

# Seed production guide curriculum for Malawi- a farmer field school approach

**Vicki Morrone<sup>1</sup>, Edward Mzumara<sup>2</sup>, and Hannah Livuza<sup>2</sup>**



Produced by

<sup>1</sup>Michigan State University - Department of Community Sustainability  
and <sup>2</sup>Michigan State University – Africa RISING Malawi Project

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## **Welcome to the seed production field school guide**

This is your chance to learn about growing seed that you can use to grow healthier crops and help others to do the same. This curriculum focuses on how to grow beans and other legumes for seed, since it is difficult to find a large selection of varieties available to plant that are good for the soil and eating. This guide also provides information on how to grow seed that can be sold through steps such as registering the production field and carefully planting the field to meet seed certification requirements. Overall, information is offered on how to successfully grow such legumes as soybeans and groundnuts for seed. We hope you enjoy the activities and dramas that will guide farmers to learn and understand better. Please share your past experiences and ideas during this program; they will help everyone to learn.

# PART I: Basic principles

## Introduction

Learning how to grow seed to sell and personal use is an opportunity to sustain local seed resources and enhance farmers' income. This module provides information on growing quality seed, and helps farmers to learn what is required to produce seed that can be registered for sale.

This curriculum intertwines activities with seed production information to create a fun and interactive learning environment. This module can be modified as needed to offer the appropriate style of teaching. The information for seed registration is based on Malawi's Ministry of Agriculture's requirements to produce and sell seed (Seed Act Amended, 1996 - [http://www.wipo.int/wipolex/en/text.jsp?file\\_id=246803](http://www.wipo.int/wipolex/en/text.jsp?file_id=246803)).

This manual is to assist educators such as extension workers and lead farmers to teach farmers how to grow seed for their own use and possibly for sale. The goal is for farmers to become more seed secure, especially for crops which are not widely available for sale, such as many legume varieties.

Legumes are good for the soil, for animal nutrition, and are especially nutritious for people. Seed companies generally sell a few varieties of legumes so farmers can grow their own seed to provide more legume selection and better local access for markets. The challenge with producing enough legume seed is that each plant produces only a few seed per pod, compared to grains like maize, millet, and sorghum. Once farmers have gained confidence to grow seed they can show other farmers their techniques. Farmers can then work together to grow a large amount of seed to sell and better supply market demand.

## Using this manual

This manual can be used by all. The more this information is shared, the more chance Malawi farmers and other farmers have to gain skills and confidence to grow seed to meet their needs, preferences, and markets.

We suggest that the facilitators of trainings mark each section they want to include in a training session before the start of the training. They should consider which sections to use in the training program based on needs of the farmers, level of current knowledge, and time available to share this information. It is best not to have a training longer than five hours per day, and breaks should be included, since people get tired and their ability to learn is reduced as they become tired.

The information in this booklet can help farmers with their farm business and their communities. Please share this information with them in a way they can use it after the training to improve seed access. If you have questions or ideas to improve this document please email Vicki Morrone ([sorrone@msu.edu](mailto:sorrone@msu.edu)) who is with Africa RISING Malawi and Michigan State University. I hope that you enjoy this approach of sharing and teaching and that you are rewarded with enthusiastic learners. I also hope that the farmers are better able to grow and sell quality seed.

### Useful materials to have for this curriculum

1. Flip chart paper.
2. Bold markers to write on flip chart paper, for easy visibility.
3. Masking tape to hang written sheets.
4. Printed curricula for teachers/facilitators.
5. Printed handouts for participants (pages 35–36).
6. Pen and notebook for each student.
7. 1–2 kg of assorted seed for seed sorting exercise (various bean varieties and qualities).
8. 1 kg of quality seed for germination exercise.
9. PICS bags (one per participant) and one traditional bag (one per participant) for seed storage and demonstration.
10. Plastic water bottle ( $\frac{1}{2}$  L) for each participant (seed germination).
11. Paper towels or sand to fill each  $\frac{1}{2}$  L plastic bottle, 20 mm deep.
12. Fresh water for moistening towel or sand.
13. Salt (500 g) for seed moisture test demonstration.
14. A 20 L bucket to demonstrate estimation of grain weight.
15. A 5 L plastic jug with tight-fitting cap for seed storage demonstration.
16. A 50 kg bag of grain for demonstration of grain weight estimation.
17. Glass jar with cap that tightens well ( $\sim \frac{1}{2}$  L).
18. Scale from extension office to weigh 20 L bucket with seeds.
19. A sachet of acetylic for demonstration only that may be used to treat seeds during storage.
20. A branch of *Tephrosia vogelli* with leaves for demonstration only to reduce pests in seeds (<http://teca.fao.org/discussion/uses-tephrois-vogelli>).
21. Assorted garden tools and supplies that can be used in the drama actions.
22. Nearby field to observe how not to grow seed, as noted in the curriculum.

23. Meeting room or shaded area with chairs or benches set up in a “U” shape or in a circle.
24. Child-care provided to allow women to freely participate.

## PART II: Seed production procedures

### Choosing which varieties to grow

**Goal of the session:** This session aims to offer guidance to help farmers grow and save their own seed.

Selecting and growing quality seed can be the first step to a strong business and to meet the demands for legume seed.



Figure 1. Farmers grow one variety of seed, evenly and well-spaced with no intercrops when growing for seed production. Illustrated by: Mosher Chande.

## **Are you growing seed to sell or for yourself?**

Having quality seed to grow is the first step to a strong seed business. Seed that will be saved should be carefully selected, dried, and stored. If good seed is not available for saving then seed may be purchased. Quality seed is seed that is not cracked and has no insect holes. It is seed of the same variety in one bag and is from the previous season. The seed should have been stored in a dry, dark place since its harvest. You can test its germination ability to be sure it is good before planting. If you are growing seed to sell you should choose a variety that is in demand by the buyer or markets. If you are growing seed for your own production, select a variety that grows well in your soil and has the qualities that you prefer, ranging from storage ability to taste.

### **Activity: Questions for participants**

Farmers' experiences about varieties

- Ask a couple of farmers what their favourite legume varieties are (soya, pigeonpea, groundnut, beans). Why?
- How and where do they get the seeds to grow?

**For those that say that they grow their own seed, ask these questions (possible answers below):**

1. How do you choose the best variety to grow for seed?
2. How do you check the seed before growing it for good quality?
3. **A.** How do you store these seeds from the end of season till the next season?  
**B.** What is your reason for using this storage method?
4. What do you do with the seed that you produce? Describe.

### **Possible answers**

#### **Question 1**

- Seed that grow well and mature evenly.
- Seed that does not have problems with diseases (clean seed and seed pod).
- Seed that does not have problems with insects feeding on seed or plants.
- Seeds that are available in my area at planting time.
- Seeds that are given to me free of charge.
- A variety that is tasty and cooks easily.

#### **Question 2**

- Large seed that is all the same color and type (shape).
- Seed that is free of insect holes and cracks.
- Seed that is whole and not wrinkled (no split seed coat).

### Question 3

#### Part A

- PICS bags.
- Underground.
- In reusable grain bags.
- In clay pots.
- In silos.

#### Part B

- Keeps out pests.
- Rodents cannot get to the seed.
- Keeps seed dry.
- Keeps seed safe from theft.
- Does not allow pests to survive since there is no air in container.

### Question 4

- Sell after harvest as seed.
- Sell later, when we need cash.
- Share with family members to grow.
- Store; will eat only if there is a food shortage otherwise will plant the next year.
- Sell as seed to buy grain for food.
- Use as food for my family.
- Store to grow the next season.

**Activity:** Ask the farmers the following questions and list the reasons they give on a flip chart. This can be done as a fun exercise. Have two to three farmers volunteer to be interviewed in front of the class. Teacher poses as a newspaper reporter and asks the following questions:

1. Why would a farmer want to grow and save seed?
2. What traits should a seed variety that is selected to grow have?

### Possible answers

#### Question 1

- To plant the following season.
- To be sure that seed with the best traits for that area (market and climate) is available.
- To sell to a market seeking that type of seed.
- To sell later in the year for a higher price or when in need of cash (so it stores well and they have a good storage system).

## Question 2

### Possible answers

- Varieties that are of special interest or are appreciated locally.
- Seed that grows well, e.g., disease and pest resistant, high yielding, drought tolerant, extra tasty.
- Popular seed type that sells well in the market where they will be sold.
- Seed that is sought by wholesalers or traders.

## Growing seed for sale

**Goal of the session:** Participants learn what is needed to produce seed that can be labelled as SEED and sold at markets or to wholesalers.

### The difference between Seed and Grain

If you want to grow seed it is important to understand the difference between seed production and growing a crop for grain to eat or sell? What is special about growing a crop for seed?

Seed is grown specifically for planting and producing a healthy crop. What is harvested should be used to grow the crop the next year. It costs more to grow and store than grain so should not be eaten, but kept safe for planting.

Grain is for eating or selling. Grain can be grown in any field, anywhere. No special distance is needed. It can be grown mixed with other crops (maize, other legumes) in the same field. You can even grow the crop from seeds that are a mixture of varieties. You can buy this from anyone or any market. The purpose of grain is to grow food; it will be cooked and eaten.

*Trainer please explain: Growing seeds for seed (not grain for food) requires specific practices you will discuss in this session.*

## The value of certified seed

The purpose of certification is to provide seed buyers with an assurance that they are getting what they paid for and know what to expect from harvest and yields. If you want to sell a crop harvest as seed (not grain) then you should certify your seed. All the steps described in this section are mentioned to certify seed.

### Making a profit when you sell seed

The price of seed is more than that of grain since the seed process takes more of your time and is more expensive. You need to make a profit! Therefore, when determining the selling price for your seed, be sure to factor in the time, labor and costs for growing, certification, sorting and cleaning.

## Growing seed for markets

Certain steps must be followed to grow seed to be sold in the markets.

These steps include:

1. Special management in the field.
2. Certification with the Ministry of Agriculture - Seed Service Unit.

To grow pure seed you must have:

- Seed that is certified or registered by the Ministry of Agriculture-Seed Service Unit (check label on bag to be sure).
- A field that is planted at least 5 m from another field of the same type (for groundnut, beans, and soybeans).
- A field that is kept free of other crops and weeds throughout the season.  
In addition you must:
  - Harvest seed when pods are full and starting to dry.
  - Dry seed or pods on mats, not on the ground.
  - Store dried seeds in airtight bags or well-sealed containers (keep groundnut in shells).

**Activity:** Review questions for participants

1. What is the difference between seed and grain?
2. What are the possible markets for each of these products in your area?

## Answers

1. Seed is grown for planting while grain is grown for eating. Seed production includes extra steps such as registration, inspection, and following practices to be sure the variety that is grown is pure and of good quality.
2. Because seed takes extra care to grow, it should be sold for a higher price. The seed should be carefully dried, cleaned, labelled and stored properly until it is sold to protect it and get good germination. Grain can be sold at markets or from the home. It is less expensive since it is easier to produce and does not need to be able to grow. It should be clean but does not need to be a single variety. Seed sold must be a single variety, not mixed with other seeds.

Ask farmers if they would like to come up with a saying to help explain the difference between seed and grain. **For example:** *Seed is not feed and grain is best when not eaten plain.*

## Tips for growing good seed

### Choosing and preparing a field

- The field should be away from other fields of the same crop. When growing soya, groundnut or bean keep 5 meters between fields of the same crop. for pigeonpea keep 200 meters between the same crop.
- You should not grow the same crop grown the previous year in the same field.
- Plan your crops for that season to ensure that your seed field is not near that of other varieties of the same crop.
- Speak to your neighbors and ask them not to grow the same crop next to your field for seed.
- Work together with other farmers to grow the same seed variety and plant next to each other, but mark your fields.
- Locate your field where you can easily maintain it (weeding, field inspection, protection from animals, etc).
- Weed your plot and turn in crop residue in advance of planting.
- Fertilize as needed; you want a healthy crop.

**Note:** If fields are too close, you will get a mixture of seed types. Bees and other pollinator insects can go to different fields too easily. Wind may also blow pollen to other fields. When this happens, it is called cross pollination. Then the plants will not produce pure seeds and its seed cannot be certified.

**Pollination** is how a plant makes seeds from its flowers, thus how we get grain and seed from crops. In a maize crop, maize pollen is located on the plant's tassel (top) and the silk is found on the top of the maize ear. Pollen is from the male part of the plant and is usually light yellow to tan in colour (tassel on maize or anther on bean flower). The silk on maize is the female part of the plant. Pollen is collected by the bee or blown by wind and attaches to the silk. On bean plants, the stigma is on the inside of the flower where the pollen lands and is carried down to the ovule to make a seed. Figure 2 shows the parts needed to make seed on a flower.

**What is cross pollination?** This is when pollen from one variety pollinates another plant that is a different variety. For example, pollen from Groundnut variety CG7 is carried to a flower of Groundnut Chalimbana variety. The Chalimbana will produce a seed but it will be a seed that is not Chalimbana or not pure seed. This is why it is important to grow varieties far enough apart or keep the isolation distance to make sure only pollen from that variety pollinates that crop's flower. When two crops of different variety are planted too close bees and wind can carry pollen from one variety to the other variety. This is called cross-pollination. You may have seen a maize cob containing grain with more than one colour or shape of grain. The grain that does not look like the others was made from pollen of a different variety. This seed will not be "pure" or not be true variety and form a seed that is a cross between two varieties. You do not want a seed like this when your aim is to produce certified seed, hence the isolation distances prescribed in table 1.

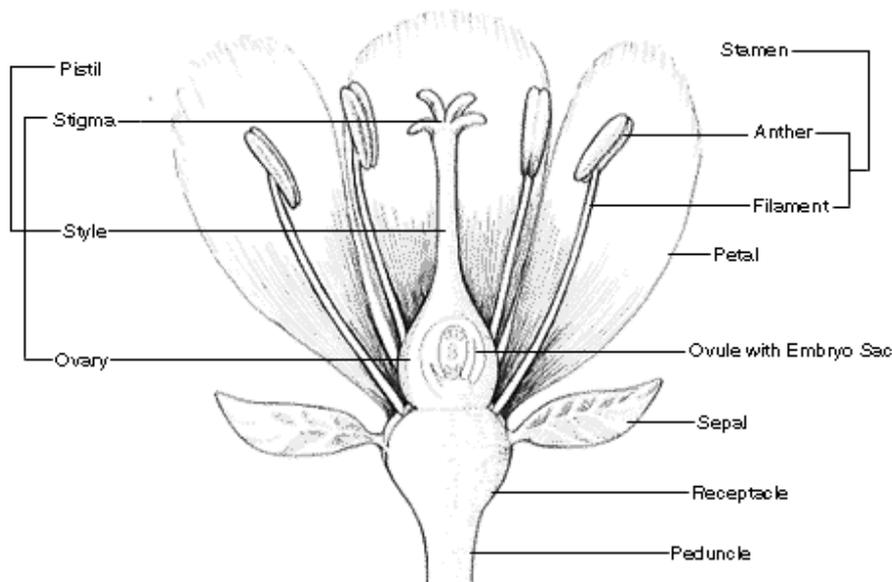


Figure 2. Flower parts important to pollination and seed production. Notice how a flower can capture pollen at the stigma, the part that is at the top of an open flower, often the highest part. Pollen is made on the flower's anthers but pollen can be carried by insects or wind carrying pollen from a different crop variety. This is when cross pollination occurs. Pollen that fertilizes a flower that comes from another flower, perhaps even from a different field will produce non-pure seed. This is why isolation distance between fields of the same crop is required when growing seed. Credit: American Museum of Natural History.

Beans have less problems of cross-pollination since most beans are self-pollinated. This is when pollen from the plant fertilizes (pollinates) a flower from the same plant to make a seed. There is usually very little crossing of pollen in legumes! Cross-pollination can happen when there is a lot of insect activity, e.g., by bees and other insects. This is why it is required to keep a distance between fields to prevent cross pollination in seed production (Fig. 3).

### Activity

Questions about cross pollination and its importance

1. Have you ever seen a maize cob with seed that has more than one color? Describe what you saw.
2. What causes different colors or variation of seed in one plant or pod in a field?
3. Why is the distance from a field of seed of the same crop (isolation distance) important?

### Possible answers

1. Farmers should share a story in which they saw different colors or shapes of seed on a plant within a field. This would be due to cross pollination.
2. Cross pollination pollen comes from a different plant. If fields of the same crop are near (less than 5 meters for most legumes) and are planted with a different variety then the pollen can fertilize and produce a seed that is different from others in that field.

3. The distance between fields of the same crop type is important to be sure that pollen from another field does not pollinate a flower in the seed field. Seed must be pure, or only of one variety. All pollen to make the seed must come from the variety being grown in that field. By keeping fields of the same crop apart there is much less chance for cross pollination.



Figure 3. This field is planted to soybean seed of different varieties. Notice there is a distance of 5 m between the crops and the field has ONLY soybean growing; no other crop and no weeds. Illustrated by: Mosher Chande.

### **Growing certified seed**

To grow high quality certified seed that you can sell, you need to follow the rules mentioned earlier. Following these rules will permit the seed to be certified by the Ministry of Agriculture-Seed Service Unit. You can then label as seed and sell the certified seed for a higher price than that of grain.

The difference between growing seed in your field and growing grain:

- Better germination (more sprout in field).
- Uniform harvest as the plants are all the same.
- Better product to sell, thus more money can be earned.

These qualities are what make for good seed that can be certified so you can sell the yield for a price higher than that of grain.

**Recommended practices to grow certified seed include:**

- a. Grow only one variety of certified or foundation seed in each field (seed label must say certified).
- b. Be sure you follow the isolation distance between adjacent fields. Do not grow seed next to a field of the same crop-type.
- c. Be sure to use the variety and amount of seed you indicated on the field registration form provide by the Ministry of Agriculture.
- d. Keep field weeded and do not allow any intercrops (no mixed cropping).
- e. Have field inspected before harvest by the Ministry of Agriculture - Seed Service Unit.
- f. Harvest seed at the best time for the best seed quality (when pods are full and plant begins to dry).
- g. Sort, clean, and dry seed on mats (remove debris, off-seed, and damaged seed).
- h. After seeds are dry and cleaned, send sample (1 kg) to the Ministry of Agriculture-Seed Service Unit. They will check for seed quality, percent germination, and purity.
- i. Store clean and dry seed in PICS bags or other sealed storage container.
- j. Seal bags properly and store away from rats and moisture.

Table 1 shows the distance required between fields of the same seed variety when growing the crop for seed. This practice greatly reduces cross pollination. This is known as isolation distance. Once you have selected the field to grow seed, talk to the farmers of the neighboring fields to help them understand the importance of this isolation distance. Ask them to please NOT plant the crop that you intend to grow for seed in the fields on either side of your field. For example, if you grow soybean in the field for seed they can grow other crops such as maize, groundnut, or bean in the fields next to yours. They cannot grow any type of soybean in the neighboring fields.

Table 1. Isolation distance needed between fields of the same crop when grown for seed.

<b>Crop</b>	<b>distance (m)</b>
Soybeans	5
Groundnut	5
Cowpea	5
Beans	5
Pigeon pea	200

**Activity:** Review of good practices to follow for harvesting and preparing seed for sale.

### 1. Harvesting seed for the best quality

- Ask two of the participants to describe the harvest process they use.
- Write these steps on the flip chart.

After two persons have described their process ask the group to fill in the gaps (using No. 2 below as a guide) Call on the less active ones. You can make up games to make the review fun.

#### **Question: When do you harvest beans/legumes?**

Answer: Harvest when pods are mostly all dry but before they shatter (this is when pods break open and drop their seed on the ground) to avoid seed loss.

### 2. How do you collect the seeds from plants?

#### **Possible answers**

- Pull seeds off stems carefully when they are partially dry on the plant.
- If they are shattering keep a tarp, basket, or bowl under the uprooted plant so you do not lose seed in the field.
  - Keep pods and seeds off bare ground.
  - Remove soybeans seed from pods then dry on mat.
  - Keep groundnut seeds in pods and dry on mats. Store in pods. **Only remove groundnut seed from pods just prior to planting.**

### 3. How do you store seeds?

#### **Possible answers**

- Test the seed to ensure that they are well dried (refer to section on checking seed for moisture before storage for the two ways to do this on pages 20 and 33).
- Sort out the bad seed (broken, cracked, with holes, different colors) and anything that is not seed such as leaves and dirt.
- Place in a sealed bag or container like the PICS bag.
- Be sure to close the bag or container well following suggested methods such as tying or sewing.
- Store containers in a dry place and away from rodents (rats and mice), water, and rain.

**Activity:** Practice sorting seeds.

This is an important step that must be done before you store, sell, or plant seeds. Doing this before sale will greatly increase the quality of seed and satisfy your customers so you can get a higher price.

- Give each group (3 – 6 persons/group) a bag of mixed seeds. Ask each group to work together and look at seeds in the bags. Look for seeds that are of different colors, damaged, different types, still moist. Sort these seeds into two piles - those that can be planted the following season (seed) and those that cannot be planted (use for food).
- The teacher/facilitator should ask one of the group members to explain/describe what are in the different piles and why they are sorted that way.
- Next, ask two people from another group to evaluate how well the other group sorted the seed. They should share their findings with the whole group. This is similar to how the seed is inspected by seed inspectors from the Ministry of Agriculture.

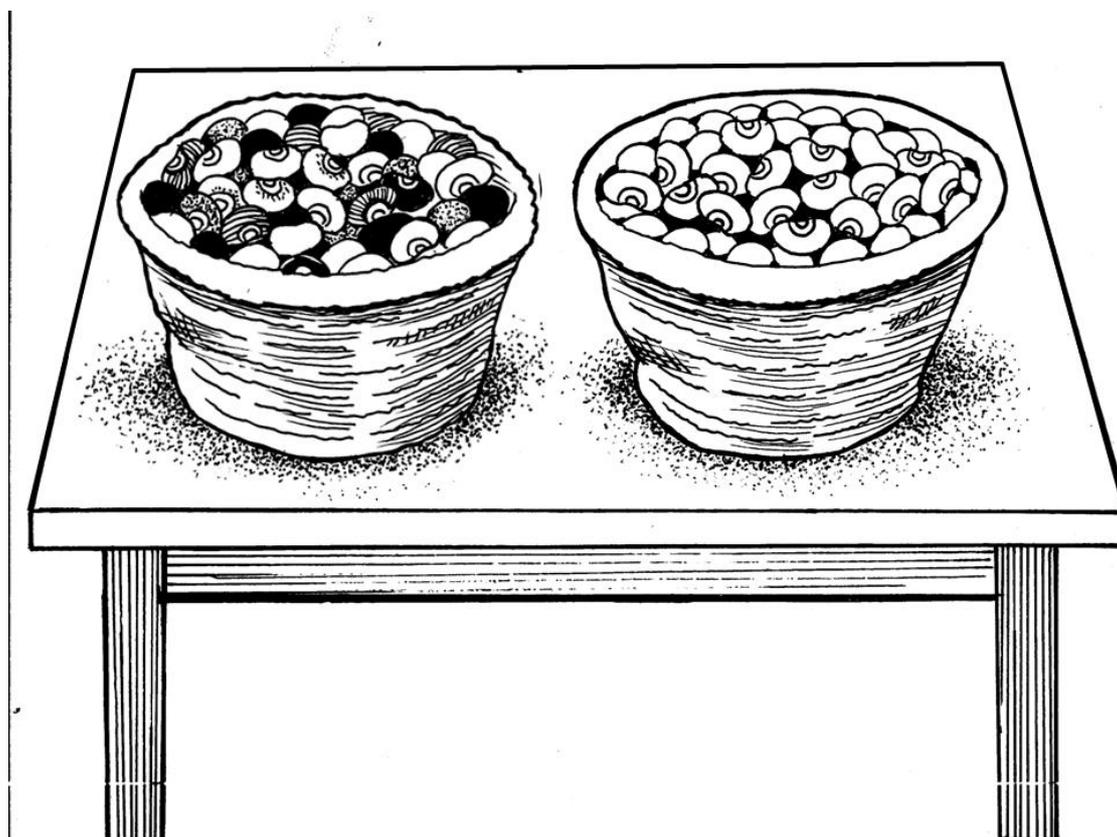


Figure 4. Sorting seeds is important. Illustrated by: Mosher Chande.

\*Note the two bowls of seeds: The bowl on the left includes a mixture of seed types and colors. These beans can be used for cooking. The bowl on the right has seeds of one type and one color. Beans from this bowl can be used to grow new seed.

Table 2. Qualities of good seed.

Physical	Physiological	Genetic
Uniform, smooth, & large seeds	No disease on seed	All same variety
No broken seeds	High % germination	Adapted to local conditions
No weed seeds/pure	Good seedling vigor Good germination	Variety liked by farmers/market: Taste, cooking, color
Seed is clean—no dirt and stones	High yielding	Pest resistant

## Seed certification process

### Overview

- If seed will be sold to markets and seed dealers, the first step is to register the fields with the Ministry of Agriculture Seed Division.
- Arrange with the Ministry of Agriculture-Seed Service Unit and extension workers to have your seed fields inspected.
- Have a seed sample collected by the Ministry of Agriculture-Seed Service Unit to test for purity (all the same) and germination (ability to sprout).
- Once seed meets the requirements for certification, the bags should be labeled as noted on page 17.

### Checklist of steps to certify seed

#### A. Field registration

- Complete field registration application form (Fig. 10).
- Send completed form to the Ministry of Agriculture.
- Include payment when turning in form.
- Keep a copy of your form or take a photo with your phone or camera before turning in.

#### Following is the information that must be included on the seed crop registration form (Fig. 10).

- Grower information (name, address, contact number).
- Seed variety that will be grown.
- Location of the field where the variety will be grown (village and landmarks).
- Size of field.
- Initial source of seed (Where is seed that you will grow from? Keep your receipt).
- Seed type (class of seed—foundation, breeder, or certified seed).
- Land history to note which crops were grown on the field last season.

## **B. Where to turn in your completed seed registration form**

Here is a list of offices where the forms can be submitted for different regions in Malawi.

- Southern Malawi: Bvumbwe Research Station in Thyolo.
- Central Malawi: Chitedze Research Station in Lilongwe and Lifuwu Research Station in Salima.
- Northern Malawi: Lunyangwa Research Station in Mzuzu.

## **Activity: Practice filling the form for seed crop registration**

Facilitator/teacher should check that someone is able to read the form in each group (form is at the end of this manual).

- Ask farmers to open their booklet to the page with the seed crop registration form. In groups, they can practice filling in all the blanks. Work in groups and use one person's information to practice filling in the form.
- After each group (3–4 persons/group) works together to complete the form, discuss the answers by asking the following questions:

### **Questions**

- Are there any questions you are not able to answer on the application form?
- Why are these questions asked (variety, field size, source of seed?)
- How can you ensure your beans will qualify for seed certification?
- *Facilitator: List responses on a flip chart.*

## **C. Field inspection**

The Ministry of Agriculture Seed Division will visit the field during the growing season and check that:

- The field is free of weeds and crop is disease and insect free.
- Plants are all the same variety. There are no mixed crops with the seed crop.
- The size of field and variety being grown matches to what you listed on the registration form.

## **D. Seed testing**

- Before they take the sample, you should check your seed for purity (clean) and germination (use test with moist towel and a bottle).
- Note that taking the time to clean and sort the seed will greatly improve the outcome.
- Officials of the Seed Division will collect a sample of the seed after you harvest, dry, sort, and clean the seed.
- They will collect a 1 kg seed sample from your harvest and take that amount to the laboratory for testing. The rest of the seed is yours.
- The Ministry of Agriculture Seed Division will test the seed for quality. The sample must pass the tests to become certified so that it can be sold as seed.
- Test results must be the same or higher than the percentages given in Table 3.

## E. Seed bag labeling

**Once the seed is certified you should label it to include the following information:**

Make sure the label is easy to read and secured to the bag.

If your seed does not pass certification, you should still label it with the information marked by an asterisk (\*) in the list below. Importantly too, it is compulsory that certified seed is labeled with each point on this list.

- a) The name and address of the supplier (you)\*.
- b) The kind and variety of seed\*. For example - Soya, Magoya.
- c) The class of seed.
- d) Date of testing by the Ministry.
- e) The percentage purity and germination of the seed at time of packing. This information is found on the certification results.
- f) The date of packing into storage bags\*.
- g) The lot number (this number tells you the date of harvest, your field location, and who was the farmer).

For example: A lot number can be 0918LINSVM = Harvested Sept 2018(918) at Linthipe South field (LINS) grown by Vicki Morrone (VM).

Table 3. These are the minimum requirements for seed to be certified.

Crop type	Purity (%) (all same type of seed)	The lowest the germination can be (%)
Cowpea	98	75
Soybean	98	70
Common bean & pigeon pea	98	75
Groundnut	95	80

\* The field inspector will collect a sample of your seed after it has been cleaned. Your seed must have the following scores or higher to be certified.

**Activity: Session review. This can be done in teams as a contest or you can let each team do one of the reviews and share their answers with the group (1, 2, and 3).**

### Review 1

#### Seed certification

Can you list the three main steps to complete seed certification?

#### Possible answers

1. Seed field registration with the Ministry of Agriculture-Seed Certification.
2. Field Inspection by an official seed inspector.
3. Seed testing to check for purity and germination of seed.

## Review 2

### Seed field registration

- Do you know what information is needed to register the field that will grow the seed?
- What do you need to do to register and certify seed to sell to markets?
- Have you ever tried to grow seed yourself? Share your experience please.

### Possible answers

- Grower's information (name, village, contact information).
- Seed variety that will be grown.
- Location of the field where the variety will be grown.
- Size of field to grow seed.
- Where was the seed purchased or what organization provided the seed?
- Type of seed being used: foundation, breeder, or certified. (keep its label)
- Land history of what was grown there the previous season.

## Review 3

### Seed production

#### 1. What do you need to grow good quality seed?

##### Possible answers

- Certified or foundation seed of one variety.
- A field location is 5 m or more from other fields of same crop.
- Good field management to remove weeds and control insects and weeds.
- Enough labor to harvest seed at the correct time.

*Facilitator: Help each group to list steps and write on flip chart paper.*

#### 2. What will the seed inspectors check when they come to the field?

**Activity:** Give each group five minutes (no more) to list as many of the steps they can remember. Compare and discuss answers as a group.

##### Possible answers

###### Growing seed

- Information on form that farmer completed matches field type and size.
- Field for seed is spaced the correct distance from crops of the same variety (isolation distance).
- Field is well weeded.
- No insects on plants or diseases are present in the field (very few).

###### What the inspector will look for in a seed sample

- Seed is well dried (~14% or less moisture).
- Seed is sorted and cleaned to remove cracked seed, off-types, debris (sticks, dirt, dead insects), and any damaged seed.
- Seed sample comes from a protective bag or container that keeps seed free of insects, pests, and moisture.
- Seed is weighed, labeled, and packaged or bagged.

### **3. What tests will they do on seed sample?**

#### **Possible answers**

The seed is taken to the laboratory and checked for:

- Purity (only one seed type)
- Cleanliness (free of debris such as leaves, broken seeds, sticks, and dirt).
- % dryness (so they will not rot). Seed with ~ 14% or less moisture cracks or snaps when bitten with teeth.
- Germination (% that sprouts after one week).
- That sample contains whole seed with no cracks or holes.

### **Final review**

These dramas skits can be used to review and have fun. Select any of these or all of these skits depending on your time but especially where you see there is need for review of the specific topic.

### **Getting ready for field inspection and the big day!**

*(Ask participants to perform)*

#### **What is needed**

- One lead farmer or extension staff to be the actor who understands the seed registration and certification process.
- One person can be the farmer, one the extension staff, and one the seed inspector.
- The group should choose if they want the farmer to “pass” or “fail” the inspection in their drama. This will inform how the questions in the drama should be answered.

### ***Overview of dramas (examples—they can be changed as desired)***

#### **A. Growing the seed crop**

- The drama starts when the lead farmer (extension worker) comes for a visit to the farmer who is in the field just starting to plant the crop.
- She asks how he is and what he is doing. He explains the process but appears not to understand well.
- The extension worker asks if he would like some help to understand. The farmer says yes, with enthusiasm. The field inspector speaks to the farmer in the field. Farmer continues to weed the field to indicate some time passes.

#### **B. Field inspection**

- The crop is growing in the field. The field inspector comes to the field and questions the farmer (about variety, spacing, when they were planted, and when weeding was done).
- The field inspector pulls out the registration form from a folder that the farmer turned in. The field inspector measures the field and compares what is written on the form. He states, they must match.

- The field inspector then comments on field conditions for spacing, condition of field and condition of crop. Comments vary depending how the group decided; if the farmer will pass or fail the inspection.

### **C. Harvesting and cleaning the seed**

- Several farmers work together, each with their own pile of seed on a mat.
- They clean the seed while talking about the process with each other.
- They can talk about their seed, how they clean it, and how they plan to store it.

Below is a checklist of things they can mention in the conversation:

- Sort seed and remove all damaged and off seeds.
- Check that seed is dry (demonstrate that for audience by biting the seed which will crack if it is dry enough).
- Use the salt method to test if the seed is dry enough (see page 33 ).
- Place seed in PICS bag for good storage.

Once these steps are completed the seed inspector from the Ministry of Agriculture-Seed Service Unit arrives to collect the 1 kg seed sample. They will complete the seed quality tests at the laboratory then send the farmer the results.

Farmers whose seed passes these tests can now sell their seed for a premium price as compared to grain. Be sure the seed is labeled properly with all information as noted on page 17.

### **D. Cleaning and saving only the best seed**

- Save only seed that is smooth and clean (no holes, mold, or uneven colors).
- Keep groundnut seed in pods while drying and in storage.
- Dry all types of seed on mats, not directly on soil. (Why?)
- Harvest bean seeds from pods and check for moisture.
- Test beans for dryness by biting down on a seed. If dry it will easily crack or break. If not, continue drying seed on a mat for 1–2 more days then check again.
- Store dry and sorted beans that have been shelled.
- Store groundnut seeds in their shell.
- Store in an airtight container or bag.
- Protect seed from damage, moisture, and being eaten while drying and in storage.

## **Activities to improve understanding**

Learn how to check your seed's germination.

### **Checking seed for percent sprouting (germination test)**

You can learn to do your own germination test, easily. This is a good practice to do if you have saved seed that you will plant or before you turn in a sample to the Ministry of Agriculture Service Unit for seed certification testing. Before you turn in a

sample to the Ministry of Agriculture-Seed Service Unit for certification testing, check for the percent germination.

**Question: How good is that seed?**

Activity for participants: How to check percentage of seed germination yourself.

Seed germination is when a seed sprouts and pushes up its first stem (cotyledon). You can test germination yourself with 10 or 100 seeds.

Why? This will help you to know if the seeds are healthy and can easily sprout.

**Activity: How to conduct a seed germination test**

- **Step 1:** Take 10 or 100 seeds from bag of seed—choose randomly from that bag.
- **Step 2:** Cut two slits on either side of a bottle that is laying on its side. (Fig. 4).
- **Step 3.** Fill bottom half of bottle with clean sand.
- **Step 4:** Moisten sand so it is evenly wet but no puddles.
- **Step 5:** Drain any extra water.
- **Step 6:** Line up 10 seeds so they do NOT touch each other.
- **Step 7:** Keep sand moist (check each day, add water as needed just to moisten sand).
- **Step 8:** Place bottle in a safe place where it will not be knocked down.
- **Step 9:** After 3 – 4 days you should start to see the healthy beans sprouting.
- **Step 10:** Continue checking that the sand is moist.
- **Step 11:** Count the number of seeds that have sprouted each day.
- **Step 12:** On Day 8, stop counting. Count the total number of seeds that sprouted (germinated) and look healthy (any roots should be white, not brown).
- **Step 13:** Write the number of germinated seeds and find the percentage. For example, eight germinated seeds = 80% germination (if you used 10 seeds). Or 80 germinated seeds if you used 100 seeds (this provides a more accurate measure).

- **Step 14:** This number is the percentage of seed that germinated—which is how many seeds can grow if planted. 70% = 70 out of 100 seeds will germinate.

### Germination test you can do for your own Seeds

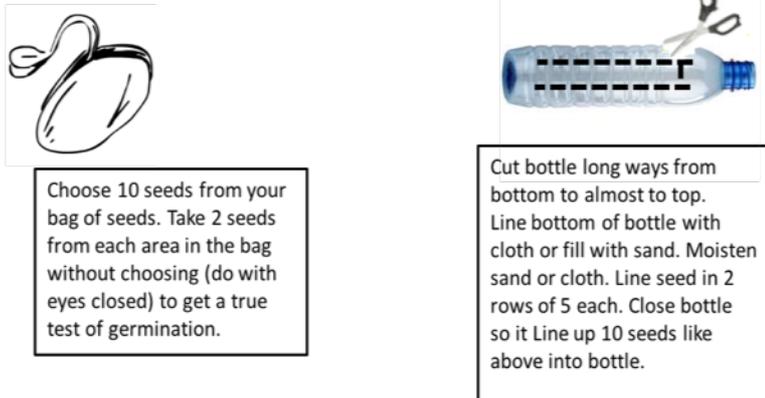


Figure 5. How to make a germination container to test seeds. Credit: Vicki Morrone/MSU.

**Directions:** Cut plastic bottle long-ways to make a “door”. Keep lid on bottle. Life “door” and fill bottom with moist sand and place the seed along the bottom. Check bottle each day that there is moisture. Moisten sand when dry. Keep safe from knocking over.

### Estimating weight (kg) of seed

**Goal of the session:** This exercise will show the approximate weight of your seed. This is very useful to do before selling or planting.

#### **Activity: Estimating approximate weight of seed or grain using a 20 L bucket**

*Note: Farmers should visit extension workers to use their scale to measure the different seed or grain types they grow.*

Knowing how to do this will help you estimate the weight of seed that is in a storage container that you sell or buy.

- **Step 1:** Take 2 – 3 types of seed (e.g., maize, common bean, and soybean) that you will sell.
- **Step 2:** Take a container you use every day and that you use for selling and buying seed (e.g., the large garden bucket or a dedicated jug).
- **Step 3:** Fill that bucket with only one type of seed. Weigh filled bucket and record weight.
- **Step 4:** Now you know how much this bucket or pot of seed weighs for each type of seed. Each seed type will weigh differently in filled container.

- **Step 5:** Write down the weights for each seed type. Keep these numbers in a safe place. Use this information when buying or selling your seed or grain.
- **Step 6:** When you have cleaned the seeds and are ready to put in a sac or container, count the number of buckets needed to fill the PICS bag, sac, or container. This will give you the approximate weight of the seed per storage container (bag, jug, bin).

**Why is this method useful?** When you buy or sell a bag of seed use the container you weighed when measuring the seed to get its weight. It will help you pay or charge the correct amount for the right amount of seed or grain. Weighing your seed helps you to know:

- How much seed you have to sell.
- How much seed you have to plant.
- How much money you can earn.
- How much money you need if you need to buy seed

### **Selling your seed**

You should know the approximate weight of the seed to know how much you should be paid. This will avoid unfortunate mistakes by the vendor. If you do not agree with their calculation when they are weighing your seed you do not have to sell it to that person. This is your seed.

### **Know the weight of the soybeans you are selling or buying**

Using the recorded weight of one bucket of seed, count the number of buckets or pots of seed filled from the seed bag. Note that you must use the same container you used when you weighed the seed previously. If a filled pot weighed 700 g and you fill the pot 10 times then you have 7000 g or 7 kg of seed. This way you will be able to pay or charge the right amount for the seed without a scale. Sometimes a road or market vendor has a scale but it may not be accurate. Using this approach provides a better estimate so you can pay or charge more accurately.



Figure 6. Woman is estimating how much seed she has. In the past she checked with a scale how much the bucket weighed when filled with each type of seed she grows. Now, when she goes to sell her seed she knows the approximate weight of the seed and can easily calculate how much the seed should cost. Illustrated by: Mosher Chande.

## PART III: Storing your seed

### Storing seeds

This is an important step if you want to keep seed to sell or plant next season. Storing beans and other legume seed requires extra care. Seed must be kept free of insects like weevils. Insects feeding on seed can cause the seed not to germinate when eventually planted. Keeping air out of seed storage bags is the best approach to kill insects since insects cannot live without air. When PICS bags are sealed properly there is no air left in the bag so any insect in the seed dies quickly. This is true for any type of container storing seed that is sealed tight. A well-sealed jug or multi-layered bag that is filled full of seed has no air and no insect can live without air.

**Activity:** Questions for participants and discussion with class

- Where and how will you store your bean seed?
- Are there possible problems with your approach?
- What are some possible solutions to these problems?
- How will you clean your seed?

*Write participants' responses on flip charts. Ask if there are other points they would like to add after you read the list to the class.*

*Facilitator: Fill in the information gaps and make corrections (gently) as needed to shared information about how to*

- Clean seed
- Sort seed
- Pack seed

**Activity for participants:** Storing seed in containers. Use PICS bag and 5 L jug for demonstrations.

Following are some steps to keep the seed in good condition (Fig. 8 shows how to properly fill a seed storage PICS bag)

#### **A. Use a seed bag or 5 L plastic jug with a well-fitted cap**

- Step 1: Fill a clean and dry sack or jug.
- Step 2: Try to fill to the top of the bag to keep out air. Seeds do not need air until they start to grow. Insects do, so keep air out.
- Step 4: If reusing a bag or plastic jug clean it with bleach (JIK) first and be sure it is well rinsed (three times) and completely dry.

## **B. Use triple-layer bags**

The three-layer bag keeps out air and prevents insects from crawling in. Note that Figure 7 refers to cowpea but you can use this type of bag for any clean and dry seed or grain.

Note: A PICS bag should have three layers when you buy it. Keep the three layers together!

- First: Fill bag with clean and DRY seed.
- Secondly: Close the innermost layer by twisting it tightly to remove any air and tie with a cord.
- Thirdly: Close the second layer in the same way: Twist it then tie it tight.
- Lastly: Close the third layer by twisting and tying. Now your bag is secure and air-tight.

### **Review from activity**

*To be done after exercise of filling containers for seed storage.*

### **Questions for participants**

**Seed needs to be protected from what?**

**Possible answers**

- a. Insect damage
- b. Rat damage
- c. Water damage
- d. Theft

**What are some ways to store seed?**

**Possible answers**

- a. Super bags or PICS bags (see Fig. 8).
- b. Woven seed bags (Fig. 7).
- c. Storage bins or silos (see Fig. 9).
- d. Recycled cooking oil containers that are dry and clean. Cover top with plastic then secure with lid. Fill full with seed to push out air.
- e. Locally made bins (branches) elevated off ground with rat guards of metal (Fig. 9). Grain and seed should be stored in bags after drying and cleaning in these bins.

*Facilitator: Discuss benefits and problems with each way; ask farmers their approaches and list on flip chart.*

## Preparing a good seed storage space

### Postharvest pest management

#### Key characteristics of a postharvest facility (shed or storage bin) for seed storage

- Shelter for seeds should have no leaks in roof and doors should be kept closed when seed is stored.
- Keep area clean: sweep and mop with bleach (e.g., JIK) water between uses to assure no seed diseases remain.
- Protect bags from rats, birds, and insect infestation.
- Store well-dried seed only.
- Clean seed before placing in storage.
- Store groundnuts in pod to maximize germination, i.e., do not shell groundnut.
- Store other beans shelled and dry (if seeds are dry enough for safe storage then the seed should break easily when bitten between teeth with no detectible moisture [not chewy]).
- Treat stored seed with a postharvest treatment if you are not using PICS bags or another storage that keeps air (oxygen) out.
- You can use either a natural or chemical pesticide dust on the seeds
  - a. Acetylic insecticide (chemical) is commonly used on seed when it is placed in bags for storage and is quite effective. *Discuss with the students the safe use of this and other pesticides.*
  - b. You can also use *Tephrosia volgeii* (fish poison bean tree, an agroforestry tree) Collect and dry leaves then pound them to make a powder. Mix powder with seed in every bag. Before you do this, check if your market allows this.
- Note that the best way to have healthy seed is to grow a healthy crop. Use good pest management and dry seed carefully. Then clean (sort) seed so it is free of debris, weed seed, mis-matched seed, and damaged seed.

Also refer to the insect and disease manual from CIAT—part of your resource packet with the Extension Workers in Africa RISING-Malawi - [handbook for small-scale seed producers2011](#)

## Sealing a 50 kg woven bag correctly

- Fold the bag mouth 5 to 10 cm inwards to create a “valve” so grain is not forced out when bags are stacked.
- Use about 16 stitches to sew a 50-kg bag closed.
- A knot should be made at one end of the string; tie a knot at one end after sewing. Leave a 10-cm extension (tail) of the string at the end without a knot. This method will make it easy for the bag to be opened.
- To open a bag of seed sealed this way: pull string from end without a knot. The bag will easily open and cause less damage to the bag, making it reusable.
- Do not shell groundnut until just prior to planting.
- Shelled groundnuts are fragile and are exposed to various agents that cause physical, chemical, and biological breakdown.

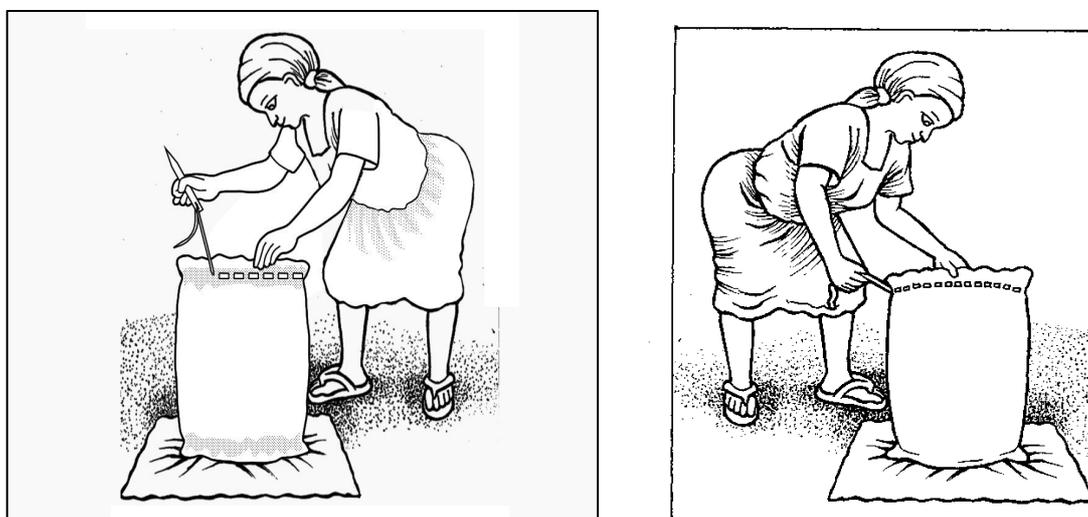


Figure 7. How to close seed bags to reduce seed loss.

Woman is sewing bag closed to store the seed securely. Note that the woman has left a “tail” on one end that does not have a knot (left illustration). To open the bag later, this “tail” can be pulled easily through the bag from end to end. Illustrated by: Mosher Chande.

- Note: before sewing bag closed, fold-in open ends into center. The mouth of the bag should be folded inwards and sewn closed making a knot at one end and leaving a tail at the other end. This is the recommended way to store grain. It is the way required to sell grain too.
- Grasp the two sides and sew with small stitches. This will improve the bag storage.
- If you are going to sell these bags to a certain organization or vendor ask how they prefer the bags to be sealed as there are several options to sew a bag.

## Using PICS bags to protect seeds while in storage

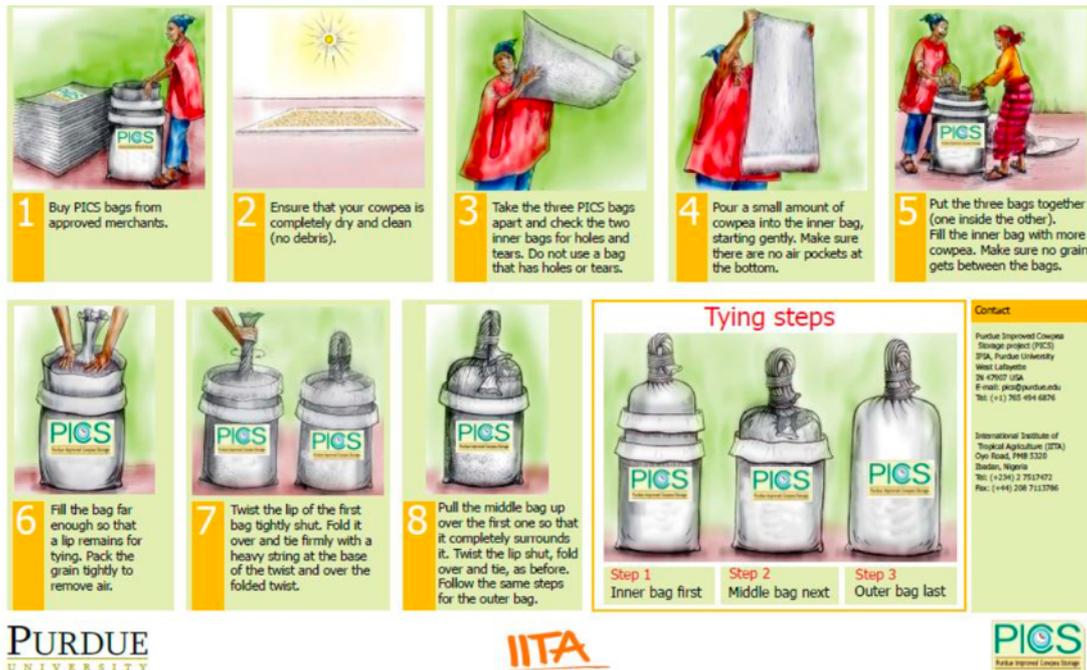


Figure 8. How to fill PICS bags correctly. Credit: Purdue University and IITA.

[https://picsnetwork.org/resources/?tab\\_id=Posters](https://picsnetwork.org/resources/?tab_id=Posters) (poster is available at this site in several African languages).

### Filling and tying PICS bags

\*Pack seed in bag. Follow steps as stated in Figure 8 for PICS bags.

1. Be sure bag has three layers inside each other (woven [outside], plastic, and plastic). Check that each later does not have tears or holes (pull apart and look at each layer then put back together).
2. Check that the seed to be placed in the bag is completely dry and clean.
3. After you have put the 3 layers of bag back together, begin to fill inner bag with seed slowly. Do not allow seed to go in-between layers.
4. Fill bag just enough so there is room to twist EACH LAYER shut.
5. Securely tying each layer is the most important step to assure no insects get in or if there are insects inside, they die due to lack of air.
  - (a) Twist, bend the twist over then tie with a strong cord or strong tire cord. Do this with each layer, starting with the innermost layer first..
  - (b) After twisting tightly, bend twist over and tie securely with nylon string or old tire inner tube strip.
  - (c) Each layer should be twisted and tied over the previous layer (see diagram in poster Fig. 8; "Tying Steps").

*After practicing this have a discussion on why these steps are important.*

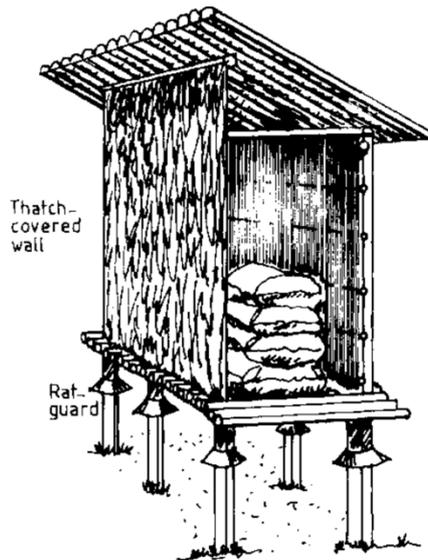


Figure 9. Grain or seed bags can be stored in this outdoor system which can be made of wooden or metal posts and poles and even covered with woven mats. Always use metal for the rat guards. Credit: FAO.

**Seed storage description** (Figs. 7, 8 and 9)

- Storage bins like these will keep out rats. Notice the rat guards. They should be made of metal so rats cannot chew through them.
- The roof must be rain-proof to keep the bags dry. Repair any holes before storing seed or grain.
- Because PICS bags have 3 layers, they keep out oxygen or air. No air means that any insects or fungi that are present will die and your seed will be safe from pests.
- Triple bags (use at least one layer that is heavy plastic) or PICS bags are a good way to store grain and seed.
- PICS bags keep insects out but rats can chew through them so store on raised shelves or as shown so that rats cannot get to the bags. Also make sure that the bags are kept dry.

## Pest management

**Activity:** Review questions for participants

1. What are some good ways to store seed to protect them from pests?
2. What can you add to seed to reduce pests in a stored bag of seed?
3. Which pests are problems on stored bean/pigeon pea seed?
4. Why do pests live on the bean seed?
5. How can you kill pests on seeds and not harm the seed?
6. What environment is not good for seed germination?

### Possible answers

1. Clay pots with tight covers, PICS bags sealed properly, sealed bottles, or jugs.
2. Poisons such as acetylic or *Tephrosia volgeii* crushed leaves.
3. Weevils, rats, grain moths.
4. The bean is rich in protein and oil (especially soybeans and groundnut).
5. Push air out of bags at tying.
6. (a) Humid environment. Moist seed will lose its ability to germinate, and will thus mold and rot. (b) Seed that is stored in metal bins can become very hot if placed in the sun. High temperatures can kill seed then it will not grow.

See Page 32 on common pests and diseases of beans and pigeon peas. Also refer to CIAT pest manual on beans in your resource kit with extension worker.

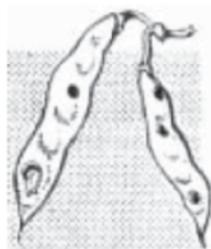
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## Common pests on beans and possible control methods

- Always follow directions on the label of any pesticide. Ask an extension worker for advice on pesticide selection and proper use. Remember pesticides are dangerous to humans, animals, and insects. Use them carefully and correctly.
- If you are not familiar with how to spray seek help from an extension worker.
- Keeping your field clean of infected plants will help reduce insects and diseases.
- Plant as early as possible to "miss" the hatching of insect pests.

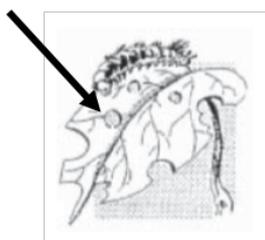


**Aphids and flower thrips:** Use Dimethoate chemical pesticide or Fenitrothion chemical pesticide against aphids and flower thrips. Use 20 ml (4 teaspoonfuls) per 15 L knapsack sprayer. These are very strong pesticides that are taken into the plant (systemic) and kill insects once they feed on the plant. Use these types of pesticides only when there are many insects on the crop (more than 10 per leaf).



**Pod-eating caterpillars:** Use Ambush which is a synthetic pyrethroid insecticide. Use 10 ml (2 teaspoonfuls) per 15 L knapsack sprayer.

*Bacillus thuringiensis* or BT is a natural pesticide but must be used when the pod-eating caterpillars are very small (less than 3 centimeters or 1 inch in length). This is a safe pesticide but must be applied to plant only when there are newly hatched caterpillars.



**Leaf eaters:** Do not worry too much about leaf eaters unless they are removing more than 1/3 of the total leaves or the plants are very small. If this is the case, use a synthetic pyrethroid insecticide as for pod-eating caterpillars.



**Bean stem maggot:** If you have a problem with bean stem maggot, treat your seed before planting with an insecticide. The method for treating seed against bean stem maggot is also explained in the handbook "Controlling diseases and pests in bean seed fields available at

[eca.fao.org/sites/default/.../handbook\\_for\\_small-scale\\_seed\\_producers2011\\_8.pdf](http://eca.fao.org/sites/default/.../handbook_for_small-scale_seed_producers2011_8.pdf)

**You can also ask your extension worker for help.**

## PART IV: Testing what you have learned

### Overall review activity

Make a game using these questions, two teams answer against each other.

Perhaps:

1. Have each team sit together.
2. Give each group one question about seed production, storage, and registration. They can help their teammates answer the question.
3. Let each group ring a bell or tap a spoon on a glass or cup to indicate they know the answer. Whoever taps the cup or rings the bell first gets to answer the question.
4. If they get it wrong then the question is passed to the other team until the question is answered correctly.
5. Offer a sweet as a prize to whoever gets the answer right or give everyone a sweet after and indicate that everyone was a winner for trying.

Preparing seed for storage

1. When should you harvest seeds?
2. How dry should seed be to store and how do you know?
3. What are the important steps to store seed?
4. How can you test seed to see if it will grow?

### Possible answers

1. When pods are full and begin to dry. Groundnut should be pulled as plants are 14% dry. Check a few plants before pulling whole field.
2. You can check for dry seed by placing a few seeds in a dry jar filled with salt. If the salt becomes moist after an hour then the seeds are not dry enough. You can also crack a seed between your teeth. If it cracks easily and is not chewy then it is dry enough for safe storage.
3. Storing seed can be done after:
  - b. All debris and any cracked seed is removed.
  - c. Seed is dried on mats.
  - d. Seed is stored in bags and weighed.
  - e. Bags are labelled with variety, date of harvest, and your name.
4. Before planting any seed it is best to test seed for germination, to see how well the seeds sprout. Place 10 seeds in a pan of moist sand or a plastic bottle cut sideways (Fig. 5) filled with moist sand. Check daily. Look for sprouted seeds. After eight days count the number of sprouted seeds. If seven or more seeds sprouted then you have 70% or more germination and the seeds are healthy.

## Field visit to test your knowledge

### Review

- *Facilitator*: Identify an area before program starts where there are fields in production (rain-fed or dimbas (hand-dug wells near river beds))
- Visit these fields with students while doing review if possible
- Remember: *Seeing is understanding*

### Activity

Share this with participants: Look at each crop in the fields. Imagine that it is being grown for seed (not grain). Consider all that was learned today.

- What do you see that is good for seed production?
- What do you see that will lead to poor quality seed?

Make a list of what will be good and bad for seed production.

*Facilitator* should write responses on flip chart in two columns –“Good Seed” and “Poor Seed”.

### Look for

- (in the field)—weeds, diseases, and insects.
- Distance from other fields that are planted to the same crop type (e.g., groundnut next to groundnut).
- Are plants all the same variety in one field? Look at leaf shape and color of flowers.

### Go back into the classroom and do the following:

Take a bag of seed and dump it on a table. Let us say this bag of seed is for sale. Let's decide if the seed is good enough to buy.

- What are the traits we want in a bag of seed for sale?

Consider:

- What is the seed color? Are they all the same?
- Are the seeds all the same size?
- Is each seed whole and not cracked?
- Is the bag of seed free of dirt and plant debris?

Are the seeds the same shape and approximate size? (This helps to tell if they are of the same variety).

# PART V: Handouts for participants

## Sample of a seed registration application form



**MALAWI GOVERNMENT**



**Ministry of Agriculture**

**REPUBLIC OF MALAWI**  
**MINISTRY OF AGRICULTURE: SEED TECHNOLOGY UNIT**  
**SEED CROP REGISTRATION**

**NAME OF GROWER:** \_\_\_\_\_ **GROWER'S NO.:** \_\_\_\_\_

**NAME OF ADDRESS OF FARM:** \_\_\_\_\_ **DATE:** \_\_\_\_\_

**DISTRICT AND T.A.:** \_\_\_\_\_ **PHONE NO.:** \_\_\_\_\_

Field No.	Crop Species	Variety	Hectares	Date planted	Planted Seed			Previous cropping history of field (Yr)			Remarks
					Status of seed to be planted	Lot No.	Source	20	20	20	

Evidence may be required – attach a label from bag of seed.  
 State how resulting seed crop will be marked  
 Draw a map on the back of this form showing how to get to the field and the position of stores where the harvested seed will be kept.

Signature of Grower  
 Or Representative \_\_\_\_\_

Figure 10. Sample application form to register a field that will grow seed. This is the form that you complete and turn in with a fee to the Ministry of Agriculture-Seed Technology Unit. Note that you can use this form for up to four fields.

## Sample of results of seed testing certificate from Malawi

FORM SR8



REPUBLIC OF MALAWI  
SEED CERTIFICATION AND QUALITY CONTROL SERVICES

Test No  
  
 (Quote in any correspondences)

Seed Testing Laboratory  
P.O. BOX 158  
LILONGWE  
TEL. 01707222/087

### SEED TESTING CERTIFICATE

Crop species		Variety	
Lot No		Quantity	
Date Sample Received		Date Reported	
Class of Seed		Valid up to	

ADDRESS

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Purity	% Germination	%
Injurious weed seeds		%
Other seeds		%
Other varieties		%
Defects		%
Inert matter		%
Shelling		%
Pips		%

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Remarks			
Abnormal:	%	Fresh seed	%
Dead seed:	%	Hard seeds	%

Sample drawn by:  
Government Seed Inspector

\_\_\_\_\_  
CONTROLLER OF SEEDS

Figure 10. Once your seed is tested at the laboratory, this is the form you will receive. It will tell you if your seed passed the tests so that it is certified based on testing results. Farmers who disagree with the results of their seed analysis can contact: Seed Service Unit (SSU) at Chitedze Agriculture Research Station, Lilongwe, Malawi, c/o The Director of Agricultural Research Services.