

SEED COLLECTION



WHY COLLECT SEEDS?

Seed recovery provides the following benefits to producers:

- Lower investment at the beginning of the season.
- Possibility of growing high value crops for producers with limited means.
- Autonomy in relation to the seed market and the financial situation of the producer.
- Preservation of genetic diversity and the possibility for the producer to select according to his own criteria.

Nevertheless, the use of own seeds competes with the use of new seeds selected to resist particular diseases.

TWO WAYS TO REPRODUCE PLANTS

- **Vegetative reproduction:** cuttings, tubers, rhizomes, shoots, etc.
- **Generative reproduction:** seeds

VEGETATIVE REPRODUCTION

- We use some parts of the plant (tuber, stem, offshoot) to recreate a new plant.
- Very practical but has some disadvantages:
 - The new plant is genetically identical to the mother plant: it is a CLONE.
 - Most of the diseases are transmitted to the new plant (mainly viruses)
 - The weight of the seeds is often very high and the shelf life minimal.
 - Examples: yams: very heavy, sweet potato: minimal shelf life
- In all cases, some plants do not produce seeds, which makes the use of vegetative propagation necessary.
- BUT BEWARE OF VIRUSES!

VEGETATIVE REPRODUCTION - CUTTINGS AND SHOOTS

- In general, it is necessary to have living plants from which cuttings and shoots are taken to plant directly in a new place.
- The shelf life is minimal (maximum a few months).
 - Sweet potato
 - Cassava
- Fodder grasses: (Brachiaria, Pennisetum, Andropogon, Citronella):
 - Cut stems of mature plants at 20 cm from the ground. The cut should be clean at an angle of about 45°. The stem can then be cut into several parts each containing 3 nodes. The cutting is planted with two of the three nodes below the soil surface.
- Pineapple, banana, plantain

VEGETATIVE REPRODUCTION - TUBERS, RHIZOMES AND CORMS

- Tubers, rhizomes and corms are underground organs in which the plant stores energy.
- They can therefore be used as seeds.
- Identify diseased plants before harvesting!
- Storage:
 - In the shade
 - Not in contact with the ground
 - Protected from rain allowing percolation.
- Treatment
 - Remove wounds, rots etc.
 - Treat in ash+water



GENERATIVE REPRODUCTION - SEED PRODUCTION

Allows mixing of plant genes to create new individuals.

- Greater genetic diversity
- Selection possible
- Conservation over several years
- Easy transport, marketing and propagation

GENERATIVE REPRODUCTION - THEORETICAL BASIS

- Pistil: female organ of plants Androecium: male organ of plants.
- The androecium produces and releases pollen that fertilizes the pistil, which will create seeds.
- **Flowers contain a pistil, an androecium or both (hermaphrodite flowers).**
- Category of plants: type of flowers
 - Monoecious plants: They have both male and female flowers on one plant.
 - Dioecious plants: They have only flowers of the same sex on one foot.
 - Hermaphroditic plants: They have hermaphroditic flowers.

GENERATIVE REPRODUCTION - THEORETICAL BASIS

- Category of plants: means of transmission
- Cross-pollinating plants cannot pollinate themselves. They need a vector to bring the pollen from the flowers of one plant to another. This transport is done either by insects or by the wind (very light pollen).
- Self-pollinating plants can pollinate themselves. They often need wind, rain, insects or animals to shake them and make the pollen fall from one flower to another.
- Plants are never solely self-pollinating, there is always a transfer of pollen between plants.

IT IS IMPORTANT TO UNDERSTAND HOW PLANTS REPRODUCE IN ORDER TO PROPERLY CARRY OUT SEED PRODUCTION AND ESPECIALLY BREEDING, TO A LESSER EXTENT FOR THE PRODUCTION ITSELF.

GENERATIVE REPRODUCTION - MANAGEMENT OF SEEDCARRIERS

- Cultivation time: not always identical (e.g. rice, tomato and carrot)
- Sun, nutrients and water: particularly demanding seed carrier!
- Water sufficiently until flowering and then reduce watering to allow maturation
- Fertilize sufficiently
- Protection
 - Protect particularly from pests
 - Protect from rain (protection against disease, too small seeds (e.g. lettuce))
- Spacing and staking
 - Provide double the space
 - Stake well, fruits should not be on the ground (except cucurbits)

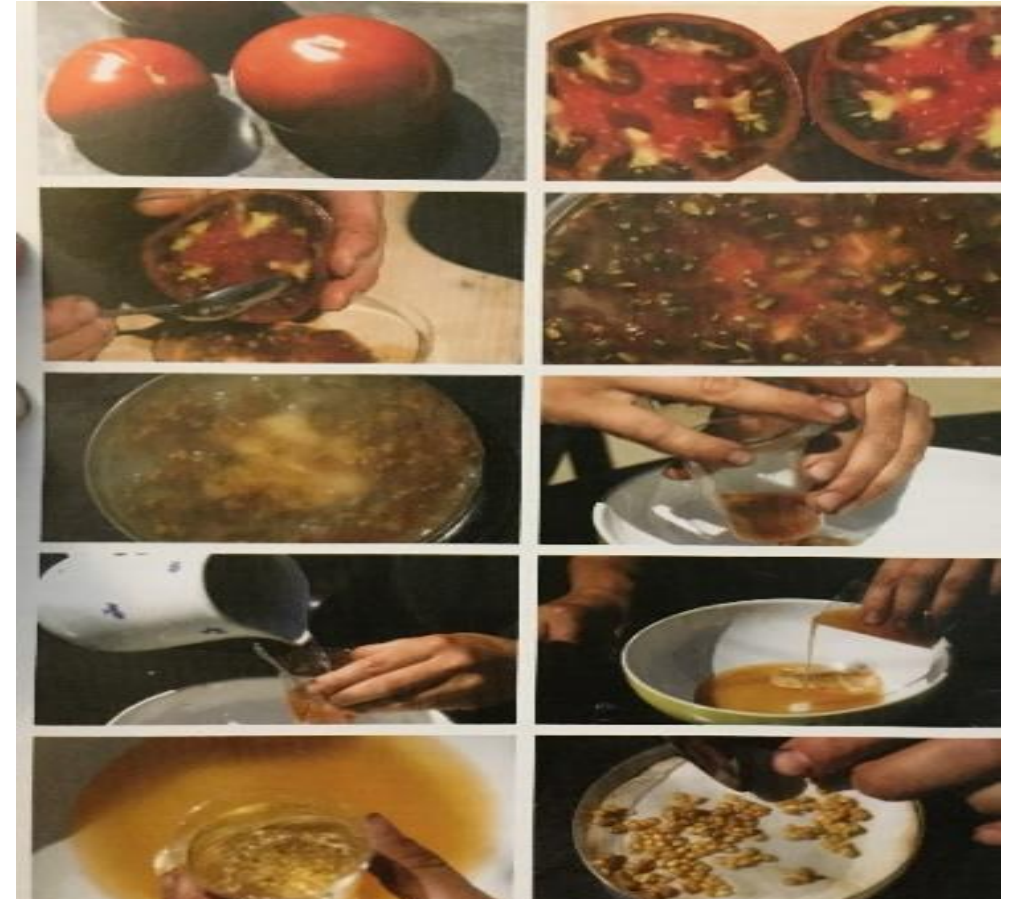
GENERATIVE REPRODUCTION - SEED PREPARATION

- Depending on the crop, different actions must be carried out to prepare the seed before conservation.
- **Soaking:** If the seeds separate badly from the pulp (ex. eggplant), it is necessary to put to soak 12-24h in cold water.
- **Wet process without fermentation:** This technique is used for most fruit vegetables. The seeds are extracted from the fruit and rinsed in a sieve with water, until the flesh of the fruit is gone. The seeds are dried as quickly as possible in a well ventilated place at a temperature between 23 and 30°C.

GENERATIVE REPRODUCTION - SEED PREPARATION

- **Wet process with fermentation:**

This technique is used for tomato and cucumber. The purpose of the fermentation is to remove the film that envelops the seed and prevents it from germinating



GENERATIVE REPRODUCTION - SEED PREPARATION

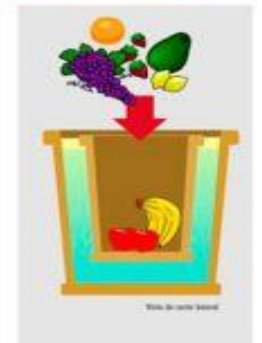
- **Dry route:**
- For all seed carriers that are not fruiting vegetables.
- Drying must be long enough (minimum 1 week) and the temperature must not exceed 35°C.
- Some crops (grasses, legumes) can be dried on the plant in the field
- Other crops (brassicaceae, apiaceae, asteraceae) must be harvested and dried
- Once the grains are dry, it is necessary to thresh the plants to remove the seeds from the rest of the plant.
- The result obtained contains the seeds and a lot of plant waste. It is therefore necessary to remove them manually and/or by blowing on them and/or with the wind.

GENERATIVE REPRODUCTION - SELECTION

- We take the seeds of the most productive and especially the healthiest carriers.
- Never take seeds from a diseased plant, and especially not from infected seeds.
- A more advanced selection requires much more work and knowledge and is not treated in this document.

GENERATIVE REPRODUCTION - CONSERVATION

- The seeds must be perfectly dry to be preserved.
- They are preserved in bags placed in hermetic glass jars.
- The jars are placed in a cool, dark and dry room. Ideally between 0° and 10°. For that, deposit the vegetable seeds in "desert fridges" (see diagram).



GENERATIVE REPRODUCTION - CONSERVATION

Seeds are separated into 4 categories according to their shelf life:

1. very sensitive (a few months)
2. short life (2-3 years)
3. medium life (4-5 years)
4. long life (> 5 years)

SOLANACEAE

- **Reproduction** : Self-pollinated, hermaphrodite
- **Number of seedcarriers needed** : 6-12
- **Staking** : Yes
- Harvest the fruits when they are well ripe (as for consumption). The fruit makes a change of color when it ripens.
- Do not use fruit with rot for seed recovery. Use large, healthy fruits of the desired shape.
- Use only seeds from the first 3 to 5 fruits of each plant. For tomatoes, use fruit from the first two clusters.



SOLANACEAE



	Species	Treatment	Shelf-life	Seeds per fruit
Lycopersicum esculentum	Tomato	Fermentation	4	90-150
Capsicum annum, chinense, frutescens	Pepper	Without Fermentation	3	150-250
Capsicum annum, chinense, frutescens	Chili	Without Fermentation	3	50-150
Solanum melongena, ethiopicum, macrocarpon, torvum	Eggplant	TH	4	50-100

CUCURBITS

- **Reproduction : Allogamous (insects), monoecious**
- **Number of seed holders needed : 6-12**
- **Number of seeds per fruit: 100-300**
- **Shelf life : 3 years**
- Be careful not to cultivate several varieties of the same species the same year because they will cross.
- Only 2 to 4 fruits of the desired shape are left to mature per plant.
- It is necessary to harvest the fruits of cucurbitaceae when they are perfectly mature, what means for certain species later than the maturation intended for consumption.
- Cucurbita. pepo: If the fruit is bitter, it is toxic, do not eat it nor reproduce it!



CUCURBITS

Species		Staking	When to harvest	Traitement
Cucurbita pepo	Courgette, Squash	No	Overripe Fruit	TH
Cucurbita maxima	Pumpkin	No	Ripe Fruit	TH
Lagenaria siceraria	Calebash, Egousi	Yes	Dry Fruit	H
Cucumis sativus	Cucumber	No	Overripe Fruit (yellow)	HF
Cucumis melo	Melon	No	Ripe Fruit	TH
Citrullus lanatus	Watermelon, Egousi	No	Ripe Fruit	H

ASTERACEAE. AMARANTHACEAE, BRASSICACEAE

- The cultivation for seed of most of the species of these families is very different from the productive cultivation.
- The consumed parts are often vegetative parts (leaves of lettuce or amaranth, cabbage, root of radish). It is thus necessary not to consume these parts on the seed holders. The plant will be able to produce flowers and go to seed.
- Harvesting is done just before the grains reach full maturity, before they fall off by themselves and are lost. It is important to protect these seedcarriers from rain, otherwise the whole crop may be lost.
- The whole plant or a part of it is harvested, dried and then threshed in a bag.
- For species where the leaves are usually harvested, it is necessary to provide much more space for the seed carrier which can become very large.

ASTÉRACÉES. AMARANTHACÉES, BRASSICACÉES

Species		Crop		Harvested		Post-harvest	
		Wintering	Stake	Part collected	Number	Threshing	Seeds per plant
Helianthus annuus	Sunflower	No	No	Head	1	Easy	
Amaranthus species	Amaranth, Celosia	No	No	Plant	1	Easy	30g
Brassica oleraceae	Cauliflower, broccoli, cabbage	According to variety	Yes	Pods	Many	Delicate	1000-2000
Raphanus sativus	Radish	According to variety	Yes	Pods	Many	Difficult	1000-2000

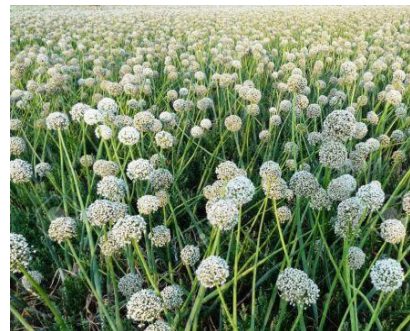
LETTUCE

- **Reproduction** : Self-pollinating, Hermaphrodite
- **Number of seed holders needed** : 10
- **Number of seeds per plant** : 10 g
- **Storage life** : 3
- **Tutor** : Yes



CARROT & ONION

	Carrot (<i>Daucus carota</i>)	Onion (<i>Allium cepa</i>)
Family	Apiaceae	Alliaceae
Reproduction	Allogam (insects)	Allogam (insects)
Flower	Monoecious	Hermaphrodite
Planting distance of seedcarriers	20cm x 40cm	15cm x 25cm
Drying time of the umbels	2-3 weeks	1 week
Quantity of grain per plant	0.25g	4g



GRASSES AND LEGUMES

Grasses

- **Reproduction** : self-pollinated, hermaphrodite (except corn : allogamous (wind), monoecious)
- **Number of carriers needed** : 100-150
- **Storage life** : 3

Legumes

- **Reproduction** : allogamous (insect), hermaphroditic (except soybean and pea : self-pollinated)
- **Number of carriers needed** : 15-20 (pea : 50)
- **Shelf life** : 3



QUESTIONS?

