

PACKAGING AND PALLETIZING PROCESSES AND EQUIPMENT

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PACKAGING

Introduction: After processing and treating are completed, seeds are packaged into containers of specified net weight. Packaging or bagging is essentially the last operation in which seeds are handled in bulk flow.

The packaging consists of the following operations:

- ✓ Filling of seed bags to an exact weight.
- ✓ Placing leaflets in the seed bags regarding improved cultivation practices.
- ✓ Attaching labels, certification tags on the seed bags, and sewing of the bags.
- ✓ Storage/Shipments of seed bags.

PART I: THE PROCESS

What is meant by seed packaging?

- This is the placing of a counted or weighed sample of seeds into a container which is then hermetically (airtight) sealed ready for storage.

Why are seeds packaged?

- Seeds are packaged to prevent absorption of water from the atmosphere after drying, to keep each separate and prevent contamination of the seeds from insects and diseases.
- ❖ Other Reasons: Contain products, defining the amount the consumer will purchase; Protects products from contamination, from environmental damage and from theft; Facilitate transportation and storing of products; Carry information and colorful designs that make attractive displays.

When should seeds be packaged?

- The best time to package seeds is directly after the moisture content has been determined and found to be within the required limits for safe storage. Seeds will always show equilibrium between their moisture content and the relative humidity of the environment and therefore, if possible, seeds should be packaged into containers and hermetically sealed in the drying room or without delay on being removed from it.

How should seeds be packaged?

- Different containers and special equipment for sealing are available for the storage of seeds.
- Storage containers for base collections should be hermetically sealed and moisture-proof.
- Cans, bottles, and laminated aluminium foil containers are all acceptable for both base and active collections. The techniques used will vary with the type of container and the equipment that your gene bank is using. The general steps outlined in this section could be followed.
- Moveable racks make the best use of available space and are ideal to store containers in walk-in stores. Small containers or aluminium foil packets can be filed in boxes for ease of locating individual accessions. Coding systems by number or colour are also helpful in exactly locating accessions.

Types of Packaging

- Packaging materials are classified as rigid, semi-rigid and flexible, according to their consistency.
- Those that present some specific characteristic due to the type of product it contains or on its applications, are considered special packs.
- Rigid packs are produced in metal (steel and aluminum), glass, cardboard (flat and corrugated), wood, rigid plastics or ceramics, with the addition in some cases, of materials such as tinfoil, resinous or synthetic oils, paints and glues.
- Semi-rigid packs are plastic bottles and containers and mixed laminated materials.

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With no reuse, discarded packs have an undesirable impact on the environment



THE PACKAGING PROCESS

- Prepare for Packing
- Package the Seeds
- Enter the data into the Data Files
- Check the Quality of the Containers

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Step 1. Prepare for Packaging

- 1. Work in the drying room or, if not possible, expose the seeds to the ambient relative humidity for the shortest possible time.
- 2. Write on the outside of each container or on an adhesive waterproof label. Also prepare a label for inclusion with the seeds. Record the accession number, date of storage, genus and species if required. Use permanent markers for this.

Notes and Examples

- Adhesive labels can be used for the outside of containers, but they must be waterproof and remain adhesive for long periods at low temperatures.
- **Equipment**
 - Labels
 - Permanent markers
 - Laminated aluminium foil containers, cans or bottles
 - Machines for sealing
 - Coarse balance
 - Scoop/spoons

Step 2. Package the Seeds

1. Weigh out or count samples of seeds to fit the containers used in your gene bank.
2. Fill the labelled containers with the seeds. Add the label prepared for the inside.
3. Seal immediately, so that the moisture content of the seeds does not increase due to equilibration with ambient relative humidity.
4. Note the weight or number of seeds in each container.

Notes and Examples

- It is important that the containers used should be moisture-proof and sealed. The exact sealing technique will depend on the type of containers and sealing methods that are available.
- **Laminated aluminium foil bags** are easy to package, can be cut to size to save space and can be sealed again after use. However, they are difficult to stack and must be made of good quality material and have good seals or leakage may occur.

Step 2 Cont.

- **Cans** are rigid and easy to stack and usually will not break open if dropped. However, some types of cans are not resealable and therefore are expensive to use. A standard size can with only a few seeds inside wastes space in the store.
- **Glass bottles** can usually be sealed again and the amount of seed left is visible. However, a standard size will waste space and bottles are easily broken.
- Seeds can be packaged in bulk into **large containers and/or sub-samples** can be packaged separately into smaller containers. Although the initial packaging period is longer, sub-samples can then be removed quickly without having to remove the bulk of the accession from the store.

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Step 3. Enter the Data into the Data Files

- 1. Enter the relevant data about each accession into the data file.
- 2. The data should include number of containers per accession, number or weight of seeds per container, type of container (if not standard) and the date of packaging.

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Step 4. Check the Quality of the Containers

- 1. After sealing, make a visual examination of each container to make sure that there is no obvious damage and that the seals do not leak.
- 2. Any containers that are below standard should be replaced immediately.
- 3. At regular intervals the containers should be checked to see that they remain in good condition. It is suggested that this check should be carried out routinely once a year and that individual containers should also be checked whenever they are removed from the genebank.
- 4. If containers are found to have been leaking and the relative humidity of the store was not controlled, determine the seed moisture content.
- 5. If the moisture content has risen, dry the seeds back to the required moisture content level.
- 6. Enter the value of the new moisture content into the data files. Make a note that the seeds in that container have been held at increased moisture content for a limited period and dried again.
- 7. Check the inventory data file for the descriptor 'date of packaging' and make a list of any other accessions which were packaged in similar containers on the same day or one day before or after.

Step 4 Cont.

- 8. Check the containers on this list for leaks and poor condition and replace any that are faulty using the methods described above.
- 9. Remember that any containers removed from the cold store should be allowed to warm to room temperature before opening. This may take several hours especially with large volumes of seeds.
- **Notes and Examples**
- If any defective containers are found, it may indicate that containers made or sealed at the same time are also faulty or it may just be one faulty container or seal. Checking those packaged at the same time will show if the problem is widespread.

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Summary of seed packaging in your gene bank

Fill in this table for your future reference:

Species	Type of container	Optimum number or weight of seeds/container	Sealing method

PACKAGING / BAGGING EQUIPMENT

- 1. **Bagger weigher:** These are small machines which when properly mounted beneath a bin will fill and weigh a bag accurately in a single operation. Bagger weigher and bagging scales used in seed packaging may be manual, semi-automatic or automatic.
- 2. **Bag sewing machine:** After an open-mouth bag is filled the bag top must be sewed with a bag sewing machine. Bag sewing machines are precision, high speed machines and must be operated and maintained properly to prevent frequent breakdowns and short operating life.
- 3. **Elevating and conveying equipment:** Several types of conveyors are available for moving seed into, through, or away from the processing plant in vertical, horizontal or inclined directions. Selection of conveyors that have adequate capacity, do little damage to seeds and are easy to clean and can have an important influence on processing effectiveness and efficiency.

Conveyors used at processing plants can be classified as:

- 1. Bucket elevators
- 2. Belt conveyors
- 3. Vibrating conveyors
- 4. Pneumatic conveyors
- 5. Screw conveyors
- 6. Chain conveyors
- 7. Lift trucks.

Packaging and Palletizing



Manual Bagger (by weight)



Open mouth bagger



HIGH SPEED ROBOT PALLETIZER



ATTACHING LABELS

- At the time of placing seed into bags, a label must be placed on each bag to maintain positive identity of the seed. When bags are closed with a bag sewing machine, a label or tag can be sewn to the bag.
- **Maximum lot size:** The maximum size of seed lot shall not exceed the limits. Each seed lot will be assigned a seed lot no. as specified in the Minimum Seed Certification Standards (MSCS).

The Steps / Parts

- ✓ Month-Year Code
- ✓ Production Location Code
- ✓ Processing Plant Code
- ✓ Seed Produce Code

FIRST PART

- This shall be called the "**Month-year code**" and will indicate the month and year in which the concerned seed crop was harvested. The month will be represented by its abbreviated form and the year will be represented by the last two digits of the calendar year, such as 89 for 1989 A.D., 90 for 1990 A.D., 00 for 2000 A.D., 01 for 2001 A.D., 10 for 2010 A.D., 11 for 2011 A.D. etc. The abbreviated form to be used each month is given as under:

■ Month	Abbreviated form
■ January	JAN
■ February	FEB
■ March	MAR
■ April	APR
■ May	MAY
■ June	JUN
■ Etc.	

SECOND AND THIRD PARTS

Second Part

- This shall be called the “**Production Location Code**” and will indicate the State, District, Sector, Territory, Province etc where the concerned seed field(s) was/were located.
- For this purpose, each State, District, Sector, Territory, Province etc is allotted a permanent numerical as shown below.

Numerical Sector / District

01	Ngoma
02	Arusha
03	Kitale
04	Jinja
05	Mugesera

Third Part

- This shall be called the “**Processing Plant Code**” and will indicate the seed processing plant where the relevant lot was processed. For this purpose, the certification department shall allot a number to each approved seed processing unit.

FOURTH PART

- This shall be called the “**Seed Produce Code**”.
- It will indicate ultimate serial number of an individual lot.
- The procedure for assigning this code will be based on unit of certification.
- For this purpose, the Certification department shall allot a number commencing from 01 to each unit of certification.
- The seed produce code shall be commenced from 01 with effect from 01-06-2011 and it shall be continued for THREE financial years.

All the four parts of the lot number shall be written in series with a “dash (-)” between first, second, third and fourth parts to distinctly indicate the code number of each part.

AN EXAMPLE

Lot No: JUN17 – 02 – 10 – 01

- JUN 17 Seed harvested in June 2017
- 02-Seed crop raised in Arusha
- 10- Seed processed in a processing plant identified as number 10 by the Arusha District Certification Department.
- 01- Seed Produce Code that will trace to the particular unit of certification.

Note: Each seed lot under Certification shall be assigned a distinct number so as to facilitate in:

- ❖ Maintaining its identity
- ❖ Tracing back to its origin
- ❖ Handling in stores, transit etc.
- ❖ Accounting and inventory maintenance
- ❖ Referring / communicating about a certain quantity of seed.

**THANKS
FOR
YOUR ATTENTION**

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