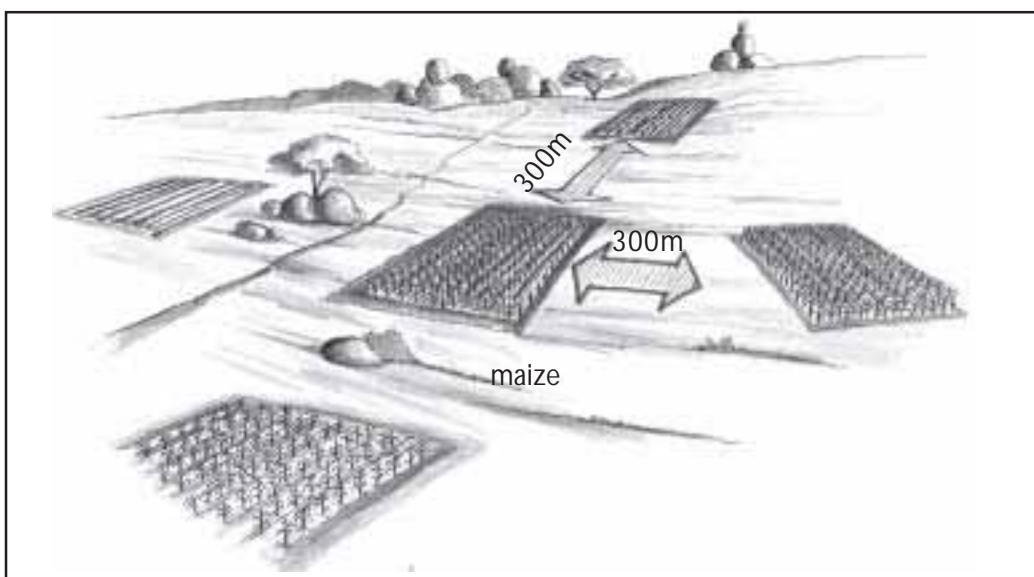
Isolation is the separation of a seed crop from all possible sources of contamination during seed production. It is important to prevent natural cross-pollination from undesirable pollen. In this regard, opvs and semi-opv crops are the most susceptible to cross pollination and admixtures of seed during harvesting and seed processing.

Isolation is required for the purposes of maintaining variety genetic purity. Adequate isolation can be achieved through space (distance between crops) and/or time (separation through periods of fertilisation). Choice of isolation techniques used depends on the farmers' systems used in a given community and crop pollination.

### 5.2.1 Isolation in space or by distance

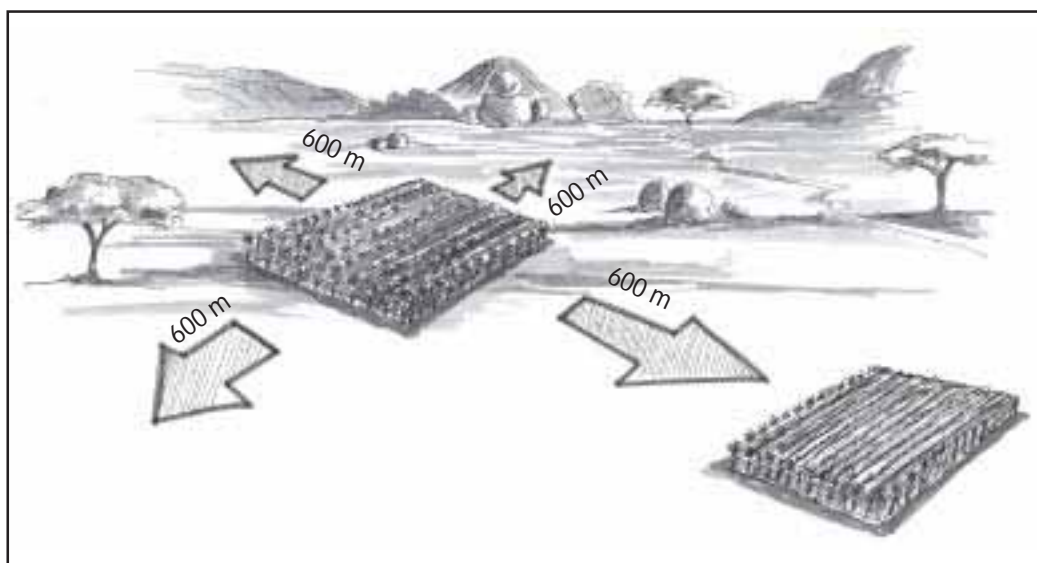
Minimum isolation distances set are mostly based on the contaminant source. For cross pollinating varieties such as

- ◆ Most cereals (maize, pearl millet and sorghum) whose pollen is wind borne, the distance between crops of a different seed generation, even if it is of the same variety is normally calculated at 300 m minimum between crops.
- ◆ Dicotyledonous crops especially sunflowers and vegetables such as brassicas, curcubits, onions etc, whose pollen is often insect and wind borne, the distance between crops of a different seed generation, even if its is of the same variety is normally calculated at 600 - 1000 m minimum between crops.



5.2.1(a) Maize seed crop isolated by distance

Isolation by using space is more applicable to those farmers who have adequate land for the isolation to be effective. It is also recommended that natural barriers such as forests and hills be used to augment this type of isolation.



5.2.1(b) Sunflower seed crop isolated by distance

### 5.2.2 Isolation in time

Isolation by time is based on careful application of the knowledge of variety vegetative growth parameters. The most important being the period after crop emergence from the ground to:

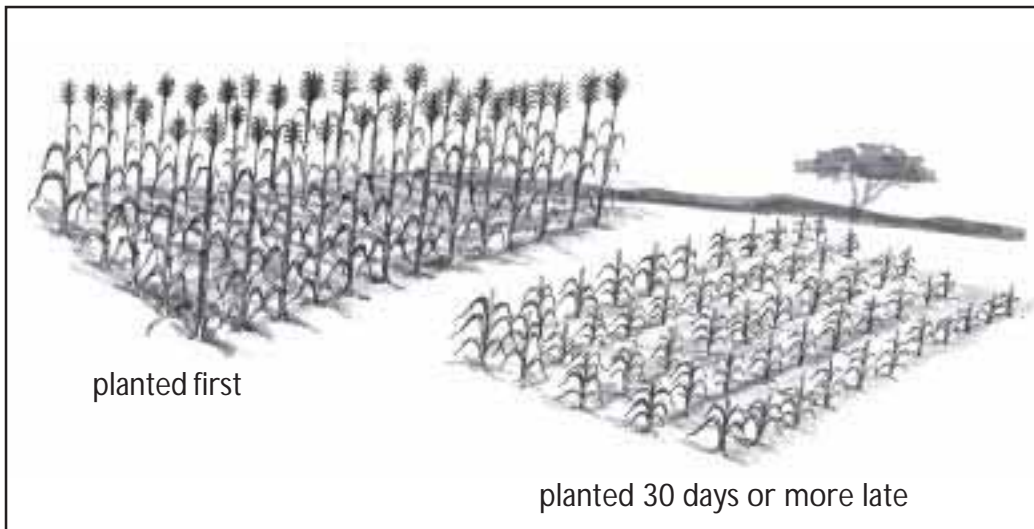
- ◆ Flowering (booting)
- ◆ Initial pollen shed
- ◆ Stigma maturation and/or condition and period of receptiveness to pollen (fertilisation period and condition)
- ◆ Period of pollen discharge (potential period for fertilisation)

Without this information, time isolation is impossible, as errant pollination might still be available to cause contamination. A rule of thumb suggests that 30 days should separate the emergence of the same crop from a seed crop. However, this might only apply to pure crop varieties whose growth cycle is known. With indigenous varieties or crops grown from food grain, whose pollen shed and stigma maturity profiles are diverse the risk of cross pollination is so high that such a process is too risky.

## Module 5

# The Small-Scale Seed Production Training Programme

## Notes



5.2.2 Maize seed srop isolated by time

However, the use of isolation by time is difficult for farmers without irrigation facilities that allow them to establish their crops early or later after other crops have been harvested.

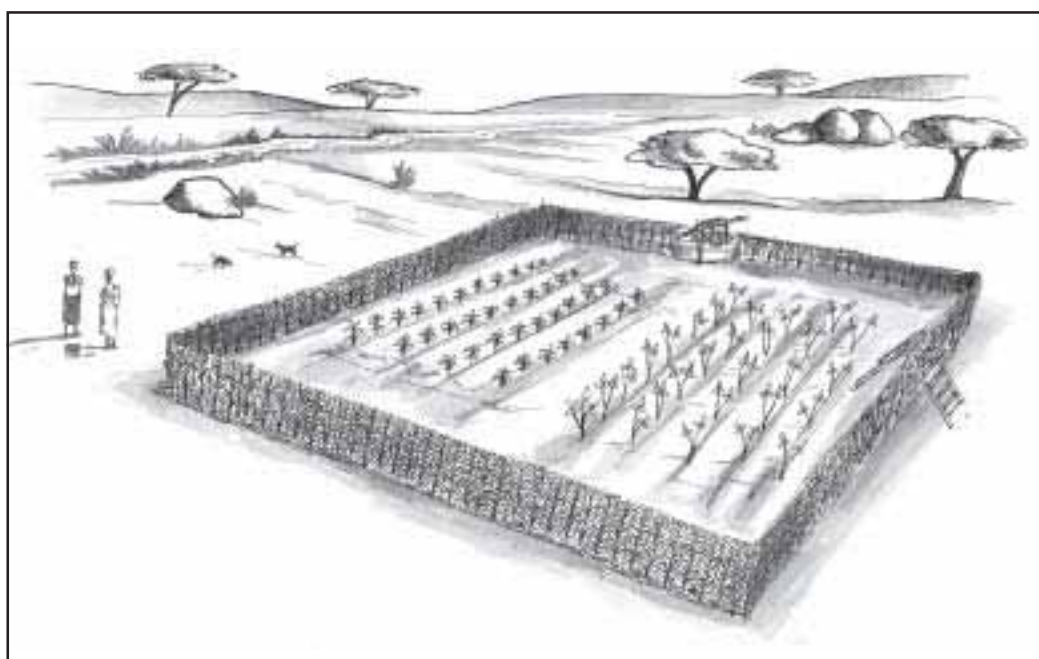
### 5.3 Off-season seed production in seed gardens.

Most small scale farming systems have over centuries used vleis (areas that retain moisture after the rainy seasons) or irrigation to grow vegetables and other crops during the off-season to the main food crop production period. With the advent of irrigation and easily constructed fenced gardens, such areas offer good opportunities for quality local seed provision processes such as:

- ◆ Growing seed crops in total isolation that ensure minimal contamination from uncooperative neighbours
- ◆ Observing variety adaptation to stress
- ◆ Quickly developing variety generations to be ready for seed bulking

#### 5.3.1 Seed garden

A seed garden is an out of season seed production system that relies on natural agroenvironmental conditions to support crop development. For summer crops such a garden should be frost free and accessible to manual irrigation processes. Where there are irrigation facilities and the area is frost free, seed gardens could be as large as commercial seed crop growing areas; otherwise the size of the seed garden is determined by access to water and availability at critical periods of seed crop development.



5.3.1 Seed garden with off-season seed crops

The objectives of seed gardens in local seed provision systems are to

- ❖ ensure that genetically pure varieties are produced locally that can form the basis for
  - ◆ basic seed generation
  - ◆ variety purity verification after long storage
  - ◆ reduction of disease and pest pressure

### **5.3.2 Factors considered in planning an effective off-season seed garden.**

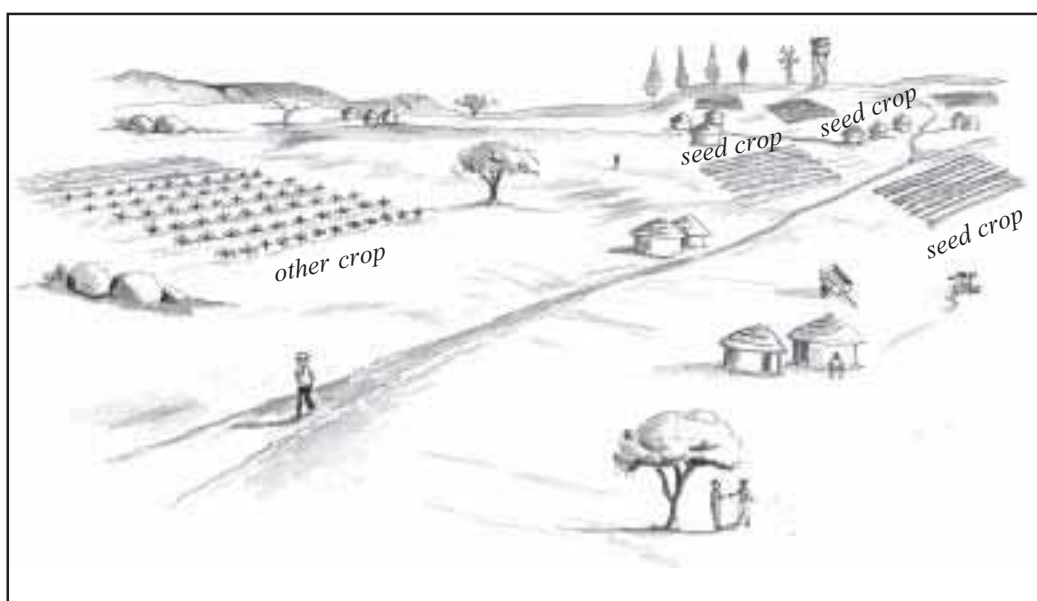
- a) Crop isolation – this is relatively easier as the crop is grown off-season, since there are usually a few crops growing this time.
- b) Diseases and pests – their prevalence is low at this stage because of unfavourable conditions. However, some may be a problem for example maize streak virus in maize. During the off-season, the seed maize may be the only host available, creating build-up of leafhoppers, vectors that transmit maize streak virus.
- c) Climatic conditions – the crop to be grown must be able to grow within the climatic conditions available. The crop's climatic requirements must therefore be assessed for suitability in the existing off-season environment.
- d) Water – a reliable water source should be close by to allow effective watering of the crop since the crop is grown after the rainy season.
- e) Aspect – depending on the seed crop the aspect chosen must suit that crop. For most tropical and sub-tropical crops they require some sunshine whereas the temperate crops require those aspects that receive cold temperatures to meet chilling requirements of the crops. Therefore, choose sites that face the sun for tropical and sub-tropical crops, and those that face away from it for temperate crops.
- f) Soils – the soil must be ideal for the seed crop selected. Generally medium to heavy textured soils are ideal for a number of crops.
- g) Rotation – the seed crop must be far away from the previous season's crop to prevent spread of pests and diseases.
- h) Accessibility – the site must be accessible and near the homestead for ease of supervision and management.



### 5.4 The concept of a seed village

This concept originates from local seed provision systems where village communities realise a potential for developing viable quality seed provision systems based on specified crop varieties. The basis for their establishment is to:

- ◆ Grow quality seed of verifiable genetic purity
- ◆ Control and co-operate in all aspects of seed provision to reduce transaction costs through combined investments in seed processing infrastructure development
- ◆ Attract external stewardship for their program



5.4 A seed village

The major advantages of this type of seed production is that everyone will grow the same crop characterised by being of a

- ◆ Single seed generation which is an advantage for cross pollinating varieties as during fertilisation a pollen cloud would envelop the whole area forming a barrier for external pollen to contaminate the crops especially if everyone plants more or less the same time.

## Module 5

### The Small-Scale Seed Production Training Programme

#### Notes

- ◆ Even farmers not intending to produce seed crops are obliged to grow the same crop variety and seed generation. Recognition that quality seed contributes to food security is also a very critical factor.
- ◆ Seed quality determination is easy for facilitators to perform as all crops are within easy walking distance from each other.
- ◆ Seed harvested could be blended into one lot for marketing should there be excess seed.
- ◆ Exposure visits for other interested partners, in particular those related to verification of variety purity probity, such as field inspections, field days and seed fairs are conducted in a most cost effective manners for all involved.

This concept derives its strength from community dynamics at village level where farmer groups combine their effort and act as an association.

## 5.5 Importance of variety viability testing

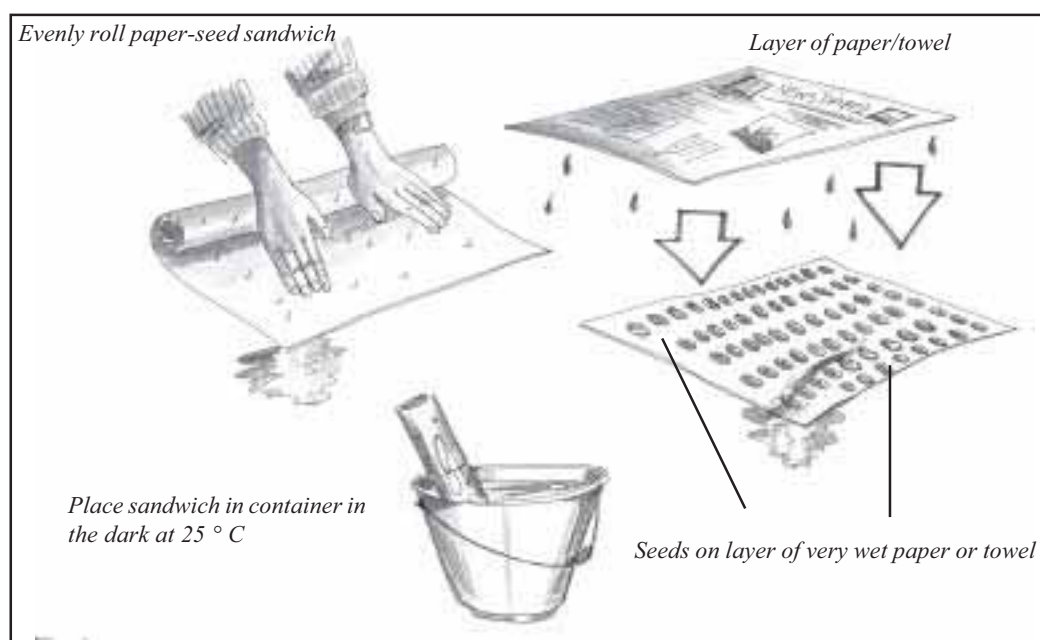
Sometime when a seed is given suitable conditions for germination, it fails to germinate. This inability to germinate may be due to dormancy (a temporary condition in living seeds which can often be removed artificially) or loss of viability. Loss of viability is a degenerative change, which is irreversible and generally considered representing the death of the seed. A viable seed is one, which can germinate under favourable conditions, provided any dormancy that may be present is removed.

Viability is therefore important in seeds because it indicates those seed that are able to germinate when planted. Such knowledge is useful in order to avoid costly planting of dead seed and the associated economic and labour losses. This information can also be used in the adjustment of seeding rates to achieve target populations.

### 5.5.1 Measurement of seed viability

Measurement of seed viability is necessary for assessing the value of seed for planting. There are various tests that can be carried out to check out whether the seed is viable or not.

**Germination capacity test** This measures the germination percentage from a known sample of seed drawn at random from a seed lot after packaging. This establishes the seed rate at which seed should be planted in a given field. There are various techniques for farmers to test seed quality for germination potential.



5.5.1(a) Determination of germination percentage using the cloth or paper towel method

## Module 5







### The Small-Scale Seed Production Training Programme

#### Notes



5.5.1(b) River sand method for assessing seed germination capacity

Germination tests are an integral component of seed quality assessment. Module 3 covers seed viability testing in greater detail.

Seed type	Minimum germination percentage	Parity
 Maize	90 %	99
 Sunflower	75 %	96
 Field Beans	70 %	98
 Sorghum	80 %	98
 Millets	70 %	96
 Groundnut	70 %	98

5.5.1c Minimum accepted germination capacities for different seed crop types

### 5.1.1 THE BASIC SEED QUALITY ASPECTS

#### Physiological seed quality

- ❖ The ability of the seed to support all the physiological processes during germination and early seedling development.

#### Sanitary seed quality

- ❖ The absence of seed-borne diseases that negatively affect germination and seedling vigor.

#### Analytical seed quality

- ❖ The physical purity of the seed or absence of useless material in a seed sample.

#### Genetic seed quality

- ❖ Refers to the genetic make up of seed that influences characteristics such as yield potential, tolerance to environmental stresses, resistance to pests and diseases.

### **5.1.3 Variety Genetic Purity In Different Crop Pollination Types**

- ❖ Refers to purity of seed in terms of distinctness and uniformity.
- ❖ A pure variety must have stable characteristics over time and place

5.1.3.1. Open pollinated varieties

5.1.3.2. Hybrids

5.1.3.3. Synthetic varieties

5.1.3.4. Self-pollinating varieties

### **5.1.4 Causes Of Loss in Variety Genetic Purity**

- ❖ Long term storage
- ❖ Chemical damage
- ❖ Irradiation
- ❖ Physical contamination

### **5.1.6 Techniques For Variety Purity Maintenance**

- ❖ OPVs and semi-OPVs
- ❖ Self-pollinating varieties
- ❖ Vegetative seeds



### 5.1.7 Determination Of Varietal Purity

- ❖ Seed – use typical seed characteristics such as seed size, colour, shape or texture
- ❖ Young plants – use characteristics such as primary root thickness, leaf shape, e.t.c
- ❖ Full-grown plants- use characteristics such as plant size, plant colour, leaf size and flower colour at different developmental stages.
- ❖ Use of complex chemical, biochemical, chromosomal and electrophoresis techniques.

## **5.2 The Concept Of Isolation In Space And Time In Different Seed Crop Types**

- ❖ Isolation is the separation of a seed crop from all possible sources of contamination during seed production.
- ❖ Allows prevention of natural cross pollination with undesired lines and mechanical admixtures in all seed types
- ❖ Can be isolated in space or time.

### Isolation in space or by distance

- ❖ Minimum isolation distances set are mostly based on the contaminant source e.g. 300 m for most cereals.
- ❖ For vegetables, the distance is normally 600-1000 m.
- ❖ This is more applicable to those farmers who have adequate land for the isolation to be effected.

### Isolation in time

- ❖ This ensures that when the seed crop is flowering, pollen is not being produced by other varieties or contaminant plants adjacent to it.
- ❖ This is more applicable to those farmers who have irrigation facilities to allow early crop establishment.
- ❖ Needs careful application of knowledge of variety phenological development particularly the onset and duration of reproductive parameters.

### 5.3.2 Important Factors In Planning Off-Season Seed Gardens

Definition: Out of season seed production system

Objectives:

- ❖ Growing seed crops in total isolation to avoid contamination.
- ❖ Reduction of disease and pest pressure.
- ❖ Observing variety adaptation to stress.
- ❖ Advancing variety generation for seed bulking.
  - ◆ Crop isolation
  - ◆ Diseases and pests
  - ◆ Climatic conditions
  - ◆ Water
  - ◆ Aspect
  - ◆ Soils
  - ◆ Rotation
  - ◆ Accessibility

## 5.4 The concept of a seed village

Basis for Establishment is to:

- ❖ Grow quality seed of verifiable genetic purity.
- ❖ Cooperate in all aspects of seed provision to reduce transaction costs.
- ❖ Attract external stewardship for program

Strengths

- ❖ Opportunities to produce single seed generation.
- ❖ Easier seed quality monitoring.
- ❖ Opportunities for blending seed lots for marketing.
- ❖ Cost effective exposure visits.

### **5.1.1. What is seed quality?**

- a. It is the measure of all seed physical, biological, pathological and genetic attributes that contribute to the final yield of a crop.
- b. Absence of seed borne diseases
- c. Varietal adaptation and varietal purity

### **5.1.4. List the causes of loss of varietal purity**

- a. Genetic causes, mutations, physical contamination and physical mixing
- b. Long term storage and pest damage
- c. None of these

### **5.2.1. What is meant by isolation of a seed crop?**

- a. Locking up seed samples in a safe place
- b. Growing a seed crop in one region only
- c. The separation of a seed crop from all possible sources of contamination during seed production.

### **5.3.1. What is a seed garden?**

- a. An out-of-season seed production system meant to reduce seed contamination
- b. An out-of-season seed production approach for increasing the seed multiplication rate
- c. Both the above

### **5.4.2. State the cause of reduced seed germination percentage.**

- a. Mechanical mixing
- b. Cross-pollination
- c. Poor storage

## Module 5

### The Small-Scale Seed Production Training Programme

#### Self Assessment Test

#### **Answer Key to Self Assessment Test**

5.1.1. a

5.1.4. a

5.2.1. c

5.3.1. c

5.4.2. c

# Module 6 - Contents

## Module 6

Assist farmers to produce and market seed within existing laws and regulations in their respective countries and in the SADC region

Sub-Modules .....	6- 1
Sub Module 6.1	
Interpret Statutory Requirements for Seed Production and Marketing (30 minutes) .....	6- 2
Sub Module 6.2	
Advise Farmers on Registration of Farmer Selected Variety (FSV) and Challenges Involved (20 minutes). .....	6- 3
Sub Module 6.3	
Discuss Plant Variety Protection (PVP) and Farmers Rights (20 mins) .....	6- 4
Sub Module 6.4	
Facilitate Farmers to Produce the Desired Category of Seed (30mins) .....	6- 5
Sub Module 6.5	
Evaluate the Concept of Harmonization of the Seed Regulatory Framework (20mins).....	6- 6
Instructor's Manual .....	6- 7
Sub Module 6.1	
Interpret Statutory Requirements for Seed Production and Marketing (30 minutes) .....	6- 7
Sub Module 6.2	
Advise Farmers on Registration of Farmer Selected Variety (FSV) and Challenges Involved (20 minutes). .....	6- 9
Sub Module 6.3	
Discuss Plant Variety Protection (PVP) and Farmer's Rights (20 minutes) .....	6-10
Sub Module 6.4	
Facilitate Farmers to Produce the Desired Category of Seed (30 minutes) .....	6-11
Sub Module 6.5	
Evaluate the Concept of Harmonization of The Seed Regulatory Framework (20 minutes) .....	6-12

## Contents - Module 6

### The Small-Scale Seed Production Training Programme

Trainee Manual .....	6-13
Sub Module 6.1	
Interpret Statutory Requirements for Seed Production and Marketing (30 minutes). ....	6-13
Sub Module 6.2	
Advise Farmers on Registration of Farmer Selected Variety (FSV) and Challenges Involved (20 minutes). ....	6-15
Sub Module 6.3	
Discuss Plant Variety Protection (PVP) and Farmer's Rights (20 minutes). ....	6-16
Sub Module 6.4	
Facilitate Farmers to Produce the Desired Category of Seed (30 minutes). ....	6-17
Sub Module 6.5	
Evaluate the Concept of Harmonization of The Seed Regulatory Framework (20 minutes) .....	6-18
Notes - Production and Marketing of Seed Within Existing Laws and Regulations in the SADC Region .....	6-19
6.1 Statutory Requirements for Seed Production and Marketing .....	6-19
6.1.1 Laws and regulations governing seed production and marketing .....	6-19
6.1.2 Implications of the Laws and Regulations on Seed Production by Small Scale Farmers .....	6-20
6.1.3 Regulatory Procedures for Small Scale Seed Production .....	6-21
6.2 Registration of Farmer Selected Variety .....	6-23
6.2.1 Farmer Selected Varieties .....	6-23
6.2.2 Challenges in Registration of a Farmer Selected Variety (FSV) .....	6-23
6.3 Plant Variety Protection and Farmers Rights .....	6-25
6.3.1 Plant Variety Protection .....	6-25
6.3.2 Farmers' rights .....	6-25
6.3.3 Plant Variety Protection and Farmers rights in small scale seed production .....	6-25



Module 6 - Contents

The Small-Scale Seed Production Training Programme

6.4	Seed quality control .....	6-26
6.4.1	Justification of Seed Quality Control .....	6-26
6.4.2	Seed quality control schemes and seed categories.....	6-26
6.5	Harmonization of the Seed Regulatory Framework.....	6-29
6.5.2	Justification for Harmonization .....	6-29
6.5.3	Benefits and Limitations of Harmonization to Small Scale Seed Production Activities .....	6-30
	Transparency .....	6-31
6.1.2	The Laws and Regulations Affecting Seed Production and Marketing .....	6-31
	Self Assessment Test .....	6-35
	Answer Key to Self Assesment Test .....	6-26

Contents - Module 6

The Small-Scale Seed Production Training Programme

## ASSIST FARMERS TO PRODUCE AND MARKET SEED WITHIN EXISTING LAWS AND REGULATIONS IN THEIR RESPECTIVE COUNTRIES AND IN THE SADC REGION.

### Purpose

The Module is intended for agricultural extension agents and rural development officers from the public, private or non-governmental organizations who are working with farmers involved in community-based seed production. At the end of this module trainees will be able to assist small-scale farmers to produce seed primarily for home use, and for sale both at local, national and regional markets within existing laws and regulations.

### Sub-Modules

- 6.1 Interpret statutory requirements for seed production and marketing
- 6.2 Advise farmers on registration of Farmer Selected Variety (FSV) and challenges involved.
- 6.3 Discuss Plant Variety Protection (PVP) and farmer's rights
- 6.4 Facilitate farmers to produce the desired category of seed.
- 6.5 Evaluate the concept of harmonization of The Seed Regulatory Framework

## Module 6

### The Small-Scale Seed Production Training Programme

#### Sub Module 6.1

#### Interpret Statutory Requirements for Seed Production and Marketing (30 minutes)

Element/Outcome	Performance Criteria	Assessment Instruments and Procedures
6.1.1. Identify the laws and regulations governing seed production and marketing in their country and the SADC region.	<ul style="list-style-type: none"><li>➤ The 3 categories of laws are outlined: seed, phytosanitary and plant variety protection.</li><li>➤ Local examples of laws in trainees' context stated including objectives of each law and the supporting regulatory framework stated e.g. Zimbabwe: Seed Act, Plant Breeders Rights Act.</li></ul>	Plenary/group discussion
6.1.2. Explain the laws and regulations affecting seed production and marketing in relation to small-scale seed production.	<ul style="list-style-type: none"><li>➤ Aspects relevant to small scale seed production covered under each law &amp; regulation and their implications stated and explained.</li></ul>	Plenary/group discussion
6.1.3. Facilitate farmers to produce and market seed within laws and regulations	<ul style="list-style-type: none"><li>➤ The regulatory procedures for small scale seed production outlined to cover registration, inspections and permits. Case study advising farmers wishing to initiate small scale seed production for local and export market highlighted.</li></ul>	Case study advising farmers wishing to initiate small scale seed production for local and export market.

## The Small-Scale Seed Production Training Programme

**Sub Module 6.2****Advise Farmers on Registration of Farmer Selected Variety (FSV) and Challenges Involved (20 minutes).**

Element/Outcome	Performance Criteria	Assessment Instruments and Procedures
6.2.1. Describe a Farmer Selected Variety (FSV)	<ul style="list-style-type: none"> <li>➤ Short definition of a farmer selected variety outlined.</li> <li>➤ Criteria used by farmers to select a variety listed</li> <li>➤ Different types of FSV (by origin) stated.</li> </ul>	Group/plenary discussion.
6.2.2. Outline procedures for variety registration in their country.	<ul style="list-style-type: none"> <li>➤ The procedure for variety registration in their respective countries stated.</li> </ul>	Group/plenary discussion.
6.2.3 Identify challenges for the registration of FSV	<ul style="list-style-type: none"> <li>➤ At least 3 challenges for registration of FSV stated.</li> </ul>	Group/plenary discussion.

## Module 6

### The Small-Scale Seed Production Training Programme

#### Sub Module 6.3

#### Discuss Plant Variety Protection (PVP) and Farmers Rights (20 mins)

Element/Outcome	Performance Criteria	Assessment Instruments and Procedures
6.3.1. Define Plant Variety Protection (PVP).	➤ PVP described stating its objectives.	Plenary/Group discussions.
6.3.2. Explain the PVP system in the context of the trainee.	➤ The PVP system in the respective country and context of the trainee described covering the law granting it, timeframe, enforcements, exemptions, rights of the breeder/ originator, any other rights, regulatory authority.	Plenary/Group discussions.
6.3.3. Discuss farmers' rights	➤ The FR stated and justified.	
6.3.4. Evaluate PVP and farmers' rights in relation to small-scale seed production.	➤ The implications on accessing parent material, multiplication and marketing explained.	Plenary/Group discussions.

## The Small-Scale Seed Production Training Programme

**Sub Module 6.4****Facilitate Farmers to Produce the Desired Category of Seed  
(30mins)**

Element/Outcome	Performance Criteria	Assessment Instruments and Procedures
6.4.1. Justify seed quality control.	➤ The objectives and the advantages of seed quality control explained.	Brainstorming exercise.
6.4.2. Explain seed quality control schemes.	➤ The explanation should give the types/options of seed quality control (compulsory and voluntary), the control stages, the factors for standards and the seed quality categories.	Self assesment test
6.4.3. Explain quality declared seed, certified seed and truthfully labeled seed.	➤ The minimum standards, control stages, major distinguishing features and production procedures for each category described.	Self assesment test

## Module 6

### The Small-Scale Seed Production Training Programme

#### Sub Module 6.5

#### Evaluate the Concept of Harmonization of the Seed Regulatory Framework (20mins).

Elements/Outcomes	Performance Criteria	Assessment Instruments and Procedures
6.5.1. Analyze the operational seed regulatory framework	➤ An overview of the basic tenets of the regulatory framework impacting on regional seed industry demonstrated, including the strengths, constraints and opportunities covering at least two countries including the trainee's own.	Plenary/group discussion.
6.5.2. Explain the concept of harmonization of the seed regulatory framework	➤ Justification for harmonization stated.	Plenary/group discussion.
6.5.3. Explain the link between small scale seed production and harmonization of the seed regulatory framework	➤ The benefits and limitations of harmonization to small-scale seed production outlined.	Plenary/group discussion.



# Module 6

## Instructor's Manual

### Sub Module 6.1

#### Interpret Statutory Requirements for Seed Production and Marketing (30 minutes)

##### Elements/Outcomes

- 6.1.1 Identify the laws and regulations governing seed production and marketing in own country and the SADC region.
- 6.1.2 Explain the laws and regulations affecting seed production and marketing in relation to small-scale seed production.
- 6.1.3 Facilitate farmers to produce and market seed within the laws and regulations.

Activities	Materials Media and Equipment	Time
1. Introduce the session by assessing trainees prior knowledge on laws and regulations which guide activities in the seed industry.		2 minutes
2. Conduct a brain storming session aimed at identifying aspects in the seed industry that are or should be regulated and why	➤ Flipchart	5 minutes
3. Show transparency (6.1.2) which is a table listing the 3 categories of laws and regulations, their general objectives and local examples.	➤ Transparency 6.1.2 Handout	3 minutes
4. Refer trainees to handout 6.1.3 on statutory requirements in their manual and go through it highlighting critical areas.	➤ Handout 6.1.3	2 minutes

## Module 6

### The Small-Scale Seed Production Training Programme

#### Instructor's Manual

Activity	Materials Media and Equipment	Time
5. Facilitate a group/plenary discussion on a case study aimed at identifying regulatory procedures for producing and marketing seed by small-scale seed producers.	➤ Flip chart	15 minutes
6. Wrap up session by showing transparency 6.1.3 giving a summary of regulatory procedures	➤ Transparency 6.1.3	3 minutes

**Sub Module 6.2****Advise Farmers on Registration of Farmer Selected Variety (FSV) and Challenges Involved (20 minutes).****Elements/Outcomes**

- 6.2.1 Describe a Farmer Selected Variety (FSV)
- 6.2.2 Outline procedures for variety registration in own respective countries and context.
- 6.2.3 Identify challenges for the registration of FSV

Activities	Materials Media and Equipment	Time
1. Start session by asking trainees to give their own definition of a FSV and write contributions on a flip chart.	➤ Flip chart	3 minutes
2. Show transparency 6.2 defining FSV and listing its characteristics.	➤ Transparency 6.2 Handout	2 minutes
3. Recap on the need for variety registration from the previous session 6.1	➤ Handout	2 minutes
4. Refer to handout 6.1.3 on FSV registration and challenges and allow trainees to read for 10mins	➤ Handout 6.1.3	10 minutes
5. Facilitate a plenary/group discussion on challenges of registering a FSV and write contributions on a flip chart	➤ Flip chart	3 minutes

## Module 6

### The Small-Scale Seed Production Training Programme

#### Instructor's Manual

### Sub Module 6.3

#### Discuss Plant Variety Protection (PVP) and Farmer's Rights (20 minutes)

##### Elements/Outcomes

6.3.1 Define Plant Variety Protection (PVP)

6.3.2 Explain PVP system in respective countries

6.3.3 Discuss farmers' rights

6.3.4 Evaluate PVP and farmers rights in relation to small scale seed production

Activity	Materials Media and Equipment	Time
1. Show transparency 6.1.2 and highlight the area covering PVP.	➤ Transparency 6.1.2 /Handout	2 minutes
2. Facilitate trainees to read handout 6.3 on PVP and farmers rights for 8mins	➤ Handout 6.3	10 minutes
3. Facilitate a group/plenary discussion (Brainstorming session) on the implications of PVP system and farmers rights in small-scale seed production. Ask trainees to write contribution on cards and group related card contributions when pinning on the board.	➤ Cards, Pins, Board.	8 minutes

**Sub Module 6.4****Facilitate Farmers to Produce the Desired Category of Seed  
(30 minutes)****Elements/Outcomes**

6.4.1 Justify seed quality control

6.4.2 Explain seed quality control schemes

6.4.3 Explain quality declared seed, certified seed and truthfully labelled seed

Activities	Materials Media and Equipment	Time
1. Conduct a brainstorming exercise aimed at justifying seed quality control and write contributions on chalkboard.	➤ Chalk board	3 minutes
2. Refer trainees to the detailed handout 6.4 on seed quality control and lead trainees through the handout highlighting key aspects.	➤ Handout 6.4	8 minutes
3. Facilitate a group/plenary discussion on factors considered in recommending a seed category and write contributions on the flip chart.	➤ Flip chart	5 minutes
4. Facilitate trainees to complete Self Assessment Test 6.	➤ Self Assessment Test 6 Answer key	14 minutes

## Module 6

### The Small-Scale Seed Production Training Programme

#### Instructor's Manual

### Sub Module 6.5

#### Evaluate the Concept of Harmonization of The Seed Regulatory Framework (20 minutes)

##### Elements/Outcomes

- 6.5.1 Analyze the operational seed regulatory framework
- 6.5.2 Explain the concept of harmonization of the seed regulatory framework
- 6.5.3 Explain the link between small scale seed production and harmonization of the seed regulatory framework

Activities	Materials Media and Equipment	Time
1. Conduct an oral question and answer session aimed at identifying the operational regulatory framework	➤ List of key questions	3 minutes
2. Facilitate group/plenary discussion on a structured exercise aimed at explaining harmonization as well as link it to small-scale seed production.	➤ Structured exercise, Flip chart.	17 minutes

# Module 6

## Trainee Manual

### Sub Module 6.1

#### Interpret Statutory Requirements for Seed Production and Marketing (30 minutes).

##### Elements/Outcomes

- 6.1.1 Identify the laws and regulations governing seed production and marketing in the country and in at least one other SADC country.
- 6.1.2 Explain the laws and regulations affecting seed production and marketing in relation to small-scale seed production.
- 6.1.3 Facilitate farmers to produce and market seed within existing laws and regulations

Activities	Materials Media and Equipment	Time
1. Note the need, importance, justification for laws and regulations which guide activities of the seed industry.		2 minutes
2. Participate in a brain storming session aimed at identifying aspects in the seed industry that are or should be regulated and give reasons. Note down key points	➤ Flip chart	5 minutes
3. View transparency 6.1.2 which is a table listing the 3 categories of laws and regulations, their general objectives and local examples.	➤ Transparency 6.1.2 Handout	3 minutes
4. Take the detailed handout 6.1.3 in the manual and note the critical areas being highlighted by the instructor.	➤ Handout 6.1.3	2 minutes
5. Participate in group/plenary discussion on a case study aimed at identifying regulatory procedures for producing and marketing seed by small scale seed producers.	➤ Flip chart	15 minutes

## Module 6

### The Small-Scale Seed Production Training Programme

#### Trainee Manual

Activity	Material Media and Equipment	Time
6. View transparency 6.1.3 giving a summary of regulatory procedures and compare this with group work	➤ Transparency 6.1.3 Handout	3 minutes



**Sub Module 6.2.****Advise Farmers on Registration of Farmer Selected Variety (FSV) and Challenges Involved (20 minutes).****Elements/Outcomes**

- 6.2.1 Describe a Farmer Selected Variety (FSV)
- 6.2.2 Outline procedures for variety registration in own respective countries and context.
- 6.2.3 Identify challenges for the registration of FSV

Activities	Materials Media and Equipment	Time
1. Participate in a plenary discussion on the definition of a FSV and note down key points.	➤ Flip chart	3 minutes
2. View transparency 6.2 defining FSV and listing its characteristics. Compare this with output from the plenary discussion	➤ Transparency 6.2 Handout	2 minutes
3. Recap on the need for variety registration from the previous session 6.1.	➤ Handout	2 minutes
4. Read handout 6.1.3 on FSV registration and challenges.	➤ Handout 6.1.3	10 minutes
5. Participate in a class discussion on challenges of registering a FSV and note down key points	➤ Flip chart	3 minutes

## Module 6

### The Small-Scale Seed Production Training Programme

#### Trainee Manual

#### Sub Module 6.3.

#### Discuss Plant Variety Protection (PVP) and Farmer's Rights (20 minutes).

##### Elements/Outcomes

6.3.1 Define Plant Variety (PVP)

6.3.2 Explain PVP system in respective countries

6.3.3 Discuss farmers' rights

6.3.4 Evaluate PVP and farmers' rights in relation to small-scale seed production.

Activity	Material Media and Equipment	Time
1. View transparency 6.1.2 and note the points covering PVP as a recap	➤ Transparency 6.1.2 /Handout	2 minutes
2. Read handout 6.3 on PVP and farmers rights for 8 mins	➤ Handout 6.3	10 minutes
3. Participate in a group discussion (Brainstorming session) on the implications of PVP system and farmers rights on small scale seed producers. Note down key points.	➤ Cards, Pins, Board.	8 minutes

### Sub Module 6.4.

#### Facilitate Farmers to Produce the Desired Category of Seed (30 minutes).

##### Elements/Outcomes

6.4.1 Justify seed quality control

6.4.2 Explain seed quality control schemes

6.4.3 Explain quality declared seed, certified seed and truthfully labelled seed

Activity	Materials Media and Equipment	Time
1. Participate in a brainstorming exercise aimed at justifying seed quality control	➤ Chalk board, chalk	3 minutes
2. Read handout 6.4 on seed quality control and mark key aspects being highlighted by the trainer.	➤ Handout 6.4	8 minutes
3. Participate in a class discussion on factors considered in recommending a seed category and note key points.	➤ Flip chart	5 minutes
4. Complete Self Assessment Test 6 on seed quality control issues in the folder for 8minutes.	➤ Self Assessment Test 6	8 minutes
5. Mark your work as the instructor calls out the answers and give feedback to the instructor.		2 minutes
6. Seek clarification if not clear.		4 minutes

## Module 6

### The Small-Scale Seed Production Training Programme

#### Trainee Manual

#### **Sub Module 6.5.**

#### **Evaluate the Concept of Harmonization of The Seed Regulatory Framework (20 minutes)**

##### **Elements/Outcomes**

- 6.5.1 Analyze the operational seed regulatory framework
- 6.5.2 Explain the concept of harmonization of the seed regulatory framework
- 6.5.3 Explain the link between small scale seed production and harmonization of the seed regulatory framework

Activity	Material Media and Equipment	Time
1. Participate in an oral question and answer session aimed at identifying the operational regulatory framework and note key points.		3 minutes
2. Participate in group structured exercise aimed at explaining harmonization as well as link it to small-scale seed production.	<ul style="list-style-type: none"><li>➤ Structured exercise</li><li>➤ Flip chart</li></ul>	17 minutes

### **Handout Notes on Production and Marketing of Seed Within Existing Laws and Regulations in the SADC Region**

#### **6.1 Statutory Requirements for Seed Production and Marketing**

##### **6.1.1 Laws and regulations governing seed production and marketing**

Seed production and marketing in most countries is affected by one or more of the following categories of laws- (1) Seed law, (2) Plant variety protection law and (3) Phytosanitary law.

The purpose of the Seed law is to facilitate and regulate the production and trade of quality seed. It offers protection to the farmers by ensuring that only seed of the highest quality finds its way onto the market thus contributing to seed security and ultimately national food security. Seed laws are there to ensure that varieties are appropriate and well identified by regulating requirements and procedures for variety release and registration. They also seek to ensure that the seed is of adequate quality, having provisions for seed quality control such as methods and rules regarding seed certification (generation system, field inspections, seed testing, labeling) and seed quality standards as well as provisions for phytosanitary control and marketing control. Some seed laws also regulate the organisational framework for the seed sector.

The Plant Variety Protection law seeks to protect the commercial interests of the discoverer or the breeder by granting ownership rights for the new variety, which are known as plant breeders' rights (PBR). The breeder can produce and market seeds of the new variety or allow others to do so against payment of royalty. The protection also extends to the use of the registered name for selling any other variety within the same class. For a variety to have plant variety protection it has to be new, distinct from other varieties, uniform in the characteristics of importance and its relevant characteristics should remain stable, not change after repeated propagation.

The Plant breeders' rights do not usually apply to seed for private or non-commercial use and it has provisions for farmers' privilege and research exemption. With farmers' privilege, a farmer is allowed to produce seed of a protected variety non-commercially for his/her own use or exchange or sale of small quantities without the breeder's consent. Research exemption allows for the use of a protected variety to produce new varieties without the breeder's consent.

## Module 6

### The Small-Scale Seed Production Training Programme

#### Notes

Phytosanitary laws are mandatory statutes in almost any United Nations (UN) member country, and cover all plant material including seed. They are meant to prevent introduction of new pests and diseases into a country by regulating importation of seed, food grain or any other material, which may contain organisms harmful to plants, thus protecting national agricultural systems. Generally imported seed lots have to be presented to the phytosanitary authority for examination of the occurrence of listed prohibited pests and disease. Alternatively documentary evidence in the form of a phytosanitary certificate issued by a reputable institution declaring absence or control measures done to avoid the introduction of foreign plant diseases and pests is evaluated.

#### **6.1.2 Implications of the Laws and Regulations on Seed Production by Small Scale Farmers**

##### (a) Implication of the Seed laws

In most SADC countries, varieties have to be officially released before wide scale production by farmers. In releasing the varieties, the variety release committee considers the value for cultivation and use as reflected from evaluation trial results conducted at various locations over a number of years. The committee also considers its distinctness, uniformity and stability, that is, the variety should be identifiable. Therefore, if small-scale farmers wish to produce seed, particularly certified seed, they have to ensure that the variety is registered. If it is a locally selected variety, they have to gather and present the variety information before the variety release committee.

Seed quality control regulations also affect community based seed production initiatives. In some countries, no person shall sell or test seed unless one is registered. In addition, no person is allowed to sell seed unless such seed complies with the prescribed requirements and is packed in the right packages or containers. Likewise seed exported should also comply with prescribed requirements (a purity and germination test) and should be inspected in the field by a phytosanitary inspector if it is for export. The seed certification scheme requires registration of growers and seed crops. In addition, seed certification is technically mandatory for some crops.

The implication of the above highlights that farmer-to-farmer seed exchange or sale is acceptable within the current laws. However, if seed projects embark on wide scale marketing of seed, then they have to be a registered seed seller and the seed has to be tested to ensure it meets the prescribed standards.

Alternatively, the seed projects may have to depend on registered laboratories for their seed testing to market the seed locally or to export it. Since seed certification requires registration of grower and crops, seed projects have to register as long as inspection services have access to the location of the seed crop and other conditions for seed certification have been met. In some countries, seed certification is mandatory for some crops. Mandatory certification might be a major constraint to local seed provision systems since it prevents farmers practicing local seed production.

#### (b) Implications of Plant Breeders' Rights Act

The plant breeders' rights do not apply to seed for private or non-commercial use. In the Zimbabwean Plant Breeders Rights Act, the farmer who cultivates less than 10 ha has the right to use retained seed. In most countries, farmer to farmer seed exchange is permitted. Therefore, a farmer is allowed to produce seed of a protected variety in a non-commercial way for his own use or for exchange or sale of small quantities without the breeder's consent. However, should community based seed projects embark on wide-scale multiplication and marketing of varieties protected by Plant Breeders Rights, there is need for negotiation with the holder of those rights.

#### **6.1.3 Regulatory Procedures for Small Scale Seed Production**

The regulatory procedures for small-scale seed production will depend on the purpose of the small-scale seed project, the type of variety to be used, the commercial seed class to be produced and the target market. Box 6.1.3. summarizes the regulatory procedures that have to be complied with for variety access, seed production and seed marketing in Zimbabwe.

## Module 6

### The Small-Scale Seed Production Training Programme

#### Notes

#### Box 6.1.3

#### The regulatory procedures for small-scale seed production in Zimbabwe

PURPOSE OF SMALL SCALE SEED PROJECT				
	Household seed security and exchange with neighbours	Local commercial sale-standard grade	Local commercial sale-certified	Export commercial sale
1. Variety access				
a. Local variety	Accessible	Accessible	Need registration for recognition in SCS	Accessible
b. Variety with PBR	Accessible	Negotiate with holder of PBR	Should be registered for recognition in SCS, Negotiate with holder of PBR	Negotiate with holder of PBR
c. Variety to be imported	Requires a PPRI plant import permit, SS permission, and MoLARR import permit, phyto from donor country	Require a PPRI plant import permit, SS permission, and MoLARR import permit, phyto from donor country	Require a PPRI plant import permit, SS permission, and MoLARR import permit, phyto certificate from donor country	Require a PPRI plant import permit, SS permission, and MoLARR import permit; phyto certificate from donor country
2. Seed Production				
Grower registration	Not required	Not required	Required	-
Seed crop registration	Not required	Not required	Required	Required
Seed crop inspection	Not required	Not required	Required	Required (phyto report)
Seed sampling	Not required	-	Required	Required
Seed quality testing	Not required	Required (purity & germination)	Required	Required (purity, germination ,issue of IOC)
3. Seed marketing				
Registration as a seller	Not required	Required	Required	-
Marketing	Limited	Maximum price determined by MoTC	Maximum price determined by MoTC	Need plant import permit from receiving country, SS permission & IOC, PPRI phyto certificate, MoLARR export permit

#### Key:

MoLARR - Ministry of Lands, Agriculture and Rural Resettlement

PBR - Plant breeders' rights

PPRI - Plant protection research institute

SS - Seed Services

SCS -Seed certification scheme

IOC - International Orange certificate

MoTC - Ministry of Trade and Commerce



## **6.2 Registration of Farmer Selected Variety**

### **6.2.1 Farmer Selected Varieties**

Farmer selected varieties (FSV) are those varieties identified by farmers to have specific adaptation to their needs following evaluation in trials such as farmer-implemented farmer-managed (FIFM) observation trials.

The FSV can be differentiated by origin. They could be varieties developed and/or selected by local farmers, local varieties, local varieties from neighbouring communities, commercially available varieties or elite material from breeding programs. They can also be differentiated by type- could be hybrids, open pollinated or pure line varieties.

### **6.2.2 Challenges in Registration of a Farmer Selected Variety (FSV)**

The farmer selected varieties that need registration maybe those developed and selected by farmers, local varieties or pre-release varieties from breeding programs

1. Plant breeders' rights (PBR) are usually granted to an individual, the state, company or corporate body. This makes it difficult to register a FSV that would have been developed and selected by a community. What makes it even more difficult is the identity of the maintainer of this community developed and selected variety. It is also impossible to release and register a variety developed by someone else without prior consent. This may affect registration of FSV originating from international organizations. If the FSV is a pre-release from local breeding program, then farmers have to approach the breeder and encourage registration.
2. For a variety to be granted PBR, it has to be new (novel) yet the FSV could be a local landrace that has been in existence for years, hence PBR cannot be granted. There are times when farmers select from an existing variety such that the FSV may be regarded as an essentially derived variety and this cannot be commercially exploited without the consent of the breeder.

## Module 6

### The Small-Scale Seed Production Training Programme

#### Notes

3. The value for cultivation and use criteria for farmers may differ from that of the Variety Release Committee resulting in rejection of a variety with strengths in characteristics considered to be minor by the Variety Release Committee and yet important to the farmers. Generally, the variety release committee places more emphasis on yield, diseases data and statistically significant improvements over the control but less attention to qualitative aspects of varieties. Statistical significance may be hard to achieve in FIFM observation trials. In addition, the variety release committee looks at broad adaptability, yet most of the FSV have specific adaptation, therefore rejection of such varieties may restrict farmers choice of potentially useful varieties.
4. By its composition, the Variety Release Committee is usually skewed in favor of scientists and administrators, biasing it in favor of the formal scientists such as breeders and disadvantaging the informal local farmer/breeder.

## **6.3 Plant Variety Protection and Farmers Rights**

### **6.3.1 Plant Variety Protection**

Plant Variety Protection (PVP) is the legal system of granting exclusive rights over varieties to the originator (breeder, discoverer). The objective is to reward the originator for the new variety, to allow the originator to recover the cost of developing the new variety and to give an incentive for further investment in variety development. By excluding others from commercially exploiting the new plant variety, PBR guarantee returns for investment. It is the duty of the holder of PBR or licensee to enforce the plant breeders' rights.

It is also the responsibility of the holder of PBR to maintain reproductive material of the plant concerned for the period when the PBR are valid.

### **6.3.2 Farmers' rights**

Farmers' rights are rights arising from past, present and future contributions of communities in conserving, improving and making available plant genetic resources particularly those in the centers of origin or diversity. They are rights that local farmers and communities can claim over genetic resources in landraces. These rights are meant to ensure equitable distribution of benefits arising from use of plant genetic resources.

### **6.3.3 Plant Variety Protection and Farmers rights in small scale seed production**

Plant variety protection can be beneficial to small-scale seed production since it gives incentives for variety development thereby increasing availability of improved varieties. However, it can restrict local seed initiatives because of prohibition of wide scale production and marketing and/ or exorbitant royalties that may be charged.

#### 6.4. Seed quality control

##### 6.4.1 Justification of Seed Quality Control

The primary objective of seed quality control is to prevent low quality seed being available on the market thus protecting the farming communities. It also protects the national agricultural industry from introduction of undesirable plant varieties as well as new pests, diseases and weeds. Seed quality control therefore contributes to seed security by ensuring that seed of appropriate improved varieties of the right quality is made available. This improves the quantity and quality of agricultural production, in turn food security is enhanced and agricultural development also takes place.

##### 6.4.2 Seed quality control schemes and seed categories

Generally seed quality control schemes have two components, seed certification and seed testing. Seed certification verifies the genetic quality of seed, that is the variety identity and purity. Seed testing focuses on various seed quality parameters including germination, analytical purity, pathogen levels and moisture content. Seed quality control can be done at various stages in the seed production cycle from growing seed crops, processing the seed up to marketing and may also extend to seed personnel and facilities.

###### Box 6.4.2: Participants in seed quality control

Producers: The companies (both producers and dealers) aim to have high quality seed on the market since their reputation is at stake. As a result some have quality control procedures.

Farmers (consumers): They are the consumers of seed and hence should be aware of seed quality information in order to protect their rights and interests either as individuals or groups

Regulatory body: This body independently assesses quality and this could be a government (e.g. Seed Services in Zimbabwe) or private organization (e.g. SANSOR in South Africa). The interventions by the regulatory body maybe voluntary or mandatory depending on the crop and/or country.

Finally there are standards for post-control to verify variety identity and variety uniformity (off-type counts).

Generally there are two systems of seed quality control- truthfully labeling system and the minimum standards system.

The truthfully labeling system is when the seller is required to label the quality of the seed in the bag. There are no set standards for the seed quality, rather seed producers are required to list certain quality attributes (purity, germination %) on the label. With this system it is the consumers rather than the regulatory body that bear the responsibility for monitoring adherence to the standards. The consumer has to check the label and decide if the labeled seed quality meet their needs. Market forces dictate that the seed producer/seller supply high quality seed. Seed produced under this system is called truthfully labeled seed. When monitoring, the regulatory body just tests to verify information on the label.

With the minimum standards system, seed that does not meet the minimum set standards is not allowed onto the market. The system protects consumers from planting sub-standard seed. Within this system there is the option of seed certification and quality declared seed system.

a. Quality declared seed (QDS) system

Here, seed producers are responsible for meeting certain genetic and physical quality standards. Rather than monitoring all fields and sampling all seed lots, the regulatory agency performs spot checks on a certain percentage of these and if problems are detected that seed lot can not be sold with a QDS tag. Persistent offences will remove the company from the QDS scheme.

b. Seed certification system

The objective of seed certification is to make available seed of superior qualities (in terms of variety trueness to type, high germination and purity and freedom from specific diseases and pests) and to guarantee these qualities by means of a certificate, seal and/or label. The majority of seed certification systems are legally prescribed schemes with provisions in the seed law. Certified seed is a seed class produced in a certification scheme from a known generation, which is then sold to farmers for crop production. The qualities are guaranteed particularly in terms of genetic quality (variety trueness to type), high germination and high purity as well as freedom from certain diseases.

To ensure genetic identity and purity of each seed lot, a strict generation system is used where breeders' (pre-basic) seed is the purest generation. Pre-basic seed is maintained and produced under direct control of the breeder. Pre-basic seed is used to plant basic seed from which certified seed is harvested. Seed certification is characterized by field inspections to verify parental seed stock, confirm area and variety, as well as check isolation, general crop husbandry and incidences of pests, diseases and weeds. The processing plant, storage facilities and seed outlets are inspected to check on cleanliness, pest control, record keeping as well as collect samples for seed testing.

## **6.5 Harmonization of the Seed Regulatory Framework**

### **6.5.2 Justification for Harmonization**

The objective of harmonization is to provide for freer seed trade within the country, across the region and beyond.

Within a country, you will find that the current legislation does not cater for local seed system or on-farm seed production and yet these make a significant contribution to national seed security. With the current legislation and certification arrangements there is need for parallel arrangements to cater for on-farm seed production. Participation of community based seed initiatives on the formal level is therefore difficult. There is need to recognize and formalize on-farm or small-scale seed production activities.

At the regional level there are differences in seed quality assurance practices including differences in variety release procedures such that a variety is re-evaluated before its accepted in another country. Whilst some countries accept a phytosanitary certificate as evidence for seed health, others in spite of accepting this, will place the seed under quarantine. These differences in the application of the phytosanitary law should be regularized to protect the region from foreign pests and diseases and sustain community-based seed production.

Tariff systems also make it difficult to move seed across borders. If regional countries e.g. SADC countries could develop common variety evaluation and release procedures, this would promote faster and freer movement of varieties within the region. An acceptable seed quality assurance can be achieved by having regional referee seed testing, minimum qualification standards for seed personnel and common seed terminology. Additionally, with common seed trade regulations (addressing phytosanitary issues and documentation system), seed movement across borders maybe eased.

There is also need to harmonize the seed regulatory framework within guidelines of international conventions.

### **6.5.3 Benefits and Limitations of Harmonization to Small Scale Seed Production Activities**

Harmonization of the seed regulatory framework will promote integration of regional seed markets to give a common regional market large enough to induce more investment in the seed industry. This will create competition resulting in a viable and efficient seed system. With harmonized variety release procedures, more

crop varieties will be available thus increasing the farmers' choice. The return on investment by seed companies and breeding institutions will also increase due to the enlarged market. In-country harmonization would result in the growth and development of community based seed production initiatives. This will enhance national seed security, particularly for neglected crops. Not only will the quantities of seed available increase, but the quality as well.

Module 6

The Small-Scale Seed Production Training Programme

**Intentionally left blank**



# Module 6

## Transparency

### 6.1.2 The Laws and Regulations Affecting Seed Production and Marketing

CATEGORY OF LAW	OBJECTIVE.
1. Seed law	Facilitate and regulate the production and trade of seed
2. Plant variety protection law	Protects the commercial interests of the developer of a variety by granting ownership rights of the new variety.
3. Phytosanitary law	Prevents the introduction and spread of new pests and diseases in the country by regulating importation of seed, food grain or any other material which may contain organisms harmful to plants.

## Module 6

### The Small-Scale Seed Production Training Programme

#### Transparency

#### 6.1.3 Summary of regulatory procedures for small-scale seed production activities in Zimbabwe

PURPOSE OF SMALL SCALE SEED PROJECT				
	Household seed security and exchange with neighbours	Local commercial sale-standard grade	Local commercial sale-certified	Export commercial sale
1. Variety access				
a. Local variety	Accessible	Accessible	Need registration for recognition in SCS	Accessible
b. Variety with PBR	Accessible	Negotiate with holder of PBR	Should be registered for recognition in SCS, Negotiate with holder of PBR	Negotiate with holder of PBR
c. Variety to be imported	Require a PPRI plant import permit, SS permission, and MoLARR import permit, phyto from donor country	Require a PPRI plant import permit, SS permission, and MoLARR import permit, phyto from donor country	Require a PPRI plant import permit, SS permission, and MoLARR import permit, phyto certificate from donor country	Require a PPRI plant import permit, SS permission, and MoLARR import permit; phyto certificate from donor country
2. Seed Production				
Grower registration	Not required	Not required	Required	-
Seed crop registration	Not required	Not required	Required	Required
Seed crop inspection	Not required	Not required	Required	Required (phyto report)
Seed sampling	Not required	-	Required	Required
Seed quality testing	Not required	Required (purity & germination)	Required	Required (purity, germination ,issue of IOC)
3. Seed marketing				
Registration as a seller	Not required	Required	Required	-
Marketing	Limited	Maximum price determined by MoTC	Maximum price determined by MoTC	Need plant import permit from receiving country, SS permission & IOC, PPRI phyto certificate, MoLARR export permit

Key:

MoLARR - Ministry of Lands, Agriculture and Rural Resettlement

PBR - Plant breeders' rights

PPRI - Plant protection research institute

SS - Seed Services

SCS -Seed certification scheme

IOC - International Orange certificate

MoTC - Ministry of Trade and Commerce

## 6.2 Farmer selected variety

Farmer selected variety is a variety identified by farmers to have specific characteristics that suit their requirements following evaluation in FIFM observation trials

Specific characteristics may include:

- ❖ Production values (yield potential, disease resistance, drought tolerance, adaptability to existing environmental conditions and maturity in relation to household food needs)
- ❖ Consumption values (shape, color, palatability and suitability for different food preparations)
- ❖ Economic values (quality, storability, marketability, maturity in relation to price cycles and risk avoidance) and
- ❖ Cultural values, (characteristics should suit the beliefs and customs of the community).

These form the basis for the farmer's criteria for value for cultivation and use (VCU)

**Intentionally left blank**

# Module 6

## Self Assessment Test

### Appendix 2: KEY QUESTIONS FOR THE MODULE

6.1.1. List the 3 categories of laws affecting seed production and marketing.

- A .....
- B .....
- C .....

6.2.1. Should farmers producing Teal, a government groundnut variety, for local community seed requirements register the seed crop.

Yes/ No

6.4.2. Truthfully labeled seed should meet the minimum set standards for purity and germination.

True/ False

6.4.3. Basic seed is used to plant

- a) Pre-basic seed crop
- b) Certified seed crop
- c) Standard seed crop
- d) Commercial crop

## Module 6

### The Small-Scale Seed Production Training Programme

#### Self Assessment Test

#### **Answer Key to Self Assessment Test**

1. Seed laws, Plant variety protection laws, phytosanitary laws
2. No
3. False
4. b

# Module 7 -Contents

## Module 7 Facilitate seed networks, exposure visits and seed marketing

Sub-Modules .....	7- 1
Sub Module 7.1	
Facilitate the Establishment of Seed Networks and Exposure Visits. ....	7- 2
Sub Module 7.2	
Facilitate Seed Marketing by Small-Scale Farmers. ....	7- 4
Sub Module 7.3	
Assist Farmers in Maintaining and Using Records. ....	7- 6
Instructor’s Manual .....	7- 7
Sub Module 7.1	
Facilitate the Establishment of Seed Networks and Exposure Visits (49 minutes) .....	7- 7
Sub Module 7.2	
Facilitate Seed Marketing By Small Scale Farmers (57 minutes) .....	7- 9
Sub Module 7.3	
Assist Farmers In Maintaining And Using Records (37 minutes) .....	7-12
Trainee Manual .....	7-13
Sub Module 7.1	
Facilitate The Establishment Of Seed Networks And Exposure Visits (49 minutes) .....	7-13
Sub Module 7.2	
Facilitate Seed Marketing By Small Scale Farmers (57 minutes) .....	7-16
Sub Module 7.3	
Assist Farmers In Maintaining And Using Records (37 minutes) .....	7-19
Notes .....	7-21
7.1 Facilitating Seed and Information Sharing Among Small-Scale Seed Production Stakeholders .....	7-21

## Contents - Module 7

### The Small-Scale Seed Production Training Programme

7.1.1	The Importance of Linkages Between Community Seed Systems at the Local, National and Regional Levels .....	7-21
7.1.2	Mechanisms Through Which Farmers Can Share Seed Stocks and Information .....	7-22
7.1.3	Seed Networks.....	7-28
7.2	Facilitating the Marketing of Seed by Small-Scale Farmers.....	7-30
7.2.1	Importance of marketing .....	7-30
7.2.2	Fundamentals of marketing .....	7-30
7.2.3	Role of the extension officer in facilitating marketing of seed by small scale farmers: .....	7-35
7.3	Record Keeping for Seed Production Activities .....	7-36
7.3.1	The Importance of Keeping Records at Household Level .....	7-36
7.3.2	Why Small Scale Farmers Do Not Keep Records.....	7-36
7.3.3	Information which should be recorded .....	7-37
7.3.4	Break-even price determination .....	7-42
	Transparency .....	7-45
7.2.1	Background Setting of the Small Scale Farming Sector ....	7-45
7.2.2	Pricing mechanisms.....	7-46
	Self Assessment Test .....	7-49
	Answer Key to Self Assesment Test .....	7-50



## FACILITATE SEED NETWORKS, EXPOSURE VISITS AND SEED MARKETING

### **Purpose**

The module is intended for agricultural extension agents from the public, private and non-governmental organizations who are working with farmers involved in community based seed production. At the end of the module, trainees will be able to facilitate formation of seed networks that will benefit all players in the small scale seed sector; assist farmers to market seed, as well as to keep and use records of their seed production activities.

### **Sub-Modules**

- 7.1 Facilitate the establishment of seed networks and exposure visits.
- 7.2 Facilitate seed marketing by small-scale farmers.
- 7.3 Assist farmers in maintaining and using records.

## Module 7

### The Small-Scale Seed Production Training Programme

#### Sub Module 7.1

#### Facilitate the Establishment of Seed Networks and Exposure Visits.

Element/Outcome	Performance Criteria	Assessment Instruments and Procedures
7.1.1. Explain the importance of establishing linkages between community seed systems at local, national and regional levels	<ul style="list-style-type: none"> <li>➤ Importance of linkages between community seed systems at different levels explained</li> <li>➤ The problems associated with access to seed and information discussed and solutions preferred.</li> </ul>	Plenary/Group discussion
7.1.2. Facilitate mechanisms through which farmers can share seed stocks for mutual benefit	<ul style="list-style-type: none"> <li>➤ Seed sharing mechanisms identified</li> <li>➤ Ways in which seed sharing mechanisms can be used to the benefit of all farmers explained</li> </ul>	Plenary/Group discussion
7.1.3. Facilitate the establishment of seed knowledge and information networks between farmers, other groups of farmers and institutions at the local, national and regional levels	<ul style="list-style-type: none"> <li>➤ Knowledge and skills required for generating interest and participation of seed producers demonstrated in a simulation exercise.</li> <li>➤ A diverse knowledge base generated from participatory exercises</li> <li>➤ Simple but meaningful information that can be used for later interventions generated</li> </ul>	Role plays Simulation exercises

## The Small-Scale Seed Production Training Programme

Element/Outcome	Performance Criteria	Assessment Instruments and Procedures
7.1.4. Facilitate exposure visits by farmers	<ul style="list-style-type: none"> <li>➤ Look and learn tours planned as indicated by a well-thought exemplary plan</li> <li>➤ Ability to stimulate interest and the participation of all seed producers with respect to gender, age, social status and economic well-being demonstrated</li> </ul>	Role plays Plenary/Group discussions.
7.1.5. Facilitate the use of GIES to enhance disaster preparedness and market opportunities.	<ul style="list-style-type: none"> <li>➤ The concept of GIES defined and explained</li> <li>➤ Potential networking units and market opportunities identified using data generated from GIES</li> <li>➤ GIES data sets applied in disaster preparedness strategies and programs</li> </ul>	Plenary/Group discussions Practical exercises

## Module 7

### The Small-Scale Seed Production Training Programme

#### Sub Module 7.2

##### Facilitate Seed Marketing by Small-Scale Farmers.

Element/Outcome	Performance Criteria	Assessment Instruments and Procedures
7.2.1. Explain the importance of seed marketing	<ul style="list-style-type: none"> <li>➤ Importance of seed marketing explained, highlighting the need for income generation and development of economic incentives</li> </ul>	Plenary/Group discussions
7.2.2. Explain the fundamentals of marketing	<ul style="list-style-type: none"> <li>➤ Fundamentals of marketing explained in terms of the 4Ps viz:               <ol style="list-style-type: none"> <li>a) Product (appropriateness, quality)</li> <li>b) Price (affordability, value for money)</li> <li>c) Place (distribution convenience, marketing venues)</li> <li>d) Promotion (advertising, proper labelling, good and convenient packaging).</li> </ol> </li> </ul>	Plenary/Group discussions Self-assessment tests.
7.2.3. Outline various marketing channels available for different seed types and seed varieties	<ul style="list-style-type: none"> <li>➤ Markets commensurate with farmer situations and objectives identified</li> <li>➤ Ideal markets characterized in relation to small scale farmer circumstances</li> </ul>	Plenary/Group discussions Group exercises Brain storming sessions.

## The Small-Scale Seed Production Training Programme

Element/Outcome	Performance Criteria	Assessment Instruments and Procedures
7.2.4. Facilitate the identification of markets for seeds developed by small scale farmers.	<ul style="list-style-type: none"> <li>➤ Confidence in facilitating joint-learning exercises with other trainees/farmers using facilitation tools such as pair-wise and matrix ranking.</li> <li>➤ Knowledge and skills required for generating interest and participation of seed producers demonstrated in a simulation exercise.</li> <li>➤ Different fora at which farmers can advertise their seeds e.g. at field days, seed fairs and agricultural shows identified and described.</li> </ul>	Simulation exercises
7.2.5. Describe different pricing mechanisms.	<ul style="list-style-type: none"> <li>➤ At least four (4) different pricing mechanisms described.</li> <li>➤ Case study cost records used to determine prices of different seed types/varieties.</li> </ul>	Plenary/Group discussions
7.2.6. Explain the importance of good quality seed for purposes of marketing.	<ul style="list-style-type: none"> <li>➤ The relationship between good quality seed and effective market demand outlined.</li> </ul>	Plenary/Group discussions Demonstrations and follow-up practicals
7.2.7. Facilitate the marketing of different seed types and varieties.	<ul style="list-style-type: none"> <li>➤ Different market niches (locally and regionally) identified.</li> <li>➤ Various marketing strategies that can be used by smallholder farmers in one's area of operation developed.</li> <li>➤ Skills that can be used to facilitate trade between prospective buyers and groups of farmers demonstrated.</li> </ul>	Individual case study assignment Plenary/Group discussions

## Module 7

### The Small-Scale Seed Production Training Programme

#### Sub Module 7.3

##### Assist Farmers in Maintaining and Using Records.

Elements/Outcomes	Performance Criteria	Assessment Instruments and Procedures
7.3.1. Facilitate the establishment of record systems at the farm level on the performance of all seed varieties developed by farmers.	<ul style="list-style-type: none"><li>➤ The need and importance of keeping a database at the farm level outlined. Simple and easy to follow data capture/record sheets that can be used by all farmers developed.</li><li>➤ Data collection and data capturing procedures explained.</li></ul>	Case study project Group exercise
7.3.2. Calculate costs incurred in producing the seed.	<ul style="list-style-type: none"><li>➤ Simple enterprise gross margin procedures and calculations demonstrated based on existing records.</li></ul>	Individual demonstrations
7.3.3. Determine the minimum selling (break-even) prices for seeds developed by farmers.	<ul style="list-style-type: none"><li>➤ Simple procedures and calculations for break-even price determination demonstrated based on existing records.</li></ul>	Individual demonstration

### Sub Module 7.1

#### Facilitate the Establishment of Seed Networks and Exposure Visits (49 minutes)

##### Elements/Outcomes

- 7.1.1 Explain the importance of establishing linkages between community seed systems at local, national and regional levels.
- 7.1.2 Facilitate mechanisms through which farmers can share seed stocks for mutual benefit.
- 7.1.3 Facilitate the establishment of seed knowledge and information networks between farmers and institutions at the local, national and regional levels.
- 7.1.4 Facilitate exposure visits by farmers.
- 7.1.5 Facilitate the use of GIES to enhance disaster preparedness and market opportunities

Activities	Materials Media and Equipment	Time
1. Define the term "linkage mechanisms" in terms of both their institutional and functional meanings.		2 minutes
2. Describe the concept of networks, distinguishing networks from linkage mechanisms by emphasising the informal and voluntary nature of networks.	➤ Flip Chart/Chalk Board	2 minutes
3. Facilitate a plenary discussion session to come up with an inventory of all players to include possible seed sources, seed buyers or seed information sources, noting what each of the players is currently doing in as far as seed production, seed distribution and information dissemination are concerned.	➤ Flip Chart/Chalk Board	5 minutes

## Module 7

### The Small-Scale Seed Production Training Programme

#### Instructor's Manual

Activity	Material Media and Equipment	Time
4. Facilitate a discussion on how trainees can contribute to the seed system at all levels by facilitating information and seed sharing for the benefit of all.	➤ Flip Chart/Chalk Board	5 minutes
5. Explain the importance of establishing linkages and networks between community seed systems at local, national and regional levels and give trainees Handout number 7.1.2 that cites examples of case studies of successful linkages and networks and give trainees 2 minutes to browse through the handout.	➤ Handout number 7.1.2	5 minutes
6. Facilitate an impromptu drama presentation by randomly selected participants who simulate/role play the role of a facilitator, highlighting the knowledge and skills required for an extension agent to facilitate the establishment and strengthening of seed system networks within the context of a district/province and invite comments from other participants before wrapping up.		10 minutes
7. Facilitate a plenary discussion on all aspects that are to be considered when planning an exposure visit for farmers.	➤ Flip Chart/Chalk Board	10 minutes
8. Discuss how GIES is used to enhance disaster preparedness and marketing opportunities.	➤ Flip Chart/Chalk Board	10 minutes



**Module 7.2****Facilitate Seed Marketing By Small Scale Farmers****Elements/Outcomes**

7.2.1 Explain the importance of seed marketing.

7.2.2 Explain the fundamentals of marketing.

7.2.3 Outline various marketing channels available for different seed types and seed varieties.

7.2.4 Facilitate the identification of markets for seeds developed by farmers.

7.2.5 Describe different pricing mechanisms.

7.2.6 Explain the importance of good quality seed for purposes of marketing.

7.2.7 Facilitate the marketing of different seed types and varieties

Activities	Materials Media and Equipment	Time
1. Show transparency 7.2.1 listing situations faced by small scale farmers in terms of: (i) economics of crop production (ii) distances from input markets (iii) types of crops suitable for area and unavailability or availability of seed close by and (iv) possible buyers of seed and size of market; (v) importance of seed marketing as an economic incentive necessary for small scale farmers to produce seed.	➤ Transparency/ Handout 7.2.1	3 minutes
2. Explain the fundamentals of marketing through outlining all the steps that need to be carried out if one is to market seed successfully emphasising the 4 Ps viz product, price, place and promotion within the seed regulation framework. Refer trainees to Handout Number 7.2.2	➤ Flip Chart/Chalk Board Handout 7.2.2	5 minutes

## Module 7

### The Small-Scale Seed Production Training Programme

#### Instructor's Manual

Activities	Materials Media and Equipment	Time
1. Facilitate a plenary discussion exercise in which trainees identify seed types and varieties that are in demand in their areas, noting down the identified geographical areas, and reasons for the demand (e.g. unavailability of seed locally, agro-ecological suitability of growing those crops, preference of crops by communities, profitability of growing that crop).	➤ Flip Chart	10 minutes
2. Display flip chart from activity number 3 and ask trainees to identify existing and suggest potential market channels for the different seed types/varieties and geographical areas, noting down contributions on flip chart and suggesting additional regional and international marketing channels which can be exploited for the benefit of smallholder seed producers	➤ Flip Chart/Chalk Board	5 minutes
3. Refer trainees to handout number 2.2.7 (PRA tools) in Module 2 and then go into a plenary discussion on how matrix ranking and venn diagrams can be used in identifying markets for seeds developed by farmers and ask trainees to identify various fora which can be used by farmers to promote their seeds e.g field days and agricultural shows.	➤ Handout 2.2.7 (PRA Tools) in Module 2	8 minutes
4. Show transparency number 7.2.6 which lists different pricing mechanisms and give a detailed description of each pricing mechanism.	➤ Handout 7.3	3 minutes

## The Small-Scale Seed Production Training Programme

Activities	Materials Media and Equipment	Time
7. Outline the relationship between good quality seed and effective market demand by giving reasons why farmers are prepared to pay competitive prices for seed if good quality is guarantee.	➤ Flip Chart	3 minutes
8. Facilitate plenary/group discussions and presentations on marketing strategies that can be used for different market niches, noting down contribution by all participants and trainees. Outline what roles they would play to make sure that farmer groups and prospective buyers of seed trade to the benefit of both groups.	➤ Flip Chart/Chalk Board	15 minutes
9. Give trainees handout no. 7.2 which outlines all the issues, covered during the training session and give them 5 minutes to browse through it.	➤ Handout 7.2	5 minutes

## Module 7

### The Small-Scale Seed Production Training Programme

#### Instructor's Manual

### Sub Module 7.3

#### Assist Farmers In Maintaining And Using Records (37 minutes)

##### Elements/Outcomes

- 7.3.1 Facilitate the establishment of record systems at the farm level on the performance of all seed varieties developed by farmers.
- 7.3.2 Calculate costs incurred in producing the seed.
- 7.3.3 Determine the minimum selling (break-even) prices for seeds developed by farmers.

Activities	Materials Media and Equipment	Time
1. Conduct a brainstorming exercise on why it is important to have a database/records at the farm level, with a bias towards record keeping for the crop and seed production enterprises	➤ Flip Chart	2 minutes
2. Show and explain the contents of transparency number 7.3.2 which depicts simple and straight forward data record sheets, describing the various data collection methods and procedures	➤ Transparency/ Handout 7.3.2	20 minutes
3. Show trainees and facilitate a joint-learning exercise in which the trainer and trainees use exemplary case study data to calculate costs incurred in producing seeds and in determining the break-even prices for produced seeds.	➤ Case study Cost and Revenue data	10 minutes
4. Give trainees Handout 7.3, as well as the participatory process to be followed in order to get maximum participation from farmers.	➤ Handout 7.3	5 minutes

### Sub Module 7.1

#### Facilitate The Establishment Of Seed Networks And Exposure Visits (49 minutes)

##### Elements/Outcomes

- 7.1.1 Explain the importance of establishing linkages between community seed systems at local, national and regional levels.
- 7.1.2 Facilitate mechanisms through which farmers can share seed stocks for mutual benefit.
- 7.1.3 Facilitate the establishment of seed knowledge and information networks between small scale farmers, farmer groups and institutions at the local, national and regional levels.
- 7.1.4 Facilitate exposure visits by farmers.
- 7.1.5 Facilitate the use of GIES to enhance disaster preparedness and market opportunities.

Activities	Materials Media and Equipment	Time
1. Note the definition of "linkage mechanisms", considering both the institutional and functional meanings based on lecture given by instructor.	➤ Note pads	2 minutes
2. Listen and take note of descriptions on the concept of network, noting the distinction between linkage mechanisms and networks based on the informal and voluntary nature of networks, seeking for clarification where necessary.	➤ Note Pads	2 minutes

## Module 7

### The Small-Scale Seed Production Training Programme

#### Trainee Manual

Activity	Material Media and Equipment	Time
3. Participate in a plenary discussion on the development of an inventory of all players involved in the informal seed system, be they possible seed sources, seed buyers or seed information sources, noting down what each of the players is currently doing in as far as seed production, seed distribution and information dissemination are concerned.	➤ Flipchart/Chalk Board Note Pad	5 minutes
4. Participate in a plenary discussion on how trainees can contribute to the seed system at all levels by facilitating information and seed sharing for the benefit of all.	➤ Flipchart/Chalk Board Note Pad	5 minutes
5. Take note of the importance of establishing linkages and networks between community seed systems at local, national and regional levels and make reference to Handout 7.1.2 that cites examples of case studies of successful linkages and networks.	➤ Note Pads Handout 7.1.2	5 minutes
6. Participate in and critically analyse the presentation of an impromptu drama by randomly selected participants simulating the role of a facilitator, highlighting the knowledge and skills required for an extension agent to facilitate the establishment and/or strengthening of seed networks within the context of a district/ province and make comments, taking note of comments by other trainees.		10 minutes

Activities	Materials Media and Equipment	Time
7. Participate in a plenary discussion on all aspects that are to be considered when planning an exposure visit for farmers.	➤ Flip Chart/Chalk Board Note Pads	10 minutes
8. Participate in discussion on how GIES is used to enhance disaster preparedness and marketing opportunities.	➤ Flipchart/Chalk Board Note Pad	10 minutes

## Module 7

### The Small-Scale Seed Production Training Programme

#### Trainee Manual

## Module 7.2

### Facilitate Seed Marketing By Small Scale Farmers

#### Elements/Outcomes

7.2.1 Explain the importance of seed marketing.

7.2.2 Explain the fundamental of marketing.

7.2.3 Outline various marketing channels available for different seed types and varieties.

7.2.4 Facilitate the identification of markets for seeds developed by farmers.

7.2.5 Describe different pricing mechanisms.

7.2.6 Explain the importance of good quality seed for purposes of marketing.

7.2.7 Facilitate the marketing of different seed types and varieties.

Activity	Material Media and Equipment	Time
1. Note the situations faced by small-scale farmers and the importance of seed marketing and economic incentives necessary for small-scale farmers to produce seed.	➤ Transparency/ Handout 7.2.1	3 minutes
2. Take note of the fundamentals of marketing, paying particular attention to all steps that need to be carried out if one is to market seed successfully, especially the 4 Ps viz: product, price, place and promotion taking note of reference made to Handout 7.2.2.	➤ Note pad Handout 7.2.2	5 minutes
3. Participate in a plenary discussion in which trainees identify seed types and varieties that are in demand in their area noting down the identified geographical areas, and reasons for the demand.	➤ Flipchart	10 minutes



Activities	Materials Media and Equipment	Time
4. Participate in learning exercises by identifying existing and suggesting potential market channels for different seed types/varieties and geographical areas, noting down additional regional and international marketing channels suggested by the instructor.	➤ Note Pads Flip Charts	5 minutes
5. Make reference to Handout 2.2.7 (PRA tools) and participate in a plenary discussion on how matrix ranking and venn diagrams can be used in identifying markets for seeds developed by farmers, identifying various fora which can be used by farmers to promote their seeds and noting down the contributions by all participants.	➤ Handout 2.2.7 (PRA tools) in Module 2	8 minutes
6. View transparency 7.2.2 and take note of different pricing mechanisms, noting the detailed descriptions of each pricing mechanism.	➤ Transparency/ Handout 7.2.2.	3 minutes
7. Take note of the relationship between good quality seed and effective market demand by jotting down the reasons why farmers are prepared to pay competitive prices for seed if good quality is guaranteed, taking note of the different quality standards of seed.	➤ Handout 7.2.2	3 minutes

## Module 7

### The Small-Scale Seed Production Training Programme

#### Trainee Manual

Activity	Material Media Equipment	Time
8. Participate in plenary/group discussions and presentations on marketing strategies that can be used for different market niches, noting down contributions by all participants and outline what roles trainees can play as facilitators to make sure that farmer groups and prospective buyers of seed trade to the benefit of both groups.	➤ Flip Chart/Chalk Board Note Pad	15 minutes
9. Note the issues covered during the training session of sub module 7.2 in handout 7.2.	➤ Handout 7.2	5 minutes

**Sub Module 7.3****Assist Farmers In Maintaining And Using Records****Elements/Outcomes**

7.3.1 Facilitate the establishment of record systems at the farm level on the performance of all seed varieties developed by farmers.

7.3.2 Calculate costs incurred in producing the seed.

7.3.3 Determine the minimum selling (break-even) prices for seeds developed by farmers.

Activity	Materials Media and Equipment	Time
1. Participate in a brainstorming exercise on why it is important to have a database/records at the farm level, giving bias towards record keeping for the crop and seed production enterprises, taking note of all contributions.	➤ Flip Charts Note Pads	2 minutes
2. View and take note of contents of transparency 7.3.2, which depicts simple and straight forward data record sheets, noting the various data collection methods and procedures.	➤ Transparency/ Handout 7.3.2 Note Pads	20 minutes
3. Participate in a joint –learning exercise in which the trainer and trainees use case study data to calculate costs incurred in producing seeds and in determining the break-even prices for produced seeds.	➤ Case study Cost and revenue data	10 minutes
4. Note the participatory process to be followed in Handout 7.3 in order to get maximum participation from farmers.	➤ Handout 7.3.	5 minutes

Module 7

The Small-Scale Seed Production Training Programme

**Intentionally left blank**

### **7.1 FACILITATING SEED AND INFORMATION SHARING AMONG SMALL-SCALE SEED PRODUCTION STAKEHOLDERS**

#### **7.1.1 The Importance of Linkages Between Community Seed Systems at the Local, National and Regional Levels**

The primary objective of on-farm seed production, storage and crop variety genetic purity maintenance by small-scale farmers is to ensure household food security. Despite efforts by small scale farmers to produce their own seed, more often than not, a farmer will have more seed of one crop type than he/she needs, while on the other hand, a farmer might not have adequate supplies of seeds of other crop types. In such cases, it is a common and traditional practice for farmers to swap corresponding amounts of one crop for the other. That way, the community would, to some extent, achieve household seed security.

Seed security can be defined as the ability of all farmers to access sufficient seed quantities of the sought seed of different varieties at the right time on a sustainable basis. It has three aspects: the availability of, access to, and utilization of quality seed. It does not only refer to the quantities and qualities of seed, but also to the timing of the availability of seed.

The best approach to increase seed security is to strengthen the local seed system. With home-grown seed varieties a farmer knows how to plant and manage the crop. They know what inputs to use for different crops and at what levels because they have experimented with the seed crops over a period of time.

However, the continuous use of farmer-produced and locally stored seed has limitations. Most farmers have limited capacity to maintain quality of seed varieties from one season to the next. This may lead to poor crop performance over a period of time. To ensure household food security through on-farm production of seed by small scale farmers, while at the same time maintaining good crop performance, there is need to establish collaboration between the seed producers, extension staff, researchers and other organisations involved in seed activities such as seed information distribution and establishment of networks.

This collaboration could be formal or informal and could be enhanced through activities and fora such as field days, agricultural shows, green shows, seed fairs, look-and-learn tours and demonstration plots which serve as places for exchanging ideas, information and seed among all the collaborators.

## Module 7

### The Small-Scale Seed Production Training Programme

#### Notes

#### 7.1.2 Mechanisms Through Which Farmers Can Share Seed Stocks and Information

##### 1. Seed fair

A seed fair is a forum, festival, ceremony or platform primarily for seed exhibition which can be used for enhancing wider crop and crop variety diversity. This forum can be used to raise awareness on diversity, exchange experiences, local knowledge and seed. The event increases farmers' competence and capacity in the management and conservation of their crop diversity.

During the seed fair each farmer has an individual stand where they display or exhibit all their seed types and related agricultural products. On the basis of the extent of the individual farmer's diversity a competition is held to judge who has a wider and quality diversity. Displays are either placed on tables or on the ground.



7.1.2(a) Seed fair.

Participants can include local farmers, community seed producers, commercial seed companies, food processors, NGOs, local leadership, researchers and local administration. The duration can be between one to two days.

### Common impact of seed fairs

Seed fairs foster interaction between farmers and various other stakeholders, thus allowing them to gain knowledge on the diversity of seed material available and traditional conservation practices from farmers who keep the seed. Learning also takes place among the farmers themselves as they exchange seed of different varieties between them. As a result of these interactions, there is increased varieties/crops at household level leading to increased awareness of importance of diversity and also increased demand for the varieties once farmers have been exposed to the varieties. As farmers participate in the actual organization and running of the fairs, their capacity to organize similar fairs and other events in future will be enhanced. Seed fairs may involve both cash and voucher transactions, which reduces transaction costs for seed provision.

### Factors that favor hosting of seed fairs

For seed fairs to be effective there has to be actual and potential dependency on traditional varieties. Such varieties may have been lost from the area due to weather elements or the introduction of hybrids. That may have led to cash crop or hybrid intensification or cash crop diffusion leading to genetic erosion from the community. Seed fairs are also appropriate where farmers have a feeling of inadequate as well as insufficient crop or variety diversity. Seed fairs also work where there has been a lack of appropriate market for seed exchange.

Another element necessary is the availability of a minimum level of diversity to attract farmers and other stakeholders. In areas where there is poor farmer organisation and involvement of local administration the seed fair forum allows good interaction. The tool is very appropriate for risk prone agricultural conditions.

### Constraints of seed fairs

Constraints that can be faced include limitations such as funding. Transport arrangements can be an issue where larger areas are involved. The lack of institutional structures may lead to poor mobilization and poor participation. The seed fairs need proper timing e.g. not to coincide with cultural events or having them too late into the season. Experiences from previous fairs can determine participation e.g. misuse of fairs, few incentives, bad judging.

### Do's

- Include entertainment aspects related to the fair e.g. diversity songs, plays, drama, poems and local dances can be integrated.
- Clarify the objectives of the fairs with all stakeholders, have a shared vision.

## Module 7

### The Small-Scale Seed Production Training Programme

#### Notes

- Ensure sufficient seed and diversity is exhibited.
- Let the farmers drive the process: strengthen farmers' organisations, allowing farmers to invite themselves and their guests, define own judging criteria with the project giving backstopping support.
- Provide enough time and awareness for farmers to prepare.
- Provide individual and community prizes, selecting prizes that help conservation.
- Select judges strategically.
- Increasingly use locally available resources.
- Seed fairs should be part of a larger programme.

#### Don'ts

- Avoid external influence.
- Avoid same farmers winning all the time.
- Avoid prize-driven fairs.

#### Commutech's experiences with seed fairs and seed networks

Commutech has been running seed fairs in 6 districts in Zimbabwe namely Tsholotsho, Lupane, Makoni, UMP, Murehwa and Chiredzi, targeting 3 wards per district. The main objective of the seed fairs was to make seed and other inputs accessible to small-scale farmers especially the disadvantaged households such as orphans, female headed households and other poor households. Exhibiting participants at the seed fairs included seed houses, agro-dealers and small-scale farmers with seed to exhibit and sell. The farmers got vouchers from Commutech which they used to buy seed of their choice from a range of crops such as maize, sorghum, millets, groundnuts, bambara nuts and vegetables.

The seed fairs are being used as a medium of gene flow whereby farmers access good seed from their counterparts and also as a way through which farmers can easily access seed from seed companies which include Seed Co, Pannar, Pioneer, etc. The seed fairs also provide a platform for farmers to evaluate and give feedback to exhibitors on the performance of their seed under local conditions.

Small-scale seed producers benefit financially from selling their seed. Other seed fairs rewarded farmers who had great diversity of seed. Diversity has been seen to have increased especially in Tsholotsho and to some extent in Chiredzi.

At a local level, these seed fairs acted as seed networks although it was more within districts than across. Commutech acted as the link through collecting varieties of interest from one district and trying them in other areas. At national level, Commutech together with other NGOs (ENDA, ORAP, ITDG, KLC) formed a network called Seeds Action Network through which they could exchange seed and information about the seed, lobby for policy change that would enhance farmers' food production, and also get material from researchers to try out in a participatory way with farmers.

The network however suffered limited support in terms of resources then fizzled out after 3 years.



## 2. Field days

Field days provide a forum where a farmer (judged to be the best) shows his/her crop and describes all the crop production practices carried out to achieve such a performance. Field days can also feature farmers with a bad crop as a training tool for a group of farmers to learn. Participants at a field day can include farmers, representatives from various institutions, NGOs, researchers, extensionists, etc.

Other activities carried out at a field day are entertainment which can be in the form of singing, drama, plays and touring of the field as well as speech giving by different participants.



7.1.2(b) Farmer explaining to participants at a field day

## 3. Demonstration plots

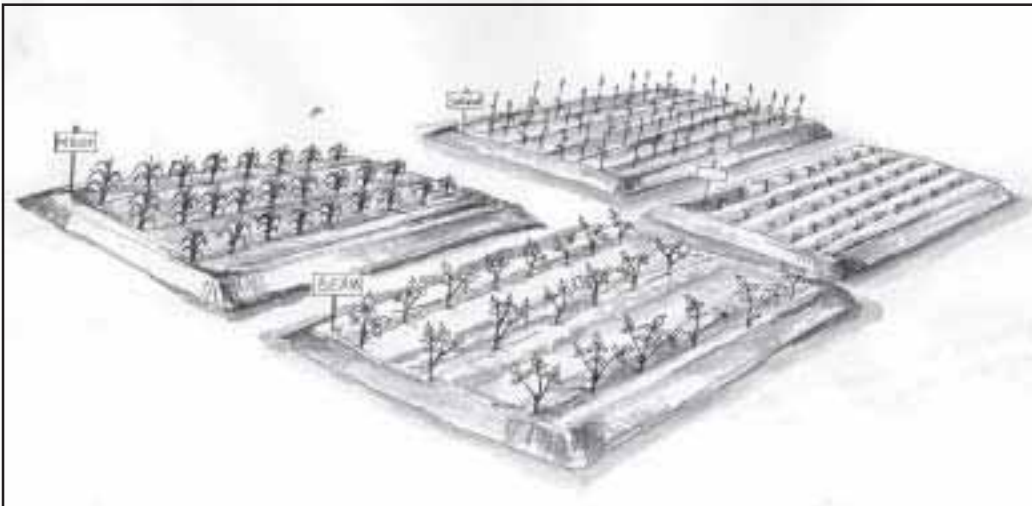
Demonstration plots use portions of farmers' or extension staff's fields set aside for demonstrating various aspects of crop production. Such plots, situated in farmers' fields and managed by the collaborating farmers themselves, are effective in introducing a new variety or demonstrating improved seed quality. The sight of an impressive looking crop can capture the interest of neighbours and others passing by.

## Module 7

### The Small-Scale Seed Production Training Programme

#### Notes

An experimental plot can also be arranged on a farm in the community or on a nearby experimental station to which farmers are invited on one or two occasions.



7.1.2(c) Demonstration plot of various seed crop types

Visits around seed crops at flowering and at harvest periods offer the best opportunity for farmers to appraise the character of the different varieties.

#### 4. Shows

When shows are used, farmers display agricultural products which could be livestock, crops, seed, implements, etc. In such fora, farmers' exhibits are judged and prizes given to those with the best items according to the set criteria.

The set-up at a show is similar to that at a seed fair, only that there is a wide variety of items unlike a seed fair which will be exhibiting seed only. One positive aspect about shows is that they provide for sharing of appropriate technology between farmers and generators of that technology be it agricultural equipment, new crop varieties, new animal breeds, etc. Thus in the long run shows have the impact of improving farmers' agricultural practices through learning from counterparts and other exhibitors at these fora.



7.1.2(d) A stand at an agricultural show

### 5. Seed kits

Seed can be distributed in small packages in kits as a way of diffusing materials. These kits contain one or two samples of seed together with inputs and information on how to use the kit. In most cases these kits are intended to be only part of a larger technology package. Farmers can evaluate the material in their own way and save most of the harvest as seed for the next planting. A follow up study after two to four seasons will show how many farmers are still growing the variety and how much exchange between farmers has taken place. Such follow-ups also serve to elicit information on the performance of the distributed materials and farmers' opinions. The packages may be distributed to key farmers, or offered for reasonable prices at local fairs, on field days or at seed fairs. The amount of seed in the packages should not be too small, as this may result in farmers' losing the crop in the field and not being able to save seed.

## Module 7

### The Small-Scale Seed Production Training Programme

#### Notes

#### 7.1.3 Seed Networks

Farmers' seed needs can be solved through networking with other farmer groups, NGOs, government departments, and other networks at local, national and regional levels. An example of a network at regional level is the SADC Seed Security Network (SSSN). The objectives of this network are;

- To improve and/or establish strategies for addressing national and regional disasters requiring seed interventions,
- To gather information on various aspects of seed and to make the information available to all stakeholders in the region,
- To identify training needs, in particular of community-based seed producers, entrepreneurs, seed personnel and extension staff, and to facilitate training, and
- To lobby for and facilitate harmonization of seed policies, rules and regulations in order to improve seed trade in the region.

The role of extension staff in facilitating exchange of seed and/or information through seed networks.

Extension agents could promote the establishment of seed growers' organizations in local villages that can work with them. Such farmer organizations could facilitate sharing of equipment such as sprayers, ploughs, cultivators, etc and jointly organize contracts and marketing. These farmer organizations could also facilitate exchange of information between farmers and other small-scale seed production stakeholders, with the extension agent playing a facilitatory role.

Extension staff can be mediators between local seed groups and the official seed-quality control agencies, and extension agents can distribute good (local and modern) varieties beyond social and ethnic borders.

Another very important function that the extension service can have is the channeling of information from farmers to researchers, extension agents and other NGOs involved in seed production. Information from the farms to the researchers and formal seed producers and distributors can significantly assist breeders to prioritize their breeding objectives, and advise seed producers and distributors about the attributes of seed that farmers really need.

#### **7.1.4 Exposure visits**

Exposure visits can be organized for farmers to gain knowledge from their counterparts who have successfully produced and/or marketed seed. Exposure visits can be initiated by the extension agent or by the farmers themselves.

It is important that before the visit is undertaken the organizers of the tour review the objectives of the group's project. It is important for the group to list what they expect to see during the tour or visit. This would establish alternatives for the farmers to maximize the benefits from the tour should some activities fail to be implemented.

There is need to communicate with the farmers being visited in time, so that they will be ready for the visit. The same applies to making arrangements for transport, accommodation, food, etc to ensure a smooth flowing and stress free tour that provides an environment conducive to learning.

## Module 7

### The Small-Scale Seed Production Training Programme

#### Notes

## 7.2 Facilitating the Marketing of Seed by Small-Scale Farmers

### 7.2.1 Importance of marketing

Marketing is a series of business activities ending in the transfer of goods and services from a production point to the consumer.

In the case of small-scale seed production, the function of marketing would be to facilitate the transfer of seed (after own requirements have been met) from the point where the seed is being produced to areas where it is needed.

Because small-scale farmers who are involved in seed production may have excess seed beyond their requirements, they need to seek or identify those who are willing to buy the excess. These buyers may be neighbours, NGO's operating in the area, shop-owners, extension agents or private organisations.

The first step if one wants to sell their seed, is to conduct a market study to collect information on the demand for seed and the number of potential consumers within the community. Current and future needs for seed can be predicted based on these data to ensure successful seed marketing. Once seed producers can adequately supply the local community with seed, the same market study can be extended to other areas where there are potential buyers of this product.

### 7.2.2 Fundamentals of marketing

Successful marketing depends on paying attention to the 4Ps viz

- ◆ Product
- ◆ Price
- ◆ Place
- ◆ Promotion

#### 1. Product

The type and quality of seed will affect demand for the seed.

#### Assembling

If small farmers are producing seed as a group, production will be fragmented, with each farmer offering a small amount at a time. It is important for these small amounts to be brought together for ease of transport and selling.

### Grading

Agriculture produce quality varied among and within varieties for colour, form, size and taste. Consumers (of seed) have certain preferences which need to be considered if one is to satisfy his/her market.

### Packing

Consumers require produce in different quantity units to match their purchasing habits, mode of transport, storage capacity and size of land to be cropped. Produce can be supplied and sold in bulk or small units. A graded product as a standard pack is likely to be more appealing to a buyer. Moreover, packaging discourages whoever is handling the seed from tampering with it (e.g. mixing different varieties).

Packaging is essential for storage and handling. Produce is packed to reduce losses due to physical and non-physical damage and deterioration. The cost of packaging should be related to the final produce price.

## 2. Price

In small-scale seed production, because the emphasis is on producing for oneself and also supplying the local community, price setting usually is a secondary issue.

Traditionally, small-scale farmers have always shared seed among themselves in their communities. This has been done through:

- i) bartering
- ii) swapping seed for other varieties
- iii) offering labour in return for seed, and
- iv) giving/receiving seed as a gift

### Pricing mechanisms

Generally, the exchange of goods involves conflicting objectives between the buyer and the seller. The seller aims at receiving a high price for his produce. On the other hand, the buyer wants to pay as low a price as is possible for the given quantity of goods. A compromise is finally reached when the two parties become relatively satisfied.

Several mechanisms are used to get to this price,

- ◆ Government pricing and/or floor pricing
- ◆ Contracts
- ◆ Formula pricing e.g. cost plus.

## Module 7

### The Small-Scale Seed Production Training Programme

#### Notes

For small-scale seed producers, the basic price should be determined based on economic production records (see section 3 of this handout) as well as on the price of competitive alternatives such as certified seed and commercial grain. Based on these indicators, the price should include a profit margin for the producer and still be affordable for the buyers (other farmers).

The seed should be available at a price such that after producing their crops, farmers will be able to sell and get a profit margin. The price should be competitive with other seed prices or else farmers will leave the seed for other varieties that perform more or less the same in terms of yield, time taken to maturity, taste, etc.

#### 3. Place

The point of sale should be accessible to all the farmers who require the seed(s) in question.

Shops and farmer distributors operate on a daily basis and therefore offer the most frequent access to seed, a factor which may be crucial at planting time. Since both types of outlets are located in villages, transport is unlikely to be a constraint for buyers.

Transport is not an issue in cases where seed is being produced for own consumption or for the local community who can easily access it on foot. When it comes to producing for other areas, the movement of seed from the area of production to consumer areas becomes critical in terms of timeliness and accessibility. The condition of the transport determines the efficiency with which seed reaches the targeted market in good shape and time.

#### 4. Promotion

Successful marketing also depends on the promotion of seed during production as well as at marketing. Seed promotion seeks to expand farmer use of seed, and thereby make possible increased production of seed which has an assured market.

Knowledge about the seed and crop production is necessary if seed is to continue to be demanded. So, seed promotional efforts must be intensive and continuous, following the educational extension promotion of educating, demonstrating and convincing farmers. All promotion efforts must be well coordinated, honest and designed to:

- ◆ Make farmers aware of the existence of improved seed.
- ◆ Arouse farmer interest in what the improved seed is and why it should be used.



- ◆ Demonstrate to farmers what the seed can do under farming conditions like theirs, which they can relate to.
- ◆ Motivate farmers to use the seed for their own crops
- ◆ Educate farmers on how to get the seed, plant it and improve their care of the crop it produces.

Most farmers can be convinced to accept and use the seed if they:

- ◆ Consistently and effectively learn of its usefulness from sources they trust.
- ◆ See that it can improve income under their own conditions.
- ◆ Are constantly kept aware of its value to them.
- ◆ The seed is always high quality and performs as promised.

Promotion must be;

- ◆ Comprehensive enough to reach all farmers in the target area.
- ◆ Intensive enough to have a positive impact on their choice of seed.
- ◆ Constant and consistent enough to keep them motivated to use improved seed every planting season every year.

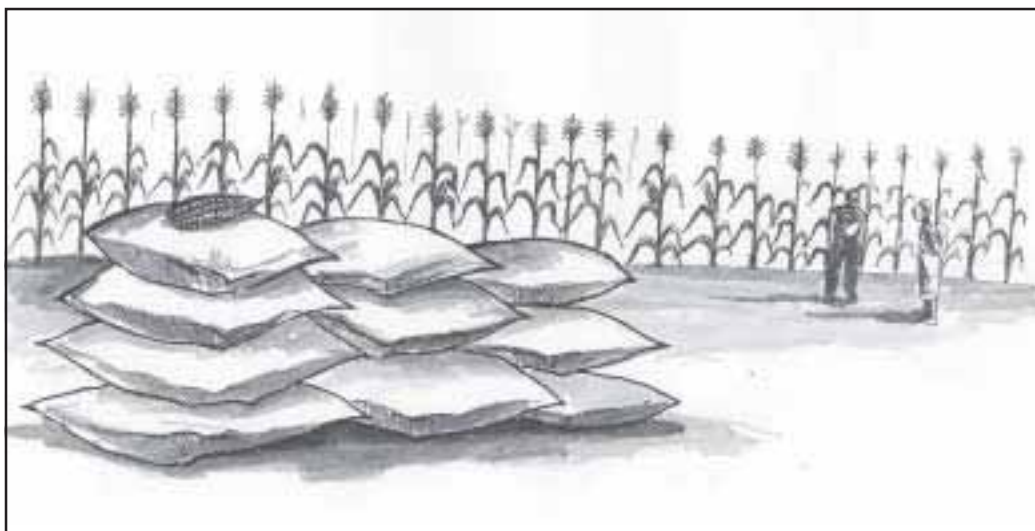


7.2.2(a) Farmers gathered at a field day where they are being shown a crop variety that is suitable for their area

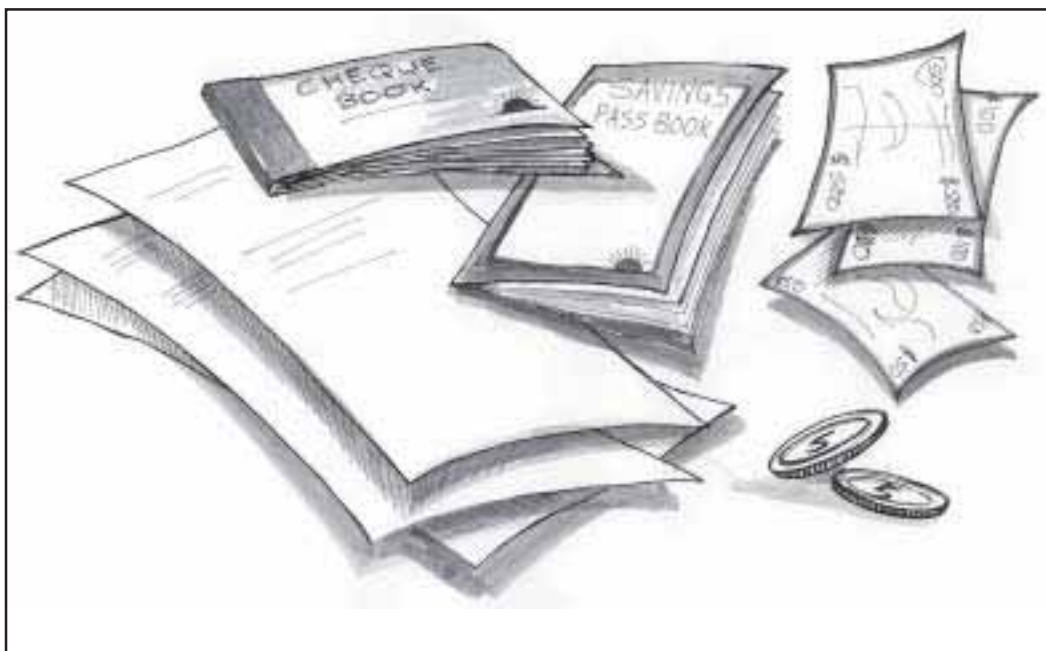
## Module 7

### The Small-Scale Seed Production Training Programme

#### Notes



7.2.2(b,) Through promotion, farmers become aware of high yielding varieties.....



7.2.2(b,) .....high yielding crop varieties that improve farmer incomes.

### **7.2.3 Role of the extension officer in facilitating marketing of seed by small scale farmers:**

Extension agents might play the role of facilitating and/or organising all seed production, promotion and marketing activities to ensure successful crop production by farmers as well as maintaining collaboration among all seed production and distribution stakeholders.

In as far as marketing of seed is concerned, the extension agent together with farmers can analyze problems associated with marketing of seed and come up with proposed solutions as well as agree on activities (e.g. market study) that will lead to successful marketing of seed.

Implications of all the suggested solutions and activities can be discussed in the same workshop. The group can assign each other tasks to carry out so that they can come up with a group marketing strategy that can be tried out. The strategy can be altered as they gain experience.

In as far as promotion is concerned, all concerned parties including extension agents, researchers, NGO's, seed houses, farmers, etc should work together in a carefully planned, coordinated and implemented promotion.

The extension agent can make use of demonstration farms and plots, variety and crop trials, tours and visits to seed operations, field days, training programs, farmer extension meetings, other meetings, etc in his/her promotion activities. These will help build farmer confidence in the seed(s) being promoted, shows what the seed can do under their own crop conditions and create the desire to use the seed(s). It also directly convinces many farmers to buy and use the seed(s).

## Module 7

### The Small-Scale Seed Production Training Programme

#### Notes

### 7.3 Record Keeping for Seed Production Activities

Record keeping defined

- ◆ Record keeping is a process by which data is systematically collected, assembled, kept and retrieved for the purposes of reporting, diagnosis and planning.

#### 7.3.1 The Importance of Keeping Records at Household Level

Records are a very important management tool for farmers. They enable one to:

- a) Assess the physical and financial performance of an enterprise or the whole farm business.
- b) Assess how the farm is progressing over a given period of time. This enables one to take corrective measures before things get out of hand.
- c) To establish a basis for planning changes in the farm business. With properly kept records, informed decisions can be made confidently.
- d) Records are also important sources of budgeting information. While national data can be used for budgeting purposes, farm generated data offers the best estimate of what takes place at the farm.
- e) Records facilitate the monitoring and control of the performance of the farm business. Here performance can be tested against past plans and against set standards.
- f) Records also facilitate business dealings e.g. borrowing, purchasing, sales and marketing of agricultural products.
- g) Intra-farm comparisons e.g. yield levels from different blocks of land and inter-farm comparisons e.g. yield levels from different farms can be done.

#### 7.3.2 Why Small Scale Farmers Do Not Keep Records

While records are very important management tools, most small-scale farmers do not keep them mainly because they lack an appreciation and understanding of why they should keep the records. There are a number of reasons why farmers do not keep records.

- i) Record keeping is considered to be time consuming especially if one does not have an appreciation and understanding of why they are keeping the records. This is further compounded by use of record keeping formats that are complicated.
- ii) Some farmers do not keep records because of illiteracy.

- iii) In some cases, losses incurred in crop production discourage small-scale farmers from keeping records.
- iv) Lack of knowledge on how to keep records is also one reason why small-scale farmers do not keep records.
- v) Lack of interest in keeping records is another reason cited by some small-scale farmers for not keeping records.
- vi) Not being there to capture an activity when it occurs is also one of the reasons why some records are not captured.
- vii) Some farmers postpone writing and end up forgetting the information before recording.
- viii) Sales records are evidence to the wife/husband who will ask for the money received. In such cases, records are deliberately not kept so as to conceal cash received from crop sales. This applies mainly to vegetable and green mealies sales.
- ix) Immediate expenditure of money received from sales before one has recorded is one of the reasons why money from some sales is not recorded.

### **7.3.3 Information which should be recorded**

For the purposes of seed production by small-scale farmers, some minimum crop production records are necessary for management purposes.

This information helps in the calculation of gross margins and also in planning activities such as marketing, when to plant, what seed variety to grow, when to weed, which crop to grow in terms of profitability, stable yield, ease of management.

Table 7.3 is an example of a recording sheet that small-scale farmers can use for seed production activities.

## Module 7

### The Small-Scale Seed Production Training Programme

#### Notes

Table 7.3 Seed Production recording sheet

It is important that farmers keep records of what actually took place, not what should have occurred.

ITEM	CROP DETAILS			
	Maize	Sorghum	Millet	Cotton
Crop				
Variety				
Month of Planting				
Area planted (ha)				
Land preparation cost (\$)				
Amount of seed used (kg)				
Cost of seed (\$)				
Type of basal fertilizer				
Amount of basal fertilizer used (kg)				
Cost of basal fertilizer (\$)				
Type of top dressing (TD) fertilizer				
Amount of TD used (kg)				
Cost of TD (\$)				
Type of chemical 1				
Amount of chemical				
Cost of chemical 1 (\$)				
Type of chemical 2				
Amount of chemical 2				
Cost of chemical 2 (\$)				
Produce consumed (kg)				
Produce retained (kg)				
Produce sold (kg)				
Market 1				
Market 2				
Market 3				
Price/unit of produce (\$)				
Total produce (kg)				
Hired labour cost (\$)				
Total transport cost (\$)				

## An example of how to utilize farmer records

### Simple Enterprise Gross Margin Calculations

The Gross Margin of an enterprise is its gross income less the variable costs. The gross margin is a decision-making tool and a necessity in planning.

---

$$\text{Gross Margin} = \text{Gross Income} - \text{Variable costs.}$$

---

Gross Income is the total value of production from an enterprise. It includes sales and value of produce consumed at home and retentions for other uses like live-stock feed.

- 1) For retained output:      Gross Income = output x farm gate price (\$) where the farm gate price = market blend price less transport costs to market.
- 2) For marketed output:      Gross Income = Market blend price (\$)/unit x Marketed output.

$$\text{Total Gross Income} = (1) + (2)$$

Variable costs are:

- ◆ Costs of production that can be directly allocated to a particular enterprise in a production season. These costs that change with the size of the enterprise and the scale of production. They are costs that can be avoided if one decides not to produce a crop.

## Module 7

### The Small-Scale Seed Production Training Programme

#### Notes

An example of how a gross margin can be calculated from records kept by small-scale farmers is shown below:

Crop: Green Mealies

Area under crop:	0.125ha
Cost of land preparation:	\$1000.00
Date of planting:	1 August 2001
Labour cost at planting:	\$800.00
Type of basal fertilizer	Compound D
Quantity applied:	40kg
Cost of 40kg of Compound D:	\$1360.00
Variety of seed used:	SC627
Quantity of seed:	5kg
Cost of 5kg of seed:	\$442.50
Labour cost for 1 <sup>st</sup> weeding:	\$800.00
Type of Top Dressing fertilizer:	AN
Quantity of AN used:	10kg
Cost of AN:	\$300.00
Date of 1 <sup>st</sup> application of AN:	29 August 2001
Date of 2 <sup>nd</sup> application of AN:	28 September 2001
Quantity of 2 <sup>nd</sup> application of AN:	10kg
Cost of 2 <sup>nd</sup> 10kg AN:	\$300.00
Labour cost for 2 <sup>nd</sup> weeding:	\$600.00
Type of chemical used for stalkborer control:	Combat Stalkborer
Quantity of Combat Stalkborer:	500grams
Cost of Combat Stalkborer (500g):	\$52.00
Date of application:	21 August 2001
Estimate of number of cobs from 0.125ha:	6880



Date of 1 <sup>st</sup> sale:	1 November 2001
Price/cob:	\$15.00
Quantity sold on November 2001:	10 dozens
Amount of money received:	\$1800.00
Total number of cobs sold:	6000
Total amount of money realized (Gross Income):	\$90 000.00
Home consumption, give away, etc:	880
Price at end of selling season:	\$10.00
Value of produce consumed, given away:	\$8800
Transport cost for inputs:	\$40 + \$20 + \$60
Push cart hire:	\$60.00
Money spent on lunch:	\$185.00
Transport (bus fares):	\$50x2 = \$100
Total Variable costs:	\$6059.50
Gross margin = Gross Income – Total Variable costs	
= \$90 000 - \$6059.50	
= \$83 940.50	

## Module 7

### The Small-Scale Seed Production Training Programme

#### Notes

#### 7.3.4 Break-even price determination

This is the determination of the critical point (expressed in physical or financial terms) at which a certain action in the enterprise will cover the total costs. A farmer can for example, ask himself what size of production (in hectares or production per unit) is required to cover his total costs. Enterprise budgets may be used to perform a break-even analysis for either prices or yields

##### 1) Calculating break-even price

This is the price to cover all costs

$$\text{Break-even price} = \frac{\text{Variable costs}}{\text{Expected yield}}$$

e.g. Total variable costs for sugar beans production = \$168 745.60  
Expected yield = 3.2t/ha

$$\begin{aligned} \text{Therefore break-even price} &= \frac{168\,745.60}{3.2} \\ &= \$52733/\text{ton} \\ &= \$52.73/\text{kg}. \end{aligned}$$

##### 2) Calculating break-even yield

$$\text{Break-even yield} = \frac{\text{Variable costs}}{\text{Output price}}$$

This is the yield necessary to just cover all costs at a given output price e.g.

$$\begin{aligned} \text{Total Variable costs for maize} &= \$16828.05 \\ \text{Price per tonne} &= \$5500 \\ \text{Therefore break-even yield for maize} &= \frac{16828.05}{5500} \\ &= 3.05\text{t/ha} \end{aligned}$$

### Data collection and data capturing procedures

Reasons have been stated earlier on in this handout why small-scale farmers do not keep records. One of the reasons why farmers do not keep records was stated as lack of an appreciation or understanding of why they need to keep records. This needs to be addressed if small-scale seed producers are to keep records that will assist them in managing this enterprise. A suggested approach to solving this problem would be to take farmers through a participatory record keeping session that will enhance their understanding of this subject and lead to them keeping records without a push from outside.

It is suggested that the facilitator takes farmers through all activities engaged in during production of a certain crop. The farmers participate in identifying activities they think need to be recorded, giving reasons why, and also explaining how that type of record would be used for future decision making and or planning. This process will enhance farmers' understanding of why it is important to keep records, unlike just presenting them with an already prepared record sheet and asking them to use it. Use of a recording sheet after farmers have been taken through a participatory process of identifying records themselves would make a difference.

**Intentionally left blank**

### 7.2.1 Background Setting of the Small Scale Farming Sector

#### 1. Economics of crop production

- revenue from crop sales to cover costs of producing crop
- need for farmers to be aware of this basic concept

#### 2. Distances from input markets

- most small scale farmers located far from marketing centres
- transport problems to and from market
- transport costs

#### 3. Types of crops suitable for area, seed availability and accessibility

#### 4. Possible buyers of seed and size of market

- local community
- other buyers away from area
- costs of transport and bearing on price
- packaging and other costs

#### 5. Importance of seed marketing as an economic incentive necessary for small scale farmers to produce seed

- marketing to get revenue

## 7.2.2 Pricing mechanisms

- ❖ Auctions
- ❖ Bids and Offers
- ❖ Wholesale markets
- ❖ Government price setting
- ❖ Floor pricing (government)
- ❖ Marketing contracts
- ❖ Formula pricing

Most important for small scale seed producers. Basic price should be determined based on economic production records as well as on the price of competitive alternatives such as certified seed and commercial grain. Based on these indicators, the price should include a profit margin for the producing farmer and still be affordable for the buying farmer.

**7.3.2 Seed Production recording sheet**

ITEM	CROP DETAILS			
	Maize	Sorghum	Millet	Cotton
Crop				
Variety				
Month of Planting				
Area planted (ha)				
Land preparation cost (\$)				
Amount of seed used (kg)				
Cost of seed (\$)				
Type of basal fertilizer				
Amount of basal fertilizer used (kg)				
Cost of basal fertilizer (\$)				
Type of top dressing (TD) fertilizer				
Amount of TD used (kg)				
Cost of TD (\$)				
Type of chemical 1				
Amount of chemical				
Cost of chemical 1 (\$)				
Type of chemical 2				
Amount of chemical 2				
Cost of chemical 2 (\$)				
Produce consumed (kg)				
Produce retained (kg)				
Produce sold (kg)				
Market 1				
Market 2				
Market 3				
Price/unit of produce (\$)				
Total produce (kg)				
Hired labour cost (\$)				
Total transport cost (\$)				

**Intentionally left blank**



# Module 7

## Self Assessment Test

- 7.1 Which of the following activities can enhance collaboration between small-scale seed production stakeholders
- A. Bull dozer competitions
  - B. Seed fairs
  - C. Look and learn tours to seed producing areas
  - D. Seed production field days
- 7.2 Which are the 4 Ps that one needs to pay attention to in order to market seed successfully
- A.....
  - B.....
  - C.....
  - D.....
- 7.3 What is the primary reason for farmers to keep records?
- A. To show to extension agents when they visit them
  - B. To use them in deciding on the most profitable enterprises and in making other crop production decisions
  - C. To supply data to researchers
  - D. To show their literacy levels

## Module 7

### The Small-Scale Seed Production Training Programme

#### Self Assessment Test

#### **Answer Key to Self Assessment Test**

7.1. B, C and E.

7.2. Product, Price, Place and Promotion.

7.3. B

# Module 8 - Contents

Module 8	
Facilitate trainers to produce a programme plan for seed production by small-scale farmers	
Sub-Modules .....	8- 1
Sub Module 8.1	
Determine the Seed Production Activities to be Carried out by Small-Scale Farmers in Your Area. ....	8- 2
Sub Module 8.2	
Facilitate Development of Work Plans by Stakeholders/Collaborators. ....	8- 4
Sub Module 8.3	
Develop a Logical Framework that Summarises the Whole Project. ....	8- 5
Instructor 's Manual .....	8- 7
Sub Module 8.1	
Determine the Seed Production Activities to be Carried out by Small-Scale Farmers in their Areas (1hr 23 minutes) .....	8- 7
Sub Module 8.2	
Facilitate Development of Work Plans for Stakeholders/ Collaborators (3 hours 5 minutes) .....	8- 9
Sub Module 8.3	
Develop a Logical Framework that Summarises the Whole Seed Project (2 hours 20 minutes) .....	8-11
Trainee Manual .....	8-13
Sub Module 8.1	
Determine the Seed Production Activities to be Carried out by Small-Scale Farmers in your area (1 hour 23 minutes) .....	8-13
Sub Module 8.2	
Facilitate Development of Work Plans by Stakeholders/ Collaborators (3hrs 5 minutes) .....	8-15
Elements/Outcomes .....	8-15
Sub Module 8.3	
Develop a Logical Framework that Summarises the Whole Seed Project (2 hours 20 minutes) .....	8-17

## Contents - Module 8

### The Small-Scale Seed Production Training Programme

Notes .....	8-19
8.1 Activity schedule for Seed Production by small-scale Farmers .....	8-19
8.2.1 Workplan for Seed Production by Small-Scale farmers. ....	8-20
8.2.2 Introduction to the Spreadsheet on Small Scale Seed Production .....	8-22
8.3.1 The Logical Framework .....	8-25
8.3.2 Example of a Summary Logical Framework .....	8-26
Transparency .....	8-31
8.1.2 Activity schedule for Seed Production by Small-scale Farmers .....	8-31
8.2.1 Workplan for Seed Production by Small-Scale farmers .....	8-32
8.3.1 The Logical Framework .....	8-34
8.4.1 Time and Mileage Schedule .....	8-35
Self Assessment Test .....	8-37
Answer Key to Self Assessment Test .....	8-38
Attachment .....	8-39
Five-Day Train the Trainer (TtT) Program. ....	8-39
Key Assumptions .....	8-39
Approach to the Workshop Presentation .....	8-40
Facilitation of the Training – Responsibility Centres .....	8-40
Workshop Work Plan .....	8-41
Day 1 .....	8-41
Day 2 .....	8-48
Day 3 .....	8-55
Day 4 and 5 .....	8-58
Important Charts That Require To Be Drawn .....	8-60
Workshop Self Assessment Tests .....	8-62

## FACILITATE TRAINERS TO PRODUCE A PROGRAMME PLAN FOR SEED PRODUCTION BY SMALL-SCALE FARMERS.

### Purpose

The main purpose of this course is to train extension agents from the public, private and non-governmental organisations involved in community-based seed production activities. This module is specifically meant to give trainees a full understanding of the whole small-scale seed provision system and to give them an opportunity to demonstrate their understanding by;

- (a) Applying lessons learnt through participating in planning for implementation of a seed provision programme.
- (b) Summarizing the whole project in a logical framework.

### Sub-Modules

- 8.1 Determine the seed production activities to be carried out by small-scale farmers in your area.
- 8.2 Facilitate development of work plans by stakeholders/collaborators.
- 8.3 Develop a Logical Framework that summarises the whole seed project.

## Module 8

### The Small-Scale Seed Production Training Programme

#### Sub Module 8.1

#### Determine the Seed Production Activities to be Carried out by Small-Scale Farmers in Your Area.

Element/Outcome	Performance Criteria	Assessment Instruments and Procedures
8.1.1. Identify crops for which seed will be produced in your area.	<ul style="list-style-type: none"> <li>➤ Crops for which seed will be produced listed in terms of;               <ul style="list-style-type: none"> <li>(a) Suitability of agro-ecological zone for production of the crop.</li> <li>(b) Time taken to maturity.</li> <li>(c) Availability of seed.</li> <li>(d) Affordability of seed.</li> <li>(e) Ability of extension officers and/or farmers to produce crop.</li> </ul> </li> </ul>	Plenary/Group discussion
8.1.2. List activities to be carried out during seed production for all the selected crops.	<ul style="list-style-type: none"> <li>➤ All activities to be carried out during seed production for all the selected crops listed and explained.</li> </ul>	Plenary/Group discussion
8.1.3. Determine, for each crop, the period of production depending on whether crops will be produced off-season in seed gardens or during the rainy season.	<ul style="list-style-type: none"> <li>➤ Period of production of each crop outlined depending on whether crops will be produced off-season in seed gardens or during the rainy season.</li> <li>➤ Timing of activities shown on a work plan/activity schedule.</li> </ul>	Plenary/Group discussion
8.1.4. Determine, for each crop, area to be cropped, quantities of seed and other inputs required, expected yield, and expected output.	<ul style="list-style-type: none"> <li>➤ Area to be put under each crop discussed and agreed upon.</li> <li>➤ Quantities of seed and other inputs required, expected yield, and expected output all calculated basing on area put under each crop.</li> </ul>	Plenary/Group discussion

## The Small-Scale Seed Production Training Programme

Element/Outcome	Performance Criteria	
8.1.5. Develop activity schedule guideline for seed production by small-scale farmers.	<ul style="list-style-type: none"> <li>➤ Activity schedules for seed production by small-scale farmers produced for all crops to be grown based on activity 8.1.2.</li> </ul>	Plenary/Group discussion
8.1.6 Facilitate farmer group formation for seed production	<ul style="list-style-type: none"> <li>➤ Ability to form farmer groups for seed production learnt in Module 2 demonstrated.</li> <li>➤ Seed production groups formed depending on crop of interest, gender vicinity to group plot.</li> </ul>	Plenary/Group discussion

## Module 8

### The Small-Scale Seed Production Training Programme

#### Sub Module 8.2

#### Facilitate Development of Work Plans by Stakeholders Collaborators.

Element/Outcome	Performance Criteria	Assessment Instruments and Procedures
8.2.1. Convene/organise a planning workshop for all stakeholders in small-scale seed production in your working area.	➤ Skills to organise a planning workshop demonstrated.	Plenary/Group discussion
8.2.2. Facilitate production of time and mileage schedule for small-scale seed production activities by officers from organisations involved in seed project.	➤ Synchronised time and mileage schedules for small-scale seed production activities for all officers concerned.	Plenary/Group discussion
8.2.3. Develop work plan for the seed production project covering one agricultural season.		Plenary/Group discussion
8.2.4. Develop a budget estimate for all seed production activities.	➤ Budget estimate for all seed production activities for the whole duration of the project outlined.	Plenary/Group discussion



**Sub Module 8.3****Develop a Logical Framework that Summarises the Whole Project.**

Element/Outcome	Performance Criteria	Assessment Instruments and Procedures
8.3.1. Facilitate production of a Logical Framework that summarises the whole project.	➤ A Logical Framework that outlines all the different levels of project objectives (i.e. activities, outputs, purpose, and goal) developed.	Plenary/Group project

Module 8

The Small-Scale Seed Production Training Programme

**Intentionally left blank**

# Module 8

## Instructor's Manual

### Sub Module 8.1

#### Determine the Seed Production Activities to be Carried out by Small-Scale Farmers in their Areas (1hr 23 minutes).

##### Elements/Outcomes

- 8.1.1 Identify crops for which seed will be produced in your working area.
- 8.1.2 List activities to be carried out during seed production for all the selected crops.
- 8.1.3 Determine, for each crop, the period of production depending on whether crops will be produced off-season in seed gardens or during the rainy season.
- 8.1.4 Determine, for each crop, area to be cropped, quantities of seed and other inputs required, expected yield, expected output.
- 8.1.5 Develop activity schedule guidelines for seed production by small-scale farmers.
- 8.1.6 Facilitate farmer group formation for seed production.

Activities	Materials Media and Equipment	Time
1. Facilitate a plenary session in which trainees list crops for which they want to produce seed, noting down contributions on a flip chart/chalkboard.	➤ Flipchart/ chalkboard.	3 minutes
2. Facilitate a plenary discussion in which, for each selected crop, trainees list activities to be carried out during seed production including the period of production, noting down contributions on a flip chart/chalkboard.	➤ Flipchart/ chalkboard.	20 minutes
3. Facilitate a discussion in which, for planning purposes, trainees and the instructor determine area to be cropped (for each crop), quantities of seed and other inputs required, expected yield and expected output.	➤ Flipchart/ chalkboard.	15 minutes

## Module 8

### The Small-Scale Seed Production Training Programme

#### Instructor's Manual

Activity	Material Media and Equipment	Time
4. Conduct a question and answer session in which issues that need clarification can be discussed.		10 minutes
5. Show transparency 8.1.2 which has an example of an Activity Schedule and describe how activities are scheduled.	➤ Transparency no. 8.1.2 showing an example of an Activity Schedule.	5 minutes
6. Use output from activity 2 under Sub Module 8.1. to facilitate production of a cropping calendar (in plenary session) which shows all the seed production activities to be conducted by small-scale farmers and their timing. Refer participants to notes 8.1.	➤ Flipchart/ chalkboard Notes 8.1.	10 minutes
7. Refer trainees to the group formation session covered in Sub Module 2.1. (activities 8 and 9) of the instructor's manual and ask trainees to give a step-by-step procedure they would follow in forming farmer groups for seed production.	➤ Handout for Module 2.	10 minutes
8. Conduct a question and answer session in which issues which need clarification can be discussed.		10 minutes

**Sub Module 8.2****Facilitate Development of Work Plans for Stakeholders/  
Collaborators (3 hours 5 minutes)****Elements/Outcomes**

- 8.2.1. Convene/organise a planning workshop for all stakeholders in small-scale seed production in your working area.
- 8.2.2 Facilitate production of time and mileage schedule for small-scale seed production activities by officers from organisations involved in the project.
- 8.2.3 Develop work plan for the seed production project covering one agricultural season.
- 8.2.4 Develop a budget estimate for all seed production activities.

Activities	Material Media and Equipment	Time
1. Facilitate a plenary discussion in which trainees outline how they would organise a planning workshop for small-scale farmers, NGOs, other stakeholders in seed production, noting down all the steps to be followed in sequential order.	➤ Flipchart/ chalkboard.	10 minutes
2. Use the output from activity one above to facilitate a session in which trainees simulate how different activities for each crop would be allocated to the different farmer groups, NGOs, extension and research organisations as well as other stakeholders involved in the project.	➤ Flipchart/ chalkboard.	20 minutes
3. Show transparency 8.2.1 with an example of a work plan on seed production and explain it to trainees and refer trainee to Notes 8.2.1.	➤ Transparency 8.2.1 with an example of a work plan. Notes 8.2.1	10 minutes

## Module 8

### The Small-Scale Seed Production Training Programme

#### Instructor's Manual

Activity	Materials Media and Equipment	Time
4. Divide trainees into groups for discussions on how they would facilitate production of work plans by all the stakeholders to be involved in small-scale seed production.	➤ Flipchart/ chalkboard	30 minutes
5. Facilitate a plenary presentation by all groups of the work plans they developed and a discussion and/or clarification on the groups' outputs.	➤ Flipchart/ chalkboard	30 minutes
6. Facilitate a plenary session in which the instructor and trainees simulate production of a combined work plan from the different work plans produced during group work.	➤ Flipchart/ chalkboard	15 minutes
7. Use outputs from activities 2 and 3 above to develop a time and mileage schedule for one officer or organisation. Refer trainee to notes 8.2.3.	➤ Flipchart/ chalkboard Notes 8.2.3	10 minutes
8. Use the example in activity 7 to facilitate production of a budget estimate for all the seed production activities to be carried out by the one officer/organisation. Refer trainee to notes 8.2.2.	➤ Flipchart/ chalkboard Notes 8.2.2	15 minutes
9. Still in plenary, facilitate production of time and mileage schedules for all the officers from stakeholder organisations involved in the production of seed.	➤ Flipchart and transparency with outputs from activities 2 and 3 of sub module 8.2.	30 minutes
10. Facilitate development of a budget estimate for all seed production activities by all stakeholders and calculate the total budget for the whole project.	➤ Flipchart/ chalkboard	15 minutes

**Sub Module 8.3****Develop a Logical Framework that Summarises the Whole Seed Project (4 hours 20 minutes)****Elements/Outcomes**

8.3.1 Facilitate production of a Logical Framework that summarises the whole seed project.

Activities	Materials Media and Equipment	Time
1. Explain the whole project phases and activities to trainees, emphasising the gradual take-over by small-scale farmers during the course of 4 years.		10 minutes
2. Introduce the Logical Framework concept and use it to explain the long-term objectives, immediate objectives, outputs and inputs of the small-scale seed production project.	➤ Transparency no. 8.3.1. showing the structure of a Logical Framework.	10 minutes
3. Facilitate a plenary session in which the instructor and trainees develop a Logical Framework that summarises the small-scale seed production project, making reference to examples in Notes 8.3.1 and 8.3.2.	➤ Flipchart/ chalkboard Notes 8.3.1 and 8.3.2	2 hours
4. Facilitate the introduction of the Five-Day Training the Trainer Program. Refer Trainees to attachment at the end of module.	➤ Attached program	2 hours

Module 8

The Small-Scale Seed Production Training Programme

**Intentionally left blank**



### Sub Module 8.1

#### Determine the Seed Production Activities to be Carried out by Small-Scale Farmers in your area (1 hour 23 minutes).

##### Elements/Outcomes

- 8.1.1 Identify crops for which seed will be produced in your working area.
- 8.1.2 List activities to be carried out during seed production for all the selected crops.
- 8.1.3 Determine, for each crop, the period of production depending on whether crops will be produced off-season in seed gardens or during the rainy season.
- 8.1.4 Determine, for each crop, area to be cropped, quantities of seed and other inputs required, expected yield, expected output.
- 8.1.5 Develop activity schedule guidelines for seed production by small-scale farmers.
- 8.1.6 Facilitate farmer group formation for seed production.

Activities	Materials Media and Equipment	Time
1. Participate in listing crops for which farmers may be interested to produce seed, noting all points in notebook.	➤ Notebook, flipchart/ chalkboard.	3 minutes
2. Participate in a plenary discussion in which for the selected crops, you list activities to be carried out during seed production and the period of production noting all points in notebook.		20 minutes
3. Participate in another discussion in which, for planning purposes, trainees and the instructor determine area to be cropped (for each crop), quantities of seed and other inputs required, expected yield and expected output.	➤ Notebook. Flipchart/ chalkboard	15 minutes

## Module 8

### The Small-Scale Seed Production Training Programme

#### Trainee Manual

Activity	Material Media and Equipment	Time
4. Participate in question and answer session, seeking clarification on issues you may not have understood with respect to elements 8.1.1, 8.1.2, 8.1.3 and 8.1.4.		10 minutes
5. View transparency no. 8.1.2 and follow the example of an Activity Schedule being explained by the instructor.	➤ Transparency 8.1.2 showing an example of an Activity Schedule.	5 minutes
6. Making use of output from activity 2 under Sub Module 8.1, participate in the production of a cropping calendar which shows all the seed production activities to be conducted by small-scale farmers as well as their timing. See Notes 8.1	➤ Notebook, flipchart/ chalkboard. Notes 8.1	10 minutes
7. Take note of the reference made to the group formation session covered in Sub Module 2.1 (activities 8 and 9) of the instructor's manual and give a step-by step procedure that you would follow in forming farmer groups for seed production.		10 minutes
8. Participate in question and answer session, seeking clarification on issues you may not have understood with respect to elements 8.2.1 and 8.2.2		10 minutes

**Sub Module 8.2****Facilitate Development of Work Plans by Stakeholders/  
Collaborators (3hrs 5 minutes)****Elements/Outcomes**

- 8.2.1 Convene/organise a planning workshop for all stakeholders in small-scale seed production in your working area.
- 8.2.2 Facilitate production of time and mileage schedule for small-scale seed production activities by officers from organisations involved in the project.
- 8.2.3 Develop work plan for the seed production project covering one agricultural season.
- 8.2.4 Develop a budget estimate for all seed production activities.

Activities	Materials Media and Equipment	Time
1. Participate in an activity in which you would organise a planning workshop for small-scale farmers, NGOs, other stakeholders in seed production, noting down all the steps to be followed in sequential order in notebook.	➤ Notebook, flipchart/ chalkboard.	10 minutes
2. Using the output from activity 1 above, participate in a plenary session in which you simulate how different activities for each crop would be allocated to the different farmer groups, NGOs, extension and research organisations as well as other stakeholders involved in the project.	➤ Notebook, flipchart/ chalkboard.	20 minutes
3. View transparency 8.2.1 with an example of a work plan on seed production and take note of the explanation given. See Notes 8.2.1.	➤ Transparency 8.2.1. with an example of a work plan. Notes 8.2.1	10 minutes
4. Join a group for discussions on how you would facilitate production of work plans by all the stakeholders to be involved in small-scale seed production.	➤ Notebook, flipchart/ chalkboard.	30 minutes

## Module 8

### The Small-Scale Seed Production Training Programme

#### Trainee Manual

Activity	Material Media and Equipment	Time
5. Participate in presentations by groups as well as discussions on group presentations, seeking clarification on the groups' outputs	➤ Notebook, flipchart/ chalkboard.	30 minutes
6. Participate in a plenary session in which together with the instructor and other trainees you simulate production of a combined work plan from the different work plans produced during group work.	➤ Notebook, flipchart/ chalkboard.	15 minutes
7. Using outputs from activities 2 and 3 above, participate in the development of a time and mileage schedule for one officer or organisation. See Notes 8.2.3.	➤ Notebook, flipchart/ chalkboard. Notes 8.2.3.	10 minute
8. Participate in the production of a budget estimate for all the seed production activities to be carried out by the one officer/ organisation, using the example in activity 7 above. See Notes 8.2.3.	➤ Notebook, flipchart/ chalkboard. Notes 8.2.2.	15 minute
9. Still in plenary, participate in the production of time and mileage schedules for all the officers from stakeholder organisations involved in the production of seed.	➤ Notebook, flipchart and transparency with outputs from activities 2 and 3 of sub module 8.2.	30 minute
10. Participate in the development of a budget estimate for all the seed production activities by all stakeholders and calculate the total budget for the whole project.	➤ Notebook, flipchart/ chalkboard.	15 minute

**Sub Module 8.3.****Develop a Logical Framework that Summarises the Whole Seed Project (4 hours 20 minutes).****Elements/Outcomes**

8.3.1 Facilitate production of a Logical Framework that summarises the whole seed project.

Activity	Materials Media and Equipment	Time
1. Take note of the explanation given on the whole project phases and activities, paying particular attention to the need for gradual take-over of the project by small-scale farmers during the course of the 4 years.		10 minutes
2. Take note of the Logical Framework concept as it is being used to explain the long-term objectives, immediate objectives, outputs and inputs of the small-scale seed production project.	➤ Handout Notes 8.1	10 minutes
3. Participate in a plenary session in which together with the instructor you develop a Logical Framework that summarises the small-scale seed production project. See example from Notes 8.3.1 and 8.3.2.	➤ Transparency no. 8.3.1 showing the structure of a Logical Framework Notes 8.3.1 and 8.3.2.	2 hours
4. Acquaint yourself to the Five-Day Train the Trainer Program. See attachment at the end of the module	➤ Attached Program	2 hours

Module 8

The Small-Scale Seed Production Training Programme

**Intentionally left blank**

### 8.1 Activity schedule for Seed Production by small-scale Farmers.

<u>Activity</u>	<u>Number of days</u>
1. Preparing and organising project review and planning workshop.	
2. Project review and planning workshop.	
3. Farmer group formation.	
4. Participatory Rapid farmer seed demand assessment.	
5. Seed acquisition and packaging.	
6. Seed distribution to farmers.	
7. Preparing and organising farmer training in gender, group dynamics, seed bed selection, soil fertility and water management, pest and disease management, seed types, role in food security, variety purity maintenance.	
8. Farmer training.	
9. Establishing seed demo-plots, observation plots (FIFM), group plots, seed gardens.	
10. Training in M and E of demo-plots, observation plots (FIFM), group plots, seed gardens	
11. M and E of demo-plots, observation plots (FIFM), group plots, seed gardens.	
12. Preparing and organising field school training (at 50% tassel and silk).	
13. Holding field training clinics (at 50% tassel and silk).	
14. Field day training	
15. Field day	
16. Preparing for field school at 50% physiological maturity.	
17. Conducting field school training clinics.	
18. Preparing for training in hosting seed fairs.	
19. Holding of the actual seed fairs.	
20. Preparing for seed garden field days.	
21. Holding seed garden field days.	
22. Preparing for farmer training in statutory requirements for seed production and marketing, variety viability testing and validation, seed marketing, analysis of data from record book, SWOT analysis on R-E-F linkages, post-harvest handling.	
23. Conducting farmer training.	
24. Harvesting, conditioning and bulking of seed (and marketing if applicable).	

**8.2.1 Workplan for Seed Production by Small-Scale farmers.**

ACTIVITY	2000					2001					
	S	O	N	D	J	F	M	A	M	J	J
1.1 Prepare & organize project review & planning workshop	X										
1.2 Hold project review & planning workshop		X									
2.1 Seed acquisition and packaging for the program	X										
2.2 Seed distribution to the farmers		X	X								
3.1 Prepare & organize for training of trainers workshop			X								
3.2 Hold the Training of Trainers workshop			X								
4.1 M&E of seed distribution & establishment of seed demo plots			X	X							
5.1 M&E of demo plots & seed crop at vegetative stage					X						
6.1 Prepare & organize Field School Training - 50% tassel & silk					X	X					
6.2 Hold Field School Training clinics - 50% tassel & silk						X	X				
7.1 Prepare for Field Days Training							X				
7.2 Actual Field Day Training held							X				
8.1 Prepare for Field School - 50% physiological maturity							X				
8.2 Conduct Field School Training clinics								X			
9.1 Prepare for training in hosting seed fairs										X	



ACTIVITY	2000					2001						
	MONTH											
	S	O	N	D	J	F	M	A	M	J	J	
9.2 Holding of the actual seed fairs											X	
10.1 Prepare for seed garden Field Days		X										
10.2 Hold seed garden Field Days		X	X									
11.1 Monthly Report writing												
11.2 Annual Report writing												X
11.2 General administration post meetings & training sessions												
12.1 Prepare & organize project review & planning workshop											X	
12.2 Hold project review & planning workshop												X

## Module 8

### The Small-Scale Seed Production Training Programme

#### Notes

#### **8.2.2 Introduction to the Spreadsheet on Small Scale Seed Production**

The spreadsheet presents costs involved in training of extension workers and farmers in seed production. The training is conducted in a process that leads to the weaning off of the seed production program to the farmers.

The spreadsheet spans over four years. A series of steps are followed which gradually reduce the involvement of the outsiders while consolidating that of the farmers.

In using the spreadsheet, various parameters and steps in the program can be changed to suit the requirements of the user. The number of participants in the program can be altered in the spreadsheet, i.e., the trainers, extension workers or farmers. In addition, all the steps in the program can be included, or alternatively, only specific parts could be included. The user could also eliminate whole sections or years in the program by making the cost of that section or year equal to zero.

#### **Assumptions and Costs Used in the Seed Program Spreadsheet**

The spreadsheet represents costs of training 100 farmers to be carried out in five districts in a given Province. Each districts has an extension worker to facilitate the training. A trainer is hired to train the extension workers. The sponsoring organisation has an intermediary who oversees the training exercise. The trainer is a consultant paid US\$250 per day. Extension workers and the intermediary are paid US\$20 per day.

#### **Overnight Accommodation**

Participants stay in a hotel at the district centre where accommodation costs US\$15 per day. Extension workers only stay in a hotel during the intensive training undertaken in Year Zero, thereafter they will attend workshops and meetings while coming from their homes. For farmers, in all cases, i.e., workshop or meeting, they will return to their homesteads at the end of each day. Experience has shown that women's participation is greatly reduced if they have to spend the night away from their home, hence the need for farmers to return to their homes at the end of the day.

#### **Conference facilities**

Conference facilities at the hotel cost US\$ 100. This flat fee would be paid for two to three day meetings in the program.

#### **Stationary costs**

Each participant, including farmers, will require US\$ 10 worth of stationery per workshop.

### Food costs

Food is prepared each time farmers attend meetings. Each workshop participant will consume US\$10 worth of food per day in the hotel. Food could also be prepared at field days or seed fairs, but will cost approximately the same.

### **Additions, Merging and Splitting Activities**

In each year, a new set of columns to show the number of persons participating has been included. The personnel are divided into trainers, extensions workers, intermediaries and farmers. The number of man-days is the total time required for undertaking an activity. Multiplying the number of personnel and the number of man-days gives the total time required of each labour type during an activity.

Remuneration is the honorarium paid to each person for taking part in the seed production program.

For clarity of the spreadsheet, activities have been classified into sections, which are closely related to each other. In some cases, the activities in a section are undertaken during one workshop. Each section's total cost is calculated at the bottom of the activities in the section. The total cost of the year's activities is obtained by adding the cost of the year's various sections.

Program on CD-Rom

8.4.1 Time and Mileage Schedule

Activity	Narrative	Days / Village a,b,c,d				# of days	km
		a	b	c	d		
1	1.1 Prepare & organize project review & planning workshop	1	1	1	1	4	610
	1.2 Hold project review & planning workshop at HQ	0	0	0	0	3	200
2	2.1 Seed acquisition and packaging for the program at HQ	0	0	0	0	3	600
	2.2 Seed distribution to the farmers	1	1	1	1	4	610
3	3.1 Prepare & organize for training of trainers workshop	1	1	1	1	4	610
	3.2 Hold the Training of Trainers workshop at HQ	0	0	0	0	4	140
4	4.1 M&E of seed distribution & establishment of seed demo plots	1	1	1	1	4	610
5	5.1 M&E of demo plots & seed crop at vegetative stage	1	1	1	1	4	610
6	6.1 Prepare & organize Field School Training - 50% tassel & silk	1	2	2	2	7	610
	6.2 Hold Field School Training clinics - 50% tassel & silk	1	2	2	2	7	610
7	7.1 Prepare for Field Days Training	1	1	1	1	4	610
	7.2 Actual Field Day Training held	1	2	2	2	7	610
8	8.1 Prepare for Field School - 50% physiological maturity	1	1	1	1	4	610
	8.2 Conduct Field School Training clinics	1	2	2	2	7	610
9	9.1 Prepare for training in hosting seed fairs	1	1	1	1	4	610
	9.2 Holding of the actual seed fairs	1	1	1	1	4	610
10	10.1 Prepare for seed garden Field Days	1	1	1	1	4	610
	10.2 Hold seed garden Field Days	1	1	1	1	4	610
11	11.1 Monthly Report writing at HQ	0	0	0	0	12	0
	11.2 Annual Report writing at HQ	0	0	0	0	5	0
	11.2 General admin post meetings & training sessions at HQ	0	0	0	0	8	0
12	12.1 Prepare & organize project review & planning workshop	1	1	1	1	4	610
	12.2 Hold project review & planning workshop at HQ	0	0	0	0	3	200
<b>TOTAL</b>		<b>16</b>	<b>20</b>	<b>20</b>	<b>20</b>	<b>114</b>	<b>10900</b>

### 8.3.1 The Logical Framework

Narrative Summary	Objectively Verifiable Indicators (OVI)	Means of Verification (MOV)	Important Assumptions
<u>Goal or Wider Objective</u>	Measures of Goal achievement: conditions which will indicate that the goal has been achieved.	The way that the indicators can be objectively verified.	Assumption concerning long term value of seed production project.
<u>Purpose or immediate objective.</u>	Conditions that will indicate purpose has been achieved: End of project status.	The way that indicators can be objectively verified.	Assumption affecting Purpose to goal link: an event or action over which the project team has little control.
<u>Outputs</u>	Magnitude of outputs necessary and sufficient to achieve Purpose.	The way that the indicators can be objectively verified.	Assumption affecting Outputs to Purpose link: an event or action over which the project team has little control.
<u>Inputs</u>	Resources and Expenditure for each activity: The types and cost of resources for each activity with target dates.	The way that the indicators can be objectively verified.	Assumption affecting Inputs to Outputs linkage: an event or action over which the project team has some control.

## Module 8

### The Small-Scale Seed Production Training Programme

#### Notes

#### 8.3.2 Example of a Summary Logical Framework

Narrative Summary	Verifiable Indicators	Means of Verification	Important Assumptions
<p><b>PROJECT GOAL:</b></p> <p>To enhance seed security at household level to enable farmers to be capable of ensuring sustainable livelihood and household food security in the Southern Province.</p>	<ul style="list-style-type: none"> <li>➤ Increased areas of land cultivated with locally produced seed and a wide range of different food crops grown and processed</li> <li>➤ Increased number of farmers using improved staple food crop varieties</li> </ul>	<ul style="list-style-type: none"> <li>➤ MAFF crop production reports</li> <li>➤ Needs assessment report</li> <li>➤ Impact study</li> </ul>	<ul style="list-style-type: none"> <li>➤ Government institutions are supportive of the project's low key approach</li> </ul>
<p><b>PROJECT PURPOSE:</b></p> <p>Local seed supply systems functioning that will empower small scale farmers to operate quality local seed provision independently through self-help initiatives.</p>	<ul style="list-style-type: none"> <li>➤ Farmers initiating and managing their own demonstration plots and seed multiplication fields</li> <li>➤ SCCI training and provision of backstopping activities to ensure good quality seed is produced</li> </ul>	<ul style="list-style-type: none"> <li>➤ Field day reports</li> <li>➤ Monthly reports</li> <li>➤ Post training sessions evaluation forms</li> <li>➤ Seed fairs assessment reports.</li> </ul>	<ul style="list-style-type: none"> <li>➤ Farmers willingness to participate</li> <li>➤ High quality foundation seed is made available</li> <li>➤ SCCI willingness to train and monitor farmers</li> </ul>

## The Small-Scale Seed Production Training Programme

Notes

Narrative Summary	Verifiable Indicators	Means of Verification	Important Assumptions
PROJECT ACTIVITIES: 1.0 Prepare and organise project review & planning workshop	➤ Visits to the Camp Officers, facilitators and group leaders to conscientise them on the review and planning workshop dates and the required preparation	➤ Four visits to the four respective areas undertaken – log book and monthly report	
1.1 Hold project review and planning workshop	➤ A three day review and planning workshop is held	➤ Workshop review and planning report	
2.0 Seed acquisition and packaging for the programme	➤ Appropriate seed varieties and quantities sourced and packed prior to distribution.	➤ Report on seed varieties and quantities acquired	➤ The requisite seed is available in sufficient quantities from the NARS, IARCs and private seed companies
2.1 Seed distribution to the farmers	➤ Participating farmers receive seed on time	➤ Farmer survey	
3.0 Prepare and organise for a training of trainers workshop	➤ Trainees conscientised on workshop dates and appropriate venue booked	➤ Field visits to the project areas – log book	
3.1 Hold the training of trainers workshop	➤ Properly established observation and seed multiplication plots by farmers	➤ Monthly report by Field Manager	➤ SCCI willing to train farmers and MAFF staff

## Module 8

### The Small-Scale Seed Production Training Programme

#### Notes

Narrative Summary	Verifiable Indicators	Means of Verification	Important Assumptions
4.0 Monitoring and evaluation of seed distribution and establishment of seed observation and multiplication plots	➤ Joint field visits to all the 4 project sites by Africare and MAFF	➤ Monthly report by Africare	
5.0 Monitoring and evaluation of demo plots and seed crop during the vegetative stage	➤ Joint field visits to all the 4 project sites by Africare and MAFF	➤ Monthly report by Africare	
6.0 Prepare and organise field school training at 50% tassel and silk	➤ Joint field visits to all the 4 project sites by Africare and MAFF to establish 50% tasseling and to identify farmers to host the field school clinics	➤ Trip report – log book	
6.1 Hold field school training clinics at 50% tassel and silk in each of the four project areas	➤ 2 field school clinics held for each farmers' group	➤ Monthly report by Africare	
7.0 Prepare for field days training	➤ Target farmer groups conscientised on the training dates and host farmers/venue	➤ Field visits to the project areas – log book	
7.1 Actual field day training held	➤ 2 field days per group organised by farmers	➤ Monthly reports	



## The Small-Scale Seed Production Training Programme

Notes

Narrative Summary	Verifiable Indicators	Means of Verification	Important Assumptions
8.0 Prepare for field school – 50% physiological maturity	➤ Farmer groups aware of field school dates and venues	➤ Monthly reports	
8.1 Conduct field school training clinics	➤ At least 2 field school clinics held at each locality/area	➤ Monthly reports	
9.1 Holding of the actual seed fairs	➤ 4 seed fairs held in the 4 respective project areas by July 2001	➤ Seed fair report	
10.0 Prepare for seed garden field days	➤ Visits to the participating farmer groups to advise/consult on best gardens for hosting the seed garden field day	➤ Seed garden trip report	
10.1 Hold seed garden field days	➤ At least 3 or 4 seed gardens held in each of the participating farmer groups	➤ Seed garden field day report(s)	
11.0 Monthly report writing	➤ 12 monthly reports sent to SSSP in a year	➤ Monthly reports	
11.1 Annual report writing	➤ An annual report summarising project activities sent to SSSP by September 2001	➤ Annual report	
11.2 General administration post meetings and training sessions	➤ Two days administration time	➤ Contract document, accounts etc	

## Module 8

### The Small-Scale Seed Production Training Programme

#### Notes

Narrative Summary	Verifiable Indicators	Means of Verification	Important Assumptions
12.0 Prepare and organise project review and planning	➤ Visits and invitations to key stakeholders on workshop dates and expected preparatory work, e.g. protocols completion etc	➤ Letters of invitation and field visits to the 4 project areas – log book	
12.1 Hold project review and planning workshop	➤ A three day review and planning workshop is held by end of August 2001	➤ Workshop review and planning report	

# Module 8

## Transparency

### 8.1.2 Activity schedule for Seed Production by small-scale Farmers.

<u>Activity</u>	<u>Number of days</u>
1. Preparing and organising project review and planning workshop.	
2. Project review and planning workshop.	
3. Farmer group formation.	
4. Participatory Rapid farmer seed demand assessment.	
5. Seed acquisition and packaging.	
6. Seed distribution to farmers.	
7. Preparing and organising farmer training in gender, group dynamics, seed bed selection, soil fertility and water management, pest and disease management, seed types, role in food security, variety purity maintenance.	
8. Farmer training.	
9. Establishing seed demo-plots, observation plots (FIFM), group plots, seed gardens.	
10. Training in M and E of demo-plots, observation plots (FIFM), group plots, seed gardens	
11. M and E of demo-plots, observation plots (FIFM), group plots, seed gardens.	
12. Preparing and organising field school training (at 50% tassel and silk).	
13. Holding field training clinics (at 50% tassel and silk).	
14. Field day training	
15. Field day	
16. Preparing for field school at 50% physiological maturity.	
17. Conducting field school training clinics.	
18. Preparing for training in hosting seed fairs.	
19. Holding of the actual seed fairs.	
20. Preparing for seed garden field days.	
21. Holding seed garden field days.	
22. Preparing for farmer training in statutory requirements for seed production and marketing, variety viability testing and validation, seed marketing, analysis of data from record book, SWOT analysis on R-E-F linkages, post-harvest handling.	
23. Conducting farmer training.	
24. Harvesting, conditioning and bulking of seed (and marketing if applicable).	

**8.2.1 Workplan for Seed Production by Small-Scale farmers.**

ACTIVITY	2000					2001				
	MONTH									
	S	O	N	D	J	F	M	A	M	J
1.1 Prepare & organize project review & planning workshop	X									
1.2 Hold project review & planning workshop		X								
2.1 Seed acquisition and packaging for the program	X									
2.2 Seed distribution to the farmers		X	X							
3.1 Prepare & organize for training of trainers workshop			X							
3.2 Hold the Training of Trainers workshop			X							
4.1 M&E of seed distribution & establishment of seed demo plots			X	X						
5.1 M&E of demo plots & seed crop at vegetative stage					X					
6.1 Prepare & organize Field School Training - 50% tassel & silk					X	X				
6.2 Hold Field School Training clinics - 50% tassel & silk						X	X			
7.1 Prepare for Field Days Training							X			
7.2 Actual Field Day Training held							X			
8.1 Prepare for Field School - 50% physiological maturity							X			
8.2 Conduct Field School Training clinics								X		
9.1 Prepare for training in hosting seed fairs									X	

ACTIVITY	2000					2001						
	MONTH											
	S	O	N	D	J	F	M	A	M	J	J	
9.2 Holding of the actual seed fairs											X	
10.1 Prepare for seed garden Field Days		X										
10.2 Hold seed garden Field Days		X	X									
11.1 Monthly Report writing												
11.2 Annual Report writing												X
11.2 General administration post meetings & training sessions												
12.1 Prepare & organize project review & planning workshop											X	
12.2 Hold project review & planning workshop												X

## Module 8

### The Small-Scale Seed Production Training Programme

#### Transparency

#### 8.3.1 The Logical Framework

Narrative Summary	Objectively Verifiable Indicators (OVI)	Means of Verification (MOV)	Important Assumptions
<u>Goal</u> or Wider Objective	Measures of Goal achievement: conditions which will indicate that the goal has been achieved.	The way that the indicators can be objectively verified.	Assumption concerning long term value of seed production project.
<u>Purpose</u> or immediate objective.	Conditions that will indicate purpose has been achieved: End of project status.	The way that indicators can be objectively verified.	Assumption affecting Purpose to goal link: an event or action over which the project team has little control.
<u>Outputs</u>	Magnitude of outputs necessary and sufficient to achieve Purpose.	The way that the indicators can be objectively verified.	Assumption affecting Outputs to Purpose link: an event or action over which the project team has little control.
<u>Inputs</u>	Resources and Expenditure for each activity: The types and cost of resources for each activity with target dates.	The way that the indicators can be objectively verified.	Assumption affecting Inputs to Outputs linkage: an event or action over which the project team has some control.

## 8.4.1 Time and Mileage Schedule

Activity	Narrative	Days / Village a,b,c,d				# of days	km
		a	b	c	d		
1	1.1 Prepare & organize project review & planning workshop	1	1	1	1	4	610
	1.2 Hold project review & planning workshop at HQ	0	0	0	0	3	200
2	2.1 Seed acquisition and packaging for the program at HQ	0	0	0	0	3	600
	2.2 Seed distribution to the farmers	1	1	1	1	4	610
3	3.1 Prepare & organize for training of trainers workshop	1	1	1	1	4	610
	3.2 Hold the Training of Trainers workshop at HQ	0	0	0	0	4	140
4	4.1 M&E of seed distribution & establishment of seed demo plots	1	1	1	1	4	610
5	5.1 M&E of demo plots & seed crop at vegetative stage	1	1	1	1	4	610
6	6.1 Prepare & organize Field School Training - 50% tassel & silk	1	2	2	2	7	610
	6.2 Hold Field School Training clinics - 50% tassel & silk	1	2	2	2	7	610
7	7.1 Prepare for Field Days Training	1	1	1	1	4	610
	7.2 Actual Field Day Training held	1	2	2	2	7	610
8	8.1 Prepare for Field School - 50% physiological maturity	1	1	1	1	4	610
	8.2 Conduct Field School Training clinics	1	2	2	2	7	610
9	9.1 Prepare for training in hosting seed fairs	1	1	1	1	4	610
	9.2 Holding of the actual seed fairs	1	1	1	1	4	610
10	10.1 Prepare for seed garden Field Days	1	1	1	1	4	610
	10.2 Hold seed garden Field Days	1	1	1	1	4	610
11	11.1 Monthly Report writing at HQ	0	0	0	0	12	0
	11.2 Annual Report writing at HQ	0	0	0	0	5	0
	11.2 General admin post meetings & training sessions at HQ	0	0	0	0	8	0
12	12.1 Prepare & organize project review & planning workshop	1	1	1	1	4	610
	12.2 Hold project review & planning workshop at HQ	0	0	0	0	3	200
<b>TOTAL</b>		<b>16</b>	<b>20</b>	<b>20</b>	<b>20</b>	<b>114</b>	<b>10900</b>

**Intentionally left blank**



## Module 8

# Self Assessment Test

- 8.1.1 Give the correct sequence of steps that you would need to follow to check on the justification to mount a seed production project.
1. Crops feasible to grow in area
  2. There is adequate foundation seed to start off project
  3. There is high demand for seed of the specific crops in the local community.
  4. Training in production of seed crop is available
- 8.1.2 Choose the correct answer to complete the following statement.  
The most appropriate time to form gender-balanced groups for seed production is –
- A. After training farmers in all aspects of seed production
  - B. After establishing the need for the project and sensitising farmers in all aspects of seed production
  - C. After implementing project for one year to see how it goes
- 8.2 A work plan comprises two aspects. Choose these from the given list
- A. All project activities
  - B. The team to carry out the activities
  - C. Budget
  - D. Timing of activities (in days/months/years)
- 8.3 Mark the following statements about the Logical Framework as true (T) or false (F) according to your understanding of local seed provision systems.
1. The Logical Framework is adequate to give an understanding of the local seed provision system.
  2. The Objectively Verifiable Indicators (OVIs) are the targets to be achieved by the project
  3. The OVIs column is the only column that is used to monitor a project

## Module 8

### The Small-Scale Seed Production Training Programme

#### Self Assessment Test

#### **Answer Key to Self Assessment Test**

8.1.1 Seed laws, Plant variety protection laws, phytosanitary laws

8.1.2 No

8.2 False

8.3 b

### **Five-Day Train the Trainer (TtT) Program.**

A viable local seed supply program is successfully launched if all the service providers are fully conversant with the processes involved in implementing activities linked with the seed provision method. The Training Curriculum for “Rural Based Small Scale Seed Production” is divided into 8 modules. Each module could be used independently of the others, depending on the level of competence in seed knowledge of the trainees.

The first course of five days would be targeted at senior supervisory staff for the proposed local seed supply program. The main aim of the workshop is to appraise trainers on how to use the “Manual Small Scale Seed Production” as well as the “Small Scale Seed Production Training Program” Curriculum to train the local field level facilitators on how each of the seed provision processes are linked to each other and on when each of these activities could be best performed for optimal delivery of seed to the end user, the farmer. The training design is based on an interactive immersion type of course, with the basic assumptions that the candidates would have read the manuals before commencement of the training and are of educational competence level of matriculation (‘O’ level) or above. This prerequisite is determined by need for the participants to

- take over the bulk of the training activities to train extension personnel and farmers as the season progresses
- immediately after the training session embark on time and cost budgeted seed supply log frame

The 5-day TtT training course log frame is presented below.

### **Key Assumptions**

It is assumed that the participants at the 5-day workshop to have varied competencies with regards to seed provision knowledge. In this regard the workshop is structured to capture the

- Key elements that constitute the development of local seed provision systems for most crops, which will introduce beginners to what is involved in quality seed provision
- The training manuals and presentations would have been distributed and/or would have been translated into the official working language of the participants

## Module 8

### The Small-Scale Seed Production Training Programme

#### Attachment

#### **Approach to the Workshop Presentation**

The workshop activities are as presented below, drawn from the key elements from all 8 modules contained in the SSSP Curriculum for the Small Scale Seed Production Training Course. The elements selected by the workshop moderator/trainer would be decided by the seed knowledge competence levels of the participants and/or the felt need for the seed demand complex determined by the program's needs assessment workshop.

To this end the course would combine training tools such as;

1. Visual materials for example large posters and/or illustrations including demonstrations already described in the training manual
2. Interactive activities such as role model plays and hands-on look and learn approach of some key elements
3. Self-Evaluation Tests, if an opportunity presents itself with ideal materials, this would include Field Schools
4. Plenary Sessions that would set the stage for comprehension of the model

#### **Facilitation of the Training – Responsibility Centres**

Three key personnel would be required to conduct different training aspects of the TtT workshop:

- a. Seed Provision Specialist (SPS), who would be responsible for training participants in the use of the curriculum.
- b. Field Assessment Specialist (FAS) for demonstrating establishment and use of Seed Fairs and lay-out of Variety Evaluation, Verification and observation (VEVO) trial plots.
- c. Seed Provision Curriculum Training Moderator (CTM) to conduct plenary sessions and manage Self-Testing sessions.

## Workshop Work Plan

The workshop would cover most topics addressed in Modules 1 – 8. Those elements in *Italics* may be dropped or omitted if time is pressing.

### Day 1

Activities	Material	Performance Criteria	Time required
1. Set up germination capacity and physiological quality tests for different seed grains. Responsibility Centre Set-Ups Established 2 days before start of workshop by SPS; FAS	<ul style="list-style-type: none"> <li>➤ baby napkins cut in half</li> <li>➤ roll of string</li> <li>➤ Newspapers or 100; 30 x 10 cm newsprint pieces</li> <li>➤ 2 wooden trays (50 x 40 x 10) cm dimensions. Fill with washed river sand</li> <li>➤ 500 gm seed each for maize or sorghum, beans</li> <li>➤ 2 jam-jars with lids</li> <li>➤ cotton wool or roll of toilet tissue paper</li> <li>➤ thermometers</li> <li>➤ 2 bricks</li> </ul>	The Tests will be assessed by trainees on day 3 and/or 4 for Seed <ul style="list-style-type: none"> <li>• germination capacity</li> <li>• health status</li> <li>• vigour (capacity to lift or crack a brick)</li> <li>• moisture content</li> <li>• heat generation</li> </ul>	
2. Defining Seed & Explanation of the use of each seed component Responsibility Centre SPS	<ul style="list-style-type: none"> <li>➤ Animated Power Point Display or</li> <li>➤ Charts and Illustrations in Hand-outs</li> </ul>	Drawing to illustrate all components of <ul style="list-style-type: none"> <li>• True seed grains for both Monocotyledon and Dicotyledonous plants</li> <li>• Vegetative Materials –               <ul style="list-style-type: none"> <li>i. Runners</li> <li>ii. Roots</li> <li>iii. Tubers</li> <li>iv. Corms</li> </ul> </li> </ul>	

## Module 8

### The Small-Scale Seed Production Training Programme

#### Attachment

Activities	Material	Performance Criteria	Time required
3. Self-Test-1 CTM	➤ Test 1 1.3 Module 1		
4. Review			
5. Answers CTM			
6. Define Food and Seed Security and their linkages at <ul style="list-style-type: none"> <li>• National</li> <li>• Community</li> <li>• Household</li> <li>• Levels</li> </ul>	➤ Flow Chart and/or Handout illustrating components of food and seed security <ul style="list-style-type: none"> <li>• Availability + access + utilisation</li> <li>• At each level</li> </ul>	<ul style="list-style-type: none"> <li>• Flow Charts and Handouts for both food and seed security</li> <li>• Participants role play to illustrate               <ol style="list-style-type: none"> <li>i. Availability</li> <li>ii. Access</li> <li>iii Utilisation</li> </ol> </li> </ul>	Plenary Session Responsibility Centre CTD/SPS
7. Define differences in existing farming systems and how they contribute to 1 above	<ul style="list-style-type: none"> <li>➤ Transparency or Power Point Presentation</li> <li>➤ Responsibility Centre</li> <li>➤ CTM/SPS</li> </ul>	<ul style="list-style-type: none"> <li>• Flow chart to illustrate vertical nature of commercial seed and food crop systems and their linkages</li> <li>• Cyclic and heterogeneous structure inherent to local subsistence farming systems</li> </ul>	Plenary Session
8. Oral test Session on 5-6 above		Responsibility Centre CTD	

Activities	Material	Performance Criteria	Time required
9. Describe components of seed provision systems as a function of farming systems  Networking and Legislation	➤ Transparency or Power Point Presentation on <ul style="list-style-type: none"> <li>• Formal (vertical) and</li> <li>• Informal Seed (cyclic)</li> <li>• Provision Systems</li> </ul>	Handouts to show all components from selection of varieties, breeding/development and selection, basic seed production, quality seed multiplication, processing, quality seed testing for purity, viability and health, seed treatment, storage distribution and marketing strategies based on SWOT analysis at each stage	Plenary Session  Responsibility Centre  SPS
10. Describe seed provision systems as a function of farming systems outlining the common constraints in small scale seed production	➤ Transparency or Power Point Presentation (ex GTZ) <ul style="list-style-type: none"> <li>• Formal – separate components operated by different institutions</li> <li>• Informal – separate or part of a food crop farming system enterprise</li> </ul>	Group Discussion based on Visuals and/or PP presentation  Responsibility Centre  SPS/CTM	Group Work

## Module 8

### The Small-Scale Seed Production Training Programme

#### Attachment

Activities	Material	Performance Criteria	Time required
<p>11. Discuss Concept of Seed Demand and Review Processes involved in Assessment of Rapid Seed Demand at Community level</p>	<ul style="list-style-type: none"> <li>➤ Visual 1.5 Illustrating Assessment of Seed Demand</li> </ul>	<p>Illustrated Handout 1.5 to show how to assess seed demand at village and community level Responsibility Centre SPS</p>	<p>Plenary Session</p>
<p>12. Explain Concept of Seed Fairs &amp; their role as an effective tool for RPA of the food and hence seed security determinants Responsibility Centre FAS &amp; SPS</p>	<ul style="list-style-type: none"> <li>➤ Large Chart with Photographs</li> <li>➤ Set-up a Demonstration of Seed Fair</li> </ul>	<p>Provide Manual To demonstrate function of Seed Fairs as</p> <ul style="list-style-type: none"> <li>• Quality seed marketing strategy               <ul style="list-style-type: none"> <li>o Quantities available locally</li> <li>o Information on variety performance</li> <li>o Information on accessibility of seed</li> </ul> </li> <li>• Illustrate crop diversity as a function of food security dynamics within a community</li> <li>• Rapid assessment of household food demand hence rapid assessment of appropriate demand</li> <li>• Germplasm access and transfer for technical services (breeders formal and informal)</li> </ul>	<p>Hands-on exposure experience to RPA using Seed Fair</p>



## The Small-Scale Seed Production Training Programme

Activities	Material	Performance Criteria	Time required
13. Review Day's proceedings using exercise 1.5 Responsibility Centre CTM	➤ Exercise in Hand-out 1.5	Each Participant to Work through the Exercise	
14. Oral Test to Cover All Aspects of Module 1 Responsibility Centre CTM	➤ Test Drawn From Presentation ➤ Responsibility Centre ➤ SPS	Participants to Show Understanding of Seed Security to be a Function of Food Security	
15. 1 <sup>st</sup> Session		BREAK	
16. Discuss the concept of farmer group dynamics Responsibility Centre CTM/SPS	➤ Handout 2.1.5 ➤ Role Play ➤ Responsibility Centre ➤ FAS	Review and Discuss Hand-out 2.1.5 in groups of not more than 5 participants. Role Play to illustrate <ul style="list-style-type: none"> <li>• intra-group vertical and lateral organisational structure indicate role of each group member</li> <li>• Ideal group size for effective communication and collaboration for viability and stability</li> </ul>	

## Module 8

### The Small-Scale Seed Production Training Programme

#### Attachment

Activities	Material	Performance Criteria	Time required
		<ul style="list-style-type: none"> <li>• Inter group interactions to create umbrella groups and/or associations necessary for developing the critical mass to attract investments from expert service providers.</li> </ul>	
17. Brainstorm on rationale of working with farmer groups in rural agricultural development programs and challenges encountered thereof.	<ul style="list-style-type: none"> <li>➤ Transparencies 2.1.7a &amp; b</li> <li>➤ Responsibility Centre</li> <li>➤ CTM</li> </ul>	Discussion Groups: <ul style="list-style-type: none"> <li>• Easy facilitation of transfer of new innovations and technologies</li> <li>• Communication and dissemination of information</li> <li>• Sustainable innovations and technologies</li> <li>• Gender and cultural challenges on group dynamics</li> </ul>	
18.		BREAK	
19. Work through Visual 2.1.5 in a Plenary session Responsibility Centre CTM/SPS	<ul style="list-style-type: none"> <li>➤ Visual 2.1.5</li> </ul>	Resolve challenges encountered in group dynamics that underpin success of rural agricultural development activities	

Activities	Material	Performance Criteria	Time required
20. Distinguish between conventional agricultural extension and extension facilitation in relation to facilitation methodologies such as PEA and PRA	➤ Visual 2.2.4	Role Play and Plenary discussion based on Visual 2.2.4 Responsibility Centre SPS	
21.		BREAK	
22. Review Visual 2.2.6 in Plenary session and discuss all PRA tools related to crop/seed production and supply systems.	➤ Visual 2.2.6 ➤ Responsibility Centre ➤ CTM/SPS		
23. 2 <sup>nd</sup> Session	➤ Handout 2.2.7	BREAK	Overnight Read Handout 2.2.7

## Module 8

### The Small-Scale Seed Production Training Programme

#### Attachment

#### Day 2

Activities	Material	Performance Criteria	Time required
1. Demonstrate Team Building skills for Farmer Group Formation	➤ Transparency 2.1.9	Role Play Responsibility Centre SPS/CTM	
2. Highlight weaknesses of conventional approaches to agricultural extension 3. Responsibility Centre 4. SPS/CTM	➤ Handout 2.2.4	Plenary Session to <ul style="list-style-type: none"> <li>• Review possible solutions based on PRA tools that can be used to address attitude challenges among trainees               <ul style="list-style-type: none"> <li>○ KSA &amp; PRA tools for attitudinal change</li> </ul> </li> <li>• Differences between conventional agricultural</li> </ul>	
5. Question and Answer Session on RPA and PRA in rural agricultural development 6. Responsibility Centre 7. CTM		Expected to gauge trainees level of understanding of aspects covered so far and reinforce on areas requiring further elaboration	
8. Plenary discussion using a case study to evaluate existing R-E-F linkages. Highlighting strengths, weaknesses,			

Activities	Material	Performance Criteria	Time required
opportunities and potentials of the case study. Discuss how R-E-F linkages can be improved reviewing on how each partner would benefit			
9.		BREAK	
10. Explain gender as a concept in general local farming systems and hence its impact in local seed provision systems	<ul style="list-style-type: none"> <li>➤ Transparencies 2.4.2 &amp; 2.4.3</li> <li>➤ Responsibility Centre</li> <li>➤ SPS</li> </ul>	Explore <ul style="list-style-type: none"> <li>• role of men and women in a cultural continuum that is heterogeneous depending on cultural setting</li> <li>• gender bias in the context of               <ul style="list-style-type: none"> <li>o agricultural crop activity</li> <li>o subordination of women</li> <li>o non-wage labour</li> </ul> </li> </ul>	
11. Self Assessment Test-4	<ul style="list-style-type: none"> <li>➤ Multiple choice test</li> <li>➤ Responsibility Centre</li> <li>➤ CTM</li> </ul>	70% correct answers would constitute a pass mark	

## Module 8

### The Small-Scale Seed Production Training Programme

#### Attachment

Activities	Material	Performance Criteria	Time required
<p>12. Explain the importance of Research-Extension Farmer linkages</p> <p>Responsibility Centre SPS</p>	<p>Chart with feedback loops to illustrate vertical and lateral knowledge, information and technology transfer strengths and weaknesses between these stakeholders</p>	<p>Handbook to illustrate participatory research and extension flow chart leading to interaction processes with farmers in overcoming constraints to information flow</p> <ul style="list-style-type: none"> <li>• Role play to highlight linkages</li> </ul>	
<p>13. Discuss rationale for variety trials in any farming systems</p>	<ul style="list-style-type: none"> <li>➤ Flip Chart</li> <li>➤ Responsibility Centre</li> </ul>	<p>Plenary Discussion</p>	
<p>14. Justify the concept of FIFM variety evaluation and observation (VEVO) trials</p> <p>Responsibility Centre</p>	<p>Chart to illustrate design of a FIFM-VEVO trial in traditional farming systems</p>	<p>Handbook to illustrate participatory approaches to</p> <ul style="list-style-type: none"> <li>• accessing variety knowledge and evaluating new technologies</li> <li>• empowering participants to generate, capture and evaluate crop variety performance information at local level</li> <li>• Rapid replication and development of crop development</li> </ul>	

Activities	Material	Performance Criteria	Time required
		information systems based on diversity of resource and skills capacity at village level <ul style="list-style-type: none"> <li>• Verifiable validation of crop variety attributes</li> <li>• Exposure visit to a growing crop</li> </ul>	
15. Explain the rationale of the design of the VEVO trials	<ul style="list-style-type: none"> <li>➤ Large Chart to illustrate design concept</li> <li>➤ Responsibility Centre</li> </ul>	Handout to illustrate use of protocols in variety performance evaluation for appropriateness to meet farmers food and economic demand	
16. Define a crop variety	<ul style="list-style-type: none"> <li>➤ Chart to illustrate a stable varieties</li> <li>➤ Responsibility Centre</li> </ul>	Illustrate <ul style="list-style-type: none"> <li>• pure variety (hybrids &amp; self pollinating crops)</li> <li>• stable population (composites &amp; top crosses in cross pollinated crops)</li> </ul>	

## Module 8

### The Small-Scale Seed Production Training Programme

#### Attachment

Activities	Material	Performance Criteria	Time required
17. Explain the importance of variety characterisation as a function of quality seed production	<ul style="list-style-type: none"> <li>➤ Chart to show importance of plant's morphological vegetative structures to characterise a variety</li> <li>➤ Responsibility Centre</li> </ul>	<ul style="list-style-type: none"> <li>• Handout with illustrated line plant drawings to show variety characterisation structures</li> <li>• Exposure visit to a trial or an actively growing crop at flowering stage</li> </ul>	
18. Identify the various stakeholder in quality local seed provision systems	<ul style="list-style-type: none"> <li>➤ Chart</li> <li>➤ Responsibility Centre</li> </ul>	Plenary Discussion	
19. Explain the role and use of FIFM-VEVO trials to different stake holders		Plenary Discussion	
20. Self Evaluation Test-5		5 questions	
21. Give the factors considered in designing FIFM-VEVO trials	<ul style="list-style-type: none"> <li>➤ Chart</li> </ul>	Handout to illustrate <ul style="list-style-type: none"> <li>• Knowledge transfer through on observations by a large segment of the community</li> <li>• Replication for statistical analysis and validation of results</li> </ul>	



Activities	Material	Performance Criteria	Time required
		<ul style="list-style-type: none"> <li>• Rapid assessment of environmental interaction with a given variety</li> </ul> <p>Variety characterisation knowledge by a large section of the community to facilitate farmers' validation of variety genetic purity on their own</p>	
22. Give different type of Data critical for capture and identify which stakeholder requires what type of data		<p>Hand out to illustrate data required by</p> <ul style="list-style-type: none"> <li>• Farmers on variety yield and storability performance at local level</li> <li>• Research on genetic stability and geographic adaptation of a variety</li> <li>• Commerce on utilisation of the variety</li> </ul>	
23. Indicate how VEVO trial analysed results are interpreted		Handout to show who and how data is analysed	

## Module 8

### The Small-Scale Seed Production Training Programme

#### Attachment

Activities	Material	Performance Criteria	Time required
24. Describe different crop fertilisation types in crops	Charts to illustrate <ul style="list-style-type: none"><li>◆ Self-pollination</li><li>◆ Cross-pollination</li><li>◆ Inter mediate pollination types</li></ul>	Responsibility Centre	
25. Self Assessment Test-6	➤ Multi choice questions with answers	Self-Assessment Test with a pass mark of 70%	

**Day 3**

Activities	Material	Performance Criteria	Time required
1. Explain the concept of and determination of value for use and cultivation (VUC) in different farming systems	Chart to Illustrate Criteria for VUC in the: <ul style="list-style-type: none"> <li>◆ Formal</li> <li>◆ Informal Sectors</li> </ul> Responsibility Centre	Handout and Group Discussions to Evaluate during a Plenary Session the differences in VUC based on <ul style="list-style-type: none"> <li>• Palatability (Taste)</li> <li>• Storability of grain or product</li> <li>• Yield performance</li> <li>• Processing</li> <li>• Marketability</li> </ul>	
2. Define the Farmer Selected Variety (FSV) in relation to VEVO trials	Chart to Show variety ranking based on VUC	Plenary discussion Responsibility Centre	
3. Explain processes involved in accessing FSV	Chart Illustrating Farmer perceptions of a good variety <ul style="list-style-type: none"> <li>◆ Crop standability</li> <li>◆ Susceptibility to pest and disease attack</li> <li>◆ Yield stability under different environmental impacts</li> <li>◆ Maturation rates</li> </ul> Susceptibility to pest and disease attack after harvest	Group discussions to be reviewed at Plenary session. Develop questions for group evaluation in arriving at concept of FSV Responsibility Centre	

## Module 8

### The Small-Scale Seed Production Training Programme

#### Attachment

Activities	Material	Performance Criteria	Time required
4. Self Assessment Test-7	➤ Multiple Choice Test	3 questions with self assessment answers	
5. Justify using materials in activity 1 of day 1 to justify and demonstrate the procedure for seed physiological quality testing	<p>Flip Chart to Illustrate Essential tests for</p> <ul style="list-style-type: none"> <li>◆ Physical purity</li> <li>◆ Physiological quality                             <ul style="list-style-type: none"> <li>i. Vigour</li> <li>ii. Disease</li> <li>iii. abnormalities</li> </ul> </li> <li>◆ Moisture content</li> </ul> <p>Responsibility Centre</p>	<p>Assess cereal seed trays using given instruction manual which should be read in advance for:</p> <ul style="list-style-type: none"> <li>• % pure seed content</li> <li>• germination capacity</li> <li>• vigour</li> <li>• %moisture content = <math>\frac{(W_1 - W_2)}{W_2} \times 100\%</math></li> <li>• Diseased and abnormal seed</li> </ul>	
6. Outline factors critical for FIFM local quality seed production and supply	<p>Flip Chart to illustrate</p> <ul style="list-style-type: none"> <li>◆ Constraints to access</li> <li>◆ Appropriate varieties</li> </ul> <p>Quality seed for planting</p>	<p>Plenary Discussion</p> <p>Responsibility Centre</p>	
7. Discuss critical factors governing the selection of a seed bed for different quality of seed crop classes and crop pollination types	<p>Chart to illustrate</p> <p>Good isolation from similar crops types</p> <ul style="list-style-type: none"> <li>◆ Good drainage and soil fertility</li> <li>◆ Availability of adequate water</li> </ul> <p>Protection from pests</p>	<p>Handout on seed production to be discussed in plenary Session</p> <p>Responsibility Centre</p>	

## The Small-Scale Seed Production Training Programme

Activities	Material	Performance Criteria	Time required
8. Outline procedures for selecting local quality seed producers	➤ Responsibility Centre	Plenary Discussion of group dynamics and seed demand	
9. Discuss processes involved in procuring and accessing stock-seed for quality seed production	<ul style="list-style-type: none"> <li>➤ Chart to show seed-stock sources</li> <li>➤ Research institutions</li> <li>➤ Seed Fairs</li> <li>➤ Village seed specialists</li> </ul>	Discuss Hand-out of Seed Stock access and constraints Responsibility Centre	
10. Discuss and evaluate the rationale for seed crop monitoring and inspection until fertilisation	<ul style="list-style-type: none"> <li>➤ Chart of VEVO data capture</li> <li>➤ Responsibility Centre</li> </ul>	Handout to illustrate importance of variety development of stable traits <ul style="list-style-type: none"> <li>• Flowering and flower colour</li> <li>• Pollen shed profile</li> <li>• Fertilisation profile</li> <li>• Maturity profiles under different environments</li> <li>• Plant and crop architecture</li> </ul>	
11. Self assessment test-8	➤ Multiple Choice test	5 questions	

## Module 8

### The Small-Scale Seed Production Training Programme

Attachment

#### Day 4 and 5

Activities	Material	Performance Criteria	Time required
1. Planning for Implementation of Local Seed Systems	➤ Chart to illustrate Planning Matrix	Group Discussion followed by Plenary Session Responsibility Centre	
2. Program Planning and Budgeting	➤ Chart to Illustrate ➤ Budgeting Matrix ➤ Factor in previous Experience	Plenary Session Responsibility Centre	
3. Summarise important aspects of local quality seed provision systems	➤ Chart to show all aspects involved in seed provision ➤ Responsibility Centre	Handout summarising key aspects of sustainable seed provision based on <ul style="list-style-type: none"> <li>• Knowledge, Information and appropriate technology (VEVO trials)               <ul style="list-style-type: none"> <li>i. Variety characterisation</li> <li>ii. Variety validation</li> <li>iii. Seed quality determination</li> </ul> </li> <li>• Transfer of seed knowledge (Field days and seed fairs)</li> <li>• Seed Supply</li> </ul>	

Activities	Material	Performance Criteria	Time required
4. Test trainees for seed Knowledge, Information and Technology Transfer	➤ Written test to cover all aspects of the course	20 questions	
5. Workshop Evaluation by Participants	➤ Responsibility Centre	Plenary Session	

## Module 8

### The Small-Scale Seed Production Training Programme

#### Attachment

#### Important Charts That Require To Be Drawn

Large Chart	Illustration	Remarks
Plant Flower	Stigma, Anthers, Ovule and Process of Fertilisation	
True Seed	Differences between Monocotyledonous and Dicotyledonous plant seeds	Botany Books
Other Planting Materials Considered as Seed by Indigenous Farmers	<ul style="list-style-type: none"> <li>◆ Potato tubers with sprouting eye</li> <li>◆ Runners-sweet potato</li> <li>◆ Segments-garlic</li> <li>◆ Roots-cassava</li> <li>◆ Corms-Madumbe</li> </ul>	These will need to be Drawn from Seed Book
Seed Systems	<ul style="list-style-type: none"> <li>◆ Formal</li> <li>◆ Informal</li> <li>◆ Combined</li> </ul>	Available in GTZ-CD on Seeds Are Life
Variety Characterisation Traits	<ol style="list-style-type: none"> <li>1. Maize Plant showing               <ul style="list-style-type: none"> <li>◆ Panicle, cob and leaf insertion</li> <li>◆ Grain colour</li> <li>◆ Cob morphology</li> </ul> </li> <li>2. Rice Plant illustrating               <ul style="list-style-type: none"> <li>◆ Panicle shape</li> <li>◆ Seed grain insertion</li> </ul> </li> <li>3. Cowpea Plant illustrating               <ul style="list-style-type: none"> <li>◆ Determinate and indeterminate types</li> <li>◆ Flower colour</li> </ul> </li> <li>4. Potato tubers illustrating               <ul style="list-style-type: none"> <li>◆ Tuber colour and shape</li> </ul> </li> </ol>	These available in Botany books
Lay-Out of an FIFM Observation Trial	<ol style="list-style-type: none"> <li>1. Granaries</li> <li>2. Earthenware pots</li> <li>3. Gourds</li> </ol>	Already available at SSSP



Large Chart	Illustration	Remarks
Seed conditioning structures	<ol style="list-style-type: none"> <li>1. Hanging of fruiting bodies in eves</li> <li>2. Raised chicken Wire mesh cribs</li> <li>3. Concrete floor</li> <li>4. Plastic sheets</li> </ol>	
Seed Threshing		
Seed Screens and Seed Selection		
Seed Treatment		
Seed Grain Moisture Determination	Jam Bottle or Transparent Plastic Bag	

## Module 8

### The Small-Scale Seed Production Training Programme

#### Attachment

### Workshop Self Assessment Tests

(Tests 1 – 8 tick (a) correct answer for each question)

#### Test 1 1 minute

1. What constitutes a crop seed in agricultural systems?
  - a. Any plant part that can be planted and reproduce a similar plant
  - b. Only a grain produced from a fruiting structure of the plant in question
  - c. None of these
2. What constitutes a 'true seed'?
  - a. Any grain produced by a fruiting structure through a process of fertilisation
  - b. Any plant part that can produce a similar plant
  - c. All these

#### Test 2 1 minute

1. Which of the following best describes Seed Security?
  - a) Availability
  - b) Accessibility
  - c) Utilisation
  - d) A combination of all three
2. Household food security through farming enterprises is potentially feasible only when there is
  - a. National seed security
  - b) Community Food security
  - c) Household seed security

#### Test 3 2 minute

1. How is Seed demand measured?
  - a. Non availability of any crop planting materials in a given community

- b. Potential requirement of appropriate materials for adequate food crop production to satisfy consumption levels for a given season.
  - c. In accessibility of resources to procure seed for food crop production
  - d. None of these
2. When are Informal seed systems only possible?
- a. Traditional farmers get technical assistance from research and extension services
  - b. Improved crop varieties are available and accessible to the farmers
  - c. Farmers are fully equipped in crop seed development knowledge, information and skill processes
  - d. Government policy framework is in place
3. What characterises Formal seed systems?
- a. All their components are dependent on the performance of co-operating agencies, which might not be co-ordinated by one agency
  - b. Efficient in delivering appropriate seed to satisfy potential demand of all crop producers
  - c. Tendencies to produce hybrid seed
  - d. None of these
4. What are the objectives of conducting Seed Fairs?
- a. Crop germplasm transfer between farmers and formal crop research services
  - b. Crop seeds advertisement and marketing
  - c. Farmer to farmer seed knowledge and information transfer
  - d. All of these
5. Which of the following is best able to supply Quality seed supply and seed physical and physiological testing?
- a. Formal seed systems
  - b. Research Stations
  - c. Breeders
  - d. Informal seed systems
  - e. All these

## Module 8

### The Small-Scale Seed Production Training Programme

#### Attachment

#### **Test 4 1minute**

1. What contributions to PRE development do Farmer groups enhance?
  - a. Accelerated transfer of information on innovations, technology and knowledge
  - b. Community agricultural development institution capacity building for sustainable and wide spread adoption of agricultural development initiatives
  - c. Participatory extension approaches in tackling community related problems
  - d. All of these
  
2. Which of the following best describes the contribution of FIFM observation trials to informal seed provision systems?
  - a. Knowledge, information and technology transfer processes farmers
  - b. Easy randomisation and replication of trials to ensure scientific analysis of collected data
  - c. Introducing innovations for widespread evaluation by a number of communities at the same time
  - d. All of these
  
3. What farming systems concept was adopted in the design of variety evaluation and observation trials?
  - a. Suitability of different crops to meet the vagaries of indigenous farming systems within a given area
  - b. Farmers' ability to conduct agricultural research
  - c. The same crops varieties diversity that might be suitable for sustainable stable food crop productivity under different environmental conditions was developed and maintained
  - d. None of these

Test 5     2 minute

1. What are the main factors that are considered in establishing FIFM variety observation trials in a given community?
  - a. Seed demand for crop varieties that best address food and economic security of a community
  - b. Establishing strong participatory research and extension in a given area
  - c. Helping farmers understand how to develop a new crop variety
  - d. None of these
2. What is the basis for establishing research-extension-farmer-linkages in establishing viable quality local seed provision systems?
  - a. To train farmers in modern concepts of using improved seeds
  - b. Facilitation of horizontal knowledge, information and technology transfer to enhance well targeted delivery of appropriate technology at local level
  - c. Technology development
  - d. None of these

Test 6     3 minutes

1. What do you understand by a farmer-selected variety?
  - a. A crop variety that has been demonstrated by a large number of farmers to meet their household food and possibly economic security concerns
  - b. A very high yielding crop variety
  - c. A crop variety found grown by all farmers in a given community
  - d. A crop variety bred by farmers themselves
2. What constitutes the value for use and cultivation (VUC) of a crop variety in informal farming systems?
  - a. The food product is very palatable
  - b. The yield potential under different environmental conditions is stable and the food products are palatable and marketable
  - c. The crop product is highly profitable
  - d. The crop variety can be exported

## Module 8

### The Small-Scale Seed Production Training Programme

#### Attachment

3. What constitutes seed demand for most indigenous farming communities?
  - a Seeds of crop varieties that produce stable yield under different environmental conditions and can be processed and stored for food
  - b Seeds of crops that are very profitable when grown
  - c Seeds of crops that are commercially available
  - d Seeds on improved crop varieties only
4. Which of the following is correct?
  - a Variety characterisation in FIFM observation plots imparts knowledge for seed production to the farmers
  - b Variety evaluation and observation trials are important for generating local knowledge and information systems dynamics for local farming systems based on that variety
  - c High quality seed can be produced by indigenous farmers provided they have acquired correct local knowledge and information on crop development over a period of two or more seasons
  - d All of the above
5. What are the main functions of FIFM observation trials in local farming systems?
  - a Generate variety performance information covered by heterogeneous farming systems practised in a given community
  - b Capture the possible environmental impact on variety's development in a given district and hence shorten PRE period for assessment
  - c Assist facilitators to capture variety performance information for generating variety adaptations maps that might help in seed marketing
  - d All these and more

Test 7     2 minutes

1. What do farmer exposure visits such as Field days and Seed Fairs contribute to crop productivity?
  - a. Farmers observe for themselves at local level how a variety might perform in their own farming systems
  - b. Farmers learn about crop variety seed availability and accessibility at local level
  - c. Farmers gain knowledge on variety production and performance from their peers in their own language
  - d. All the above
2. What is the purpose for variety viability and validation testing after long seed storage?
  - a. To verify variety performance and stability of traits after storage
  - b. To reinvigorate seed vigour of a variety
  - c. To regenerate new quality seed of a variety for storage and working sample
  - d. For new variety development following major climatic and/or economic changes
  - e. All these

Test 8     3 minutes

1. Which of the following constitutes a pure seed fraction in a seed lot?
  - a. Every whole seed of any crop
  - b. Only complete seed of the crop being tested
  - c. Any seed that germinates
  - d. Whole seed plus any seed over half of the particular crop

## Module 8

### The Small-Scale Seed Production Training Programme

#### Attachment

2. Which of the following seed grain moisture contents is ideal for seed storage and marketing
  - a) Less than 12½%
  - b) 14-16%
  - c) 30%
  - d) None of these
3. What is germination capacity of a seed lot?
  - a) When all seeds in a test sample produce shoots
  - b) Seeds can produce shoots that can emerge from the soil
  - c) Ability of a given percentage of seeds in a seed lot that germinate in a specified timeframe under specified environmental conditions
  - d) None of these
4. What is seed vigour?
  - a) Seed grain with no blemishes and is hard
  - b) Capacity of seed to imbibe water quickly
  - c) Capacity of over 80% seedlings from a seed lot to emerge from the ground in a given period of time under specified conditions
  - d) Seeds that produce very big shoots only
5. Which of the following criteria are used during group dynamics to select a suitable seed crop producer?
  - a) Only married couples
  - b) Women as they have better grasps of crop production
  - c) Farmers who attend all Field Days
  - d) Farmers with suitable land and have adequate seed provision knowledge and information pertaining to the crop to be grown



Test 9     60 minutes

1. Draw a plant flower to illustrate the process of fertilisation
2. By sketches or simple diagram illustrate three main differences between a monocotyledonous and dicotyledonous plant seed
3. State four key contributions of hosting Seed Fairs in a given community
4. State the four important contributions of conducting FIFM observation trials to
  - a A farming community
  - b Research and extension services
5. State three main contributions of knowledge of seed purity and germination capacity to crop production
6. State three contributions to local seed provision systems for formation of stable farmer groups in a given community
7. Give three important contributions to household food security that accrue from knowledge and information on variety characterisation at local farming systems
8. List three critical functions of an extension facilitator in participatory research and extension in local seed provision systems
9. State three reasons for continuing to conducting FIFM observation trials after three seasons in a given community for the same crop and/or variety
10. In open pollinated crops what types of varieties are common in local farming systems?
11. Illustrate diagrammatically how informal farming systems might contribute to quality seed provision systems
12. Give three reasons why national seed security might not translate to household seed security

## Module 8

### The Small-Scale Seed Production Training Programme

#### Attachment

13. Give four reasons for removing off-types from a seed crop produced quality seed originating from a reputable producer and supplier of basic or foundation seed stock
14. Name three types of seed samples stored for supporting a successful local seed provision system in a given community
15. State three important functions of Field Days in a FIFM observation trials program

## Answers to Self Assessment Tests 1 - 8

Test 1.	1	a	2	a						
Test 2	1	d	2	c						
Test 3	1	b	2	c	3	c	4	d	5	e
Test 4	1	d	2	d	3	d				
Test 5	1	a	2	b						
Test 6	1	a	2	b	3	a	4	d	5	d
Test 7	1	d	2	d						
Test 8	1	d	2	a	3	c	4	c	5	d
Test 9										

- Diagram to illustrate stigma, anther & ovule with germinating pollen with tube going to the ovary
- single and two cotyledons
  - germination process where cotyledon in dicots emerge through the soil and in monocots remain in the ground
  - emergence of taproot through the hilum in dicots but not in monocots
- There are nine such contributions to choose from viz;
  - Output 1: Enable farmers in the area to share information regarding the performance of various crops and/or varieties under the local agro-ecological conditions.
  - Output 2: Farmers have access to a wider range of crops and varieties to meet the vagaries of local agro-ecological conditions for their food crop production.
  - Output 3 Skills and knowledge on how to produce particular crops are shared
  - Output 4 Information on quality seed sources (both availability and access) for preferred crops and/or varieties to meet household socio-economic and subsistence concerns are transferred.
  - Output 5 A competitive spirit in seed and food production is developed through quality exhibits.
  - Output 6 Local crop genetic resources inventory and conservation approaches are documented as used by each farming system. This may contribute to crop variety mapping that may assist in collating variety information systems that would be useful for disaster preparedness in specific localities.

## Module 8

### The Small-Scale Seed Production Training Programme

#### Attachment

Output 7: Improvements on crop varieties for increased crop productivity in low input agricultural systems would be demonstrated and their attributes elaborated on.

Output 9: The diversity, quality and quantity of crop and varieties seed from the local seed provision systems would be showcased.

72

a.	Farming community	Enhance adoption of new technology through comparison of results amongst farmers themselves	Farmers gain knowledge that is verifiable and replicable at local level through a hands on approach	Exchange of vital information on variety interactions versus changes in crop development under different local environmental condition	Easy access to desired crops seeds if available through community dialogue
b.	Research & Extension	Gain indigenous knowledge on handling crop husbandry and variety development for increasing crop productivity	Learn techniques for effective technology and information transfer to indigenous community farming systems	Improve data capture on geographic variety adaptation patterns for development of appropriate extension messages	Effectively assist farmers in developing appropriate variety marketing systems to enhance community economic security

4.
  - a) seed planting density for good crop productivity potential
  - b) knowledge on whether to procure seed offered in the market
  - c) possible pest and disease threats which could be introduced from external sources
5.
  - a) the need to share results for verification of data
  - b) establishment of seed processing structures and facilities that might pose investment challenges for a single family
  - c) development of farmer associations that might enhance development of farmer group networks important in local seed and food marketing
6.
  - a) correct timing of planting of a variety to achieve the highest crop productivity in a given location
  - b) knowledge of grain or product storage and processing potential which are important on how much crop to produce

- c) market potential for the crop variety grown that contributes to economic empowerment which might help farmers grow crops for sale and meet their food security through food purchases.
- 7.
- a) linking research to farmers to facilitate appropriate knowledge transfer
  - b) assist farmers in developing farmer groups for speedy dissemination of innovations
  - c) assist farmers formulate plans for produce marketing
- 8.
- a) data verification on variety performance based on genetic purity
  - b) development of information on variety interactions with vagaries of the environment
  - c) validation of data and information originating from other sources
9. Most OPV's are composites made of
- a) stable plant populations
  - b) top cross varieties
10. Show linkages elaborated on in diagrams handed out
- 11.
- a) varieties favoured for national food production might not necessarily adapted to all farming systems
  - b) food commodities suitable for national commodity trading might not necessarily be those favoured as staple by the majority of farmers
  - c) national seed stocks might not be easily accessible to most resource poor farming communities
- 12.
- a) open pollinated varieties inherently produce off-types due to diversity of the genetic pool of the parents
  - b) off-types would cause genetic contamination and hence affect variety performance data profiles
  - c) off-types might contain deleterious genes that may affect the genetic profile of the variety
  - d) affect the quality and hence probity of seed
- 13.
- a) Long term storage normally in seed banks (plant genetic resources conservation)
  - b) working sample (variety development and breeding)
  - c) commercial lot (seed and food production)

## Module 8

### The Small-Scale Seed Production Training Programme

#### Attachment

14. a) Marketing strategy for a variety to demonstrate its potential to farming systems food production
- b) Information transfer mechanism for verifiable quality seed availability and access
- c) exposure visit for other local seed participants for training other farmers on quality seed provision systems

# Bibliography

- Almekinders, C.J. M and Louwaars, N.P (1999) *Farmers' Seed Production: New Approaches and Practices*. Intermediate Technology Publications, UK.
- Appert, J. (1987) *Storage of food grains and seeds*. Wageningen Macmillan and The Technical Centre for Agricultural Rural Cooperation (CTA).
- Cromwell, E (1990). *Seed diffusion mechanisms in small farmer communities-: Lessons from Asia, Africa and Latin America*, London.
- Cromwell, E.(1992) *Supporting community-level seed production*. *Appropriate Technology* vol.18; no.4.
- Cromwell, E; Tripp, R (1994) Overseas Development Institute, London (UK) *ILCA, ICARDA Seed production by smallholder farmers*. Proceeding of the ILCA/ICARDA research planning workshop held at ILCA, Addis Ababa (Ethiopia) 13 to 15 June 1994.
- David S. (1998). *Producing bean seed: handbooks for small scale producers*. Handbook 1. Network on Bean Research in Africa, Occasional Publication Series, No. 29. CIAT, Kampala, Uganda.
- Diekmann, M (1993). *Seed-borne diseases in seed production Aleppo (Syria)*: ICARDA; 81p.
- ENDA, Muggedza, C. and Musa, T. (1996). *Brief Review of Smallholder Seed Supply Systems – Local Knowledge of On farm production*. A Seed Grower Group in Zimbabwe. SADC/GTZ Publication.
- Farm Management Manual – Department of AGRITEX, Harare, Zimbabwe*.
- Gregg, S., Abd El Wanis, S., Bishaw, Z., Van Gastel, A.J.G.(1994) *Safe seed storage Aleppo (Syria)*: WANA Seed Network; .53 p.
- Hildebrand P.E. and Russell J.T. (1996). *Adaptability analysis- a method for the design, analysis and interpretation of on-farm research extension*. Iowa State University Press.
- ILEIA, 1989. "Participatory Technology Development: A selection of ILEIA Publications", *Proceedings of ILEIA PTD Workshop*, ILEIA, Leusden (The Netherlands)
- ISTA (1994) *Understanding seed vigour*. ISTA Vigor Test Committee, Zuerich (Switzerland).
- Johnson, P.H.S.(1992) *Why farmers grow maize in Natural Region V of Zimbabwe*. Harare (Zimbabwe): Department of Agricultural Technical and Extension Services.

## Bibliography

### The Small-Scale Seed Production Training Programme

- Kaimowitz, D (ed) (1990). Making the Link: Agricultural Research and Technology Transfer in Developing Countries. The Hague: ISNAR. pp XIV + 278
- Louette, D. (1996) Traditional management of seeds and genetic diversity: what is a landrace? Supporting diversity through sustainable livelihoods: what are farmers' choices, Harare (Zimbabwe), 5-7 November 1996: Overseas Development Institute.
- Rohrbach, D.D.; Bishaw Z.; Van Gasterl, A.J.G. ed (1997). Alternative strategies for smallholder seed supply: proceedings of an international conference on options for strengthening National and Regional Seed Systems in Africa and West Asia. Andhra Pradesh, India. ICRISAT. 1997. 288p.
- Rusike, J., Sukume, C and Takavarasha, D. Opportunities for Small-Scale Seed Production by self help groups. SADC/GTZ
- Shoko, T. and Chimpira, M. (2002) Report on Participatory Record Keeping Course Conducted at Mutondwe Irrigation Scheme (16 to 19 September 2002). AGRITEX, Harare.
- The First National Workshop on Intellectual Property Rights and Patents for Zimbabwe. Harare (Zimbabwe). 9-10 October 1996. SIRDC/COMMUTECH
- Van der Mheene-Sluijter, J (1996). Towards household seed security. SADC/GTZ Project Promotion of Small-Scale Seed Production. Harare. 57p.
- Venkatesan, V. (1994) Seed systems in Sub-Saharan Africa: issues and options. Washington D.C: The World Bank.
- Wiggins Steve; Cromwell, E. (1995) NGOs and seed provision to small holders in developing countries, vol 23, no.3.
- Wright, M. (1997) Researchable constraints in the seed sector in developing countries. Natural Resources Institute, Kent.
- Wright, M.; Donaldson T.; Cromwell, E.; New, J (1994). The retention and care of seeds by small-scale farmers Natural Resources Institute (NRI); March, Kent.