

Don't waste your effort!

How to ensure a good quality of your seeds

Summary of the workshop

- Objective of the workshop and introduction
- General aspects of seed quality
- Ensuring seed quality: seed harvesting
- Ensuring seed quality: seed drying
- Ensuring seed quality: seed cleaning
- Ensuring seed quality: seed storing
- Seed testing
- Organising your seed stock



Seeds of
Growth

Objective of the workshop and introduction

Who is this workshop aimed at?

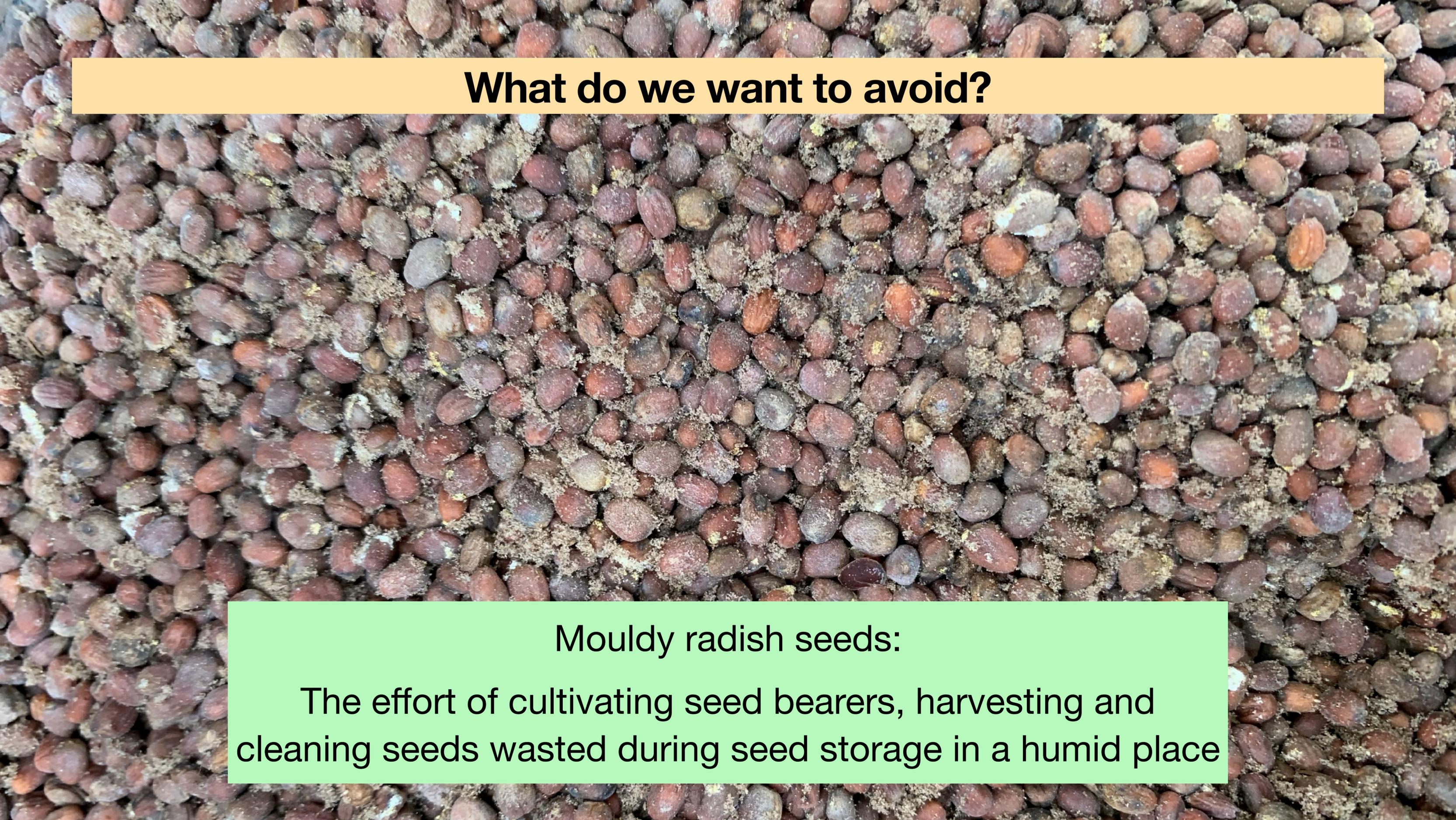
All who harvest their own vegetable seeds, such as:

- Hobby gardeners who propagate seeds of traditional varieties in their gardens
- Members of diversity initiatives who want to preserve and develop seed diversity
- Professional market gardeners who are involved in regional, autonomous food production projects ('From seed to plate')

What is the objective of this workshop?

Raise awareness among those who harvest their own seeds that:

- after all the work of seed cultivation, it is a pity to lose the seeds during the drying phase or during storage
- seed quality is the best means to ensure success and recognition of a seed project
- seed quality can be increased and secured with relatively simple means
- the energy invested in improving seed quality is anything but wasted



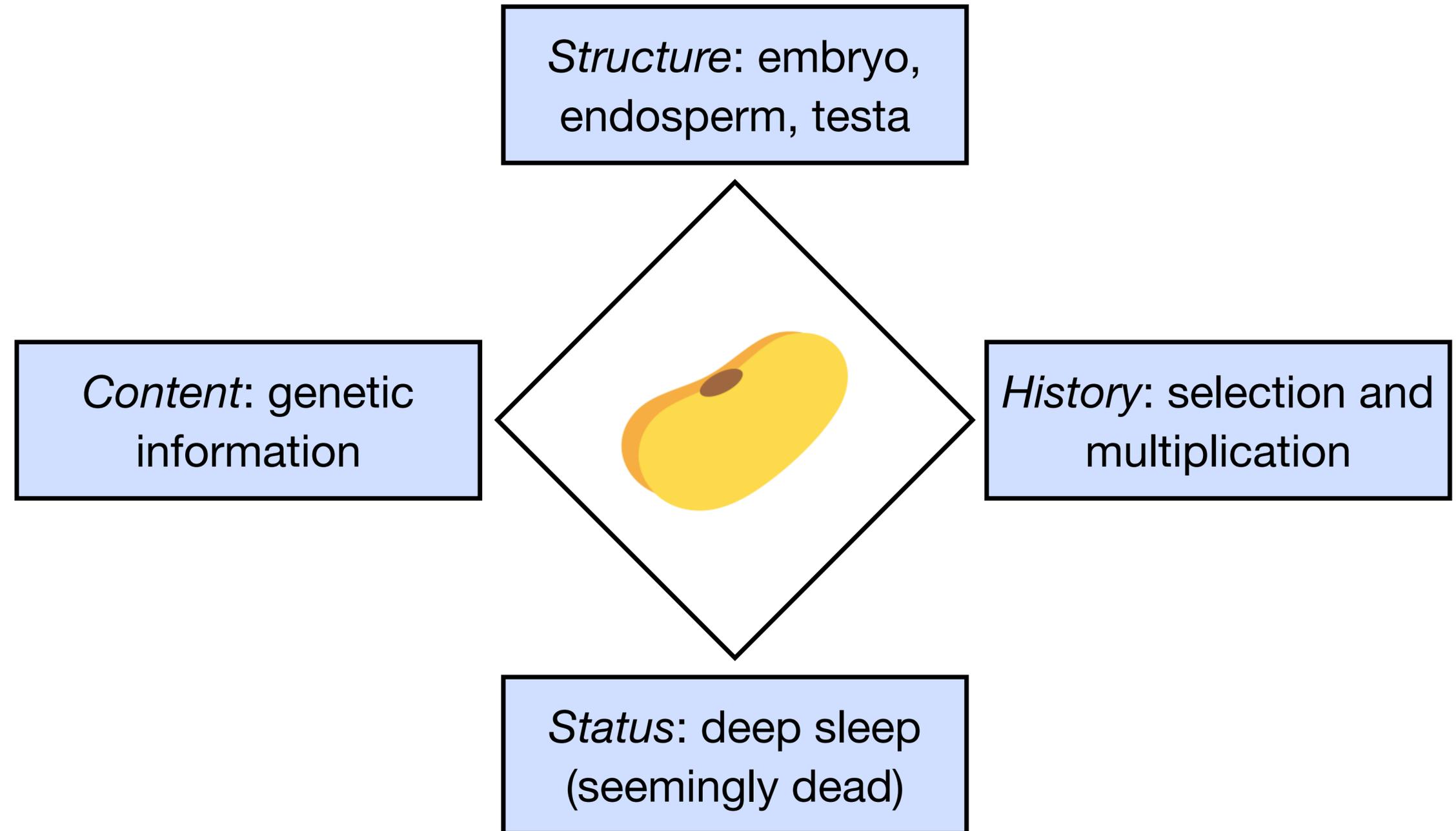
What do we want to avoid?

Mouldy radish seeds:

The effort of cultivating seed bearers, harvesting and cleaning seeds wasted during seed storage in a humid place

The nature of a seed: a sleeping beauty

- Seeds of cultivated plant varieties are the starting point of food production.
- Seeds are a storable, communally utilised cultural asset.
- Seeds connect the past (origin), present (use) and future (development).





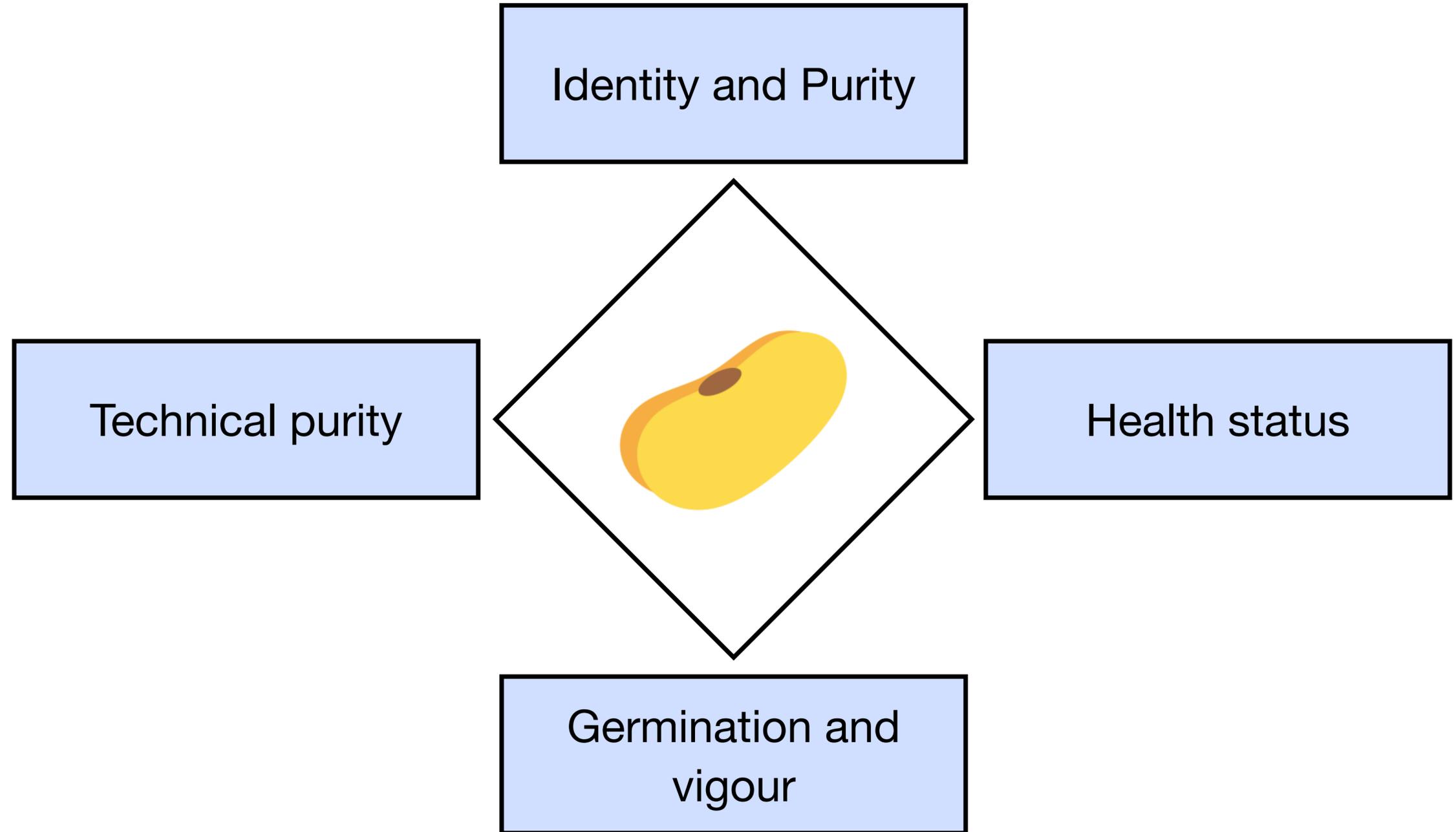
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General aspects of seed quality

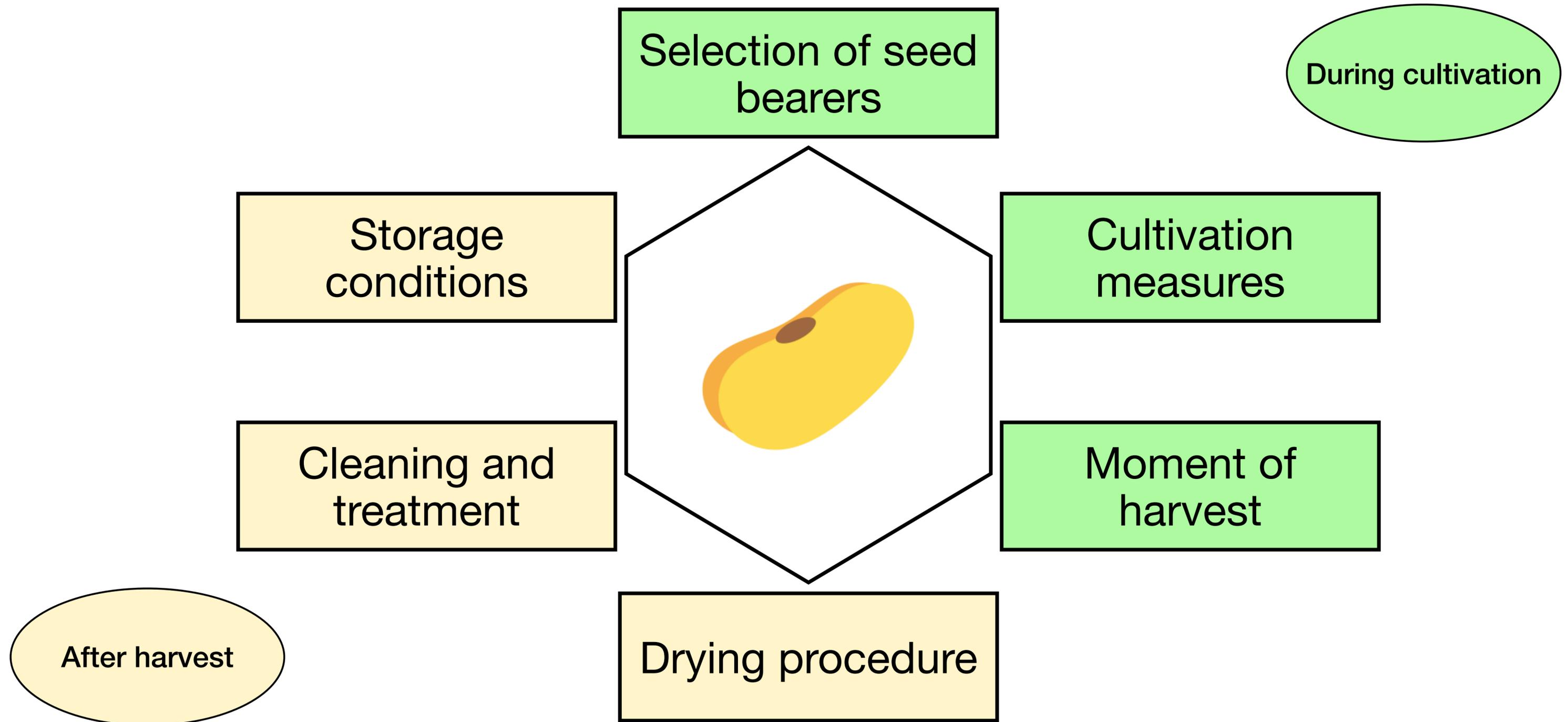


Seed quality: four official criteria

- Seeds should reproduce the traits of the original variety.
- Seeds should be as free from impurities as possible.
- Seed should be intact and externally healthy.
- Seeds should have a good germination rate and vigour.



Technical aspects of ensuring seed quality



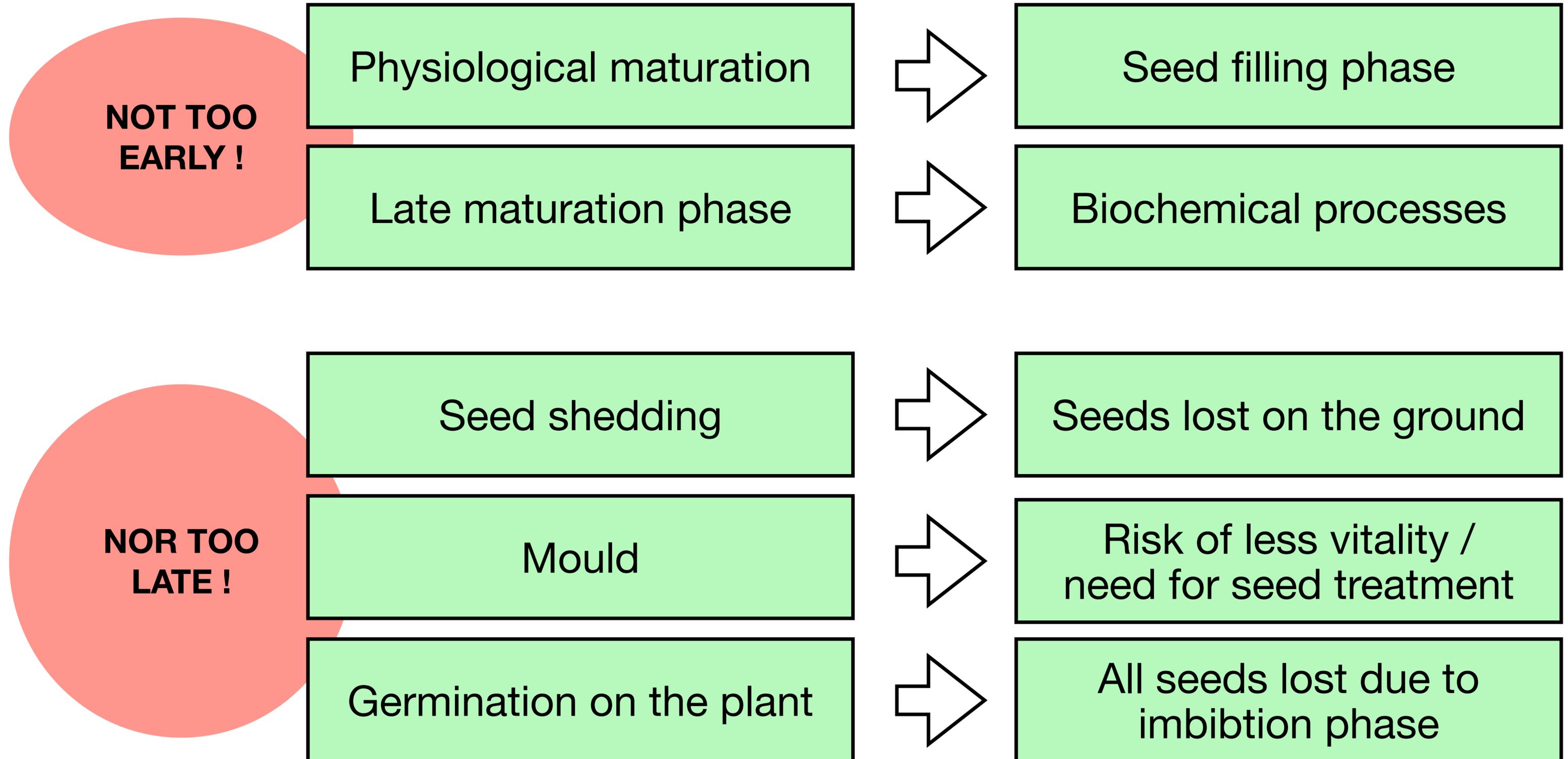


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Ensuring seed quality: seed harvesting

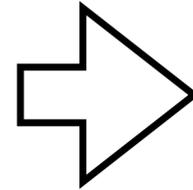


The right time for seed harvesting: neither too early, nor too late



The right time for seed harvesting: neither too early, nor too late

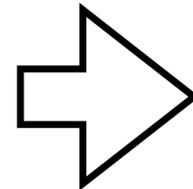
Seed filling phase
(physiological maturity)



Seeds

- fill with starch, lipids and proteins
- reach maximum dry weight
- and are disconnected from the mother plant

Late maturation phase
(Biochemical processes
for seed protection)



- Degradation of chlorophyll
- Accumulation of carbohydrates in the cytoplasm that replace water
- Synthesis of protective proteins and antioxidants
- Condensation (folding) of DNA to reduce its vulnerability to oxidation

During cultivation: the seed needs to get sufficient nutrients and water in order to reach maximum physiological maturity

Before harvest: the seed produces protective substances that determine vigour and longevity

Technical advice for seed harvesting 1

General rule:

Let the seeds ripen on the mother plant as long as possible

Exceptions:

1. Corn salad sheds its seeds long before they have taken their final color => harvest when the first seeds are falling
2. When a rainy period may persist with the risk of seeds getting mouldy => harvest the seeds before complete maturation and let them dry as slowly as possible in the workshop
3. Extract the pepper seeds from the fruit when it is just ripe and the seeds have not yet taken on their yellow colour => pepper seeds go mouldy quite quickly and at an early stage



Ripening bean pods

Technical advice for seed harvesting 2

General rule:

Choose a sunny day when the seed bearers are relatively dry on the field

Exceptions:

1. Harvest corn salad in the early morning => thanks to the morning dew, the seeds will stick to the mother plants / spread the seed bearers on sheets and they will dry very quickly
2. Harvest cabbage seed bearers in the early morning => thanks to the morning dew the pods will not burst open



Technical advice for seed harvesting 3

Harvested too late: leek seeds germinate on the mother plant

No use drying the leek head quickly: some seeds are sprouting and all the others may have already entered the imbibition phase.

Even if you dry the seemingly intact seeds now, they may already have absorbed water and started enzymatic germination processes. Such seeds cannot be stored for a long time, as they will quickly lose their germination capacity.



Technical advice for seed harvesting 4

Use sheets to harvest the seed bearers on the field:

- Easy harvest => no spilling of seeds
- Easy transport => join the corners of the sheet and carry the "bag"
- Easy drying => spread the sheet on a grid
- Easy provisional storing => hang the sheets on a hook

Secateurs and Japanese sickle



Technical advice for seed harvesting 5

Use sheets to harvest the seed bearers

Photos:

1. Harvest of lettuce seed bearers on a sheet
2. Transport the seed bearers like in a bag





Seeds of
Growth

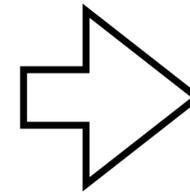
Ensuring seed quality: seed drying



How to dry and store seeds correctly: sing your seeds to sleep

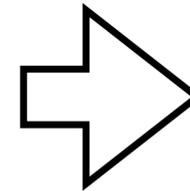
**First
drying
phase**

On the field



Harvest the seeds in a dry period (no rain for days)

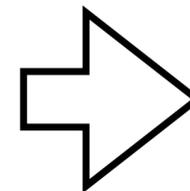
After the harvest / before seed cleaning



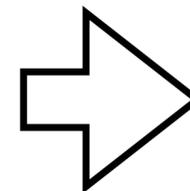
Use sun and air circulation / fan and dehumidifier

**Final
drying
phase**

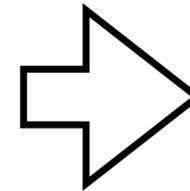
After seed cleaning (after reduction of the volume) / before final storage



Use silica gel or other desiccants



Check relative humidity with hygrometers



Use airtight containers

Technical advice for seed drying 1

When the harvested seed bearers are relatively dry, hang the sheets to economise space and protect the seeds from mice

Photos:

1. Suspended sheets
2. Threads with two loops
3. Self-made hooks to hang the sheets



Technical advice for seed drying 2

Technical equipment

Photos:

1. Grid and sheet
2. Fan / heater
3. Hygrometer
4. Dehumidifier





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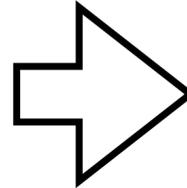
Ensuring seed quality: seed cleaning



Seed cleaning: sorting the wheat from the chaff

WET EXTRACTION

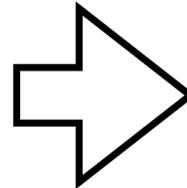
Seeds in fleshy
fruits



Examples: tomato, pepper, eggplant, cucumber, courgette, pumpkins
Procedure: Cut up the fruits, extract, wash and dry the seeds

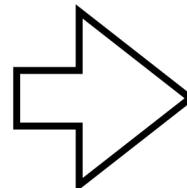
DRY EXTRACTION

Seeds in dry pods



Examples: bean, pea, broad bean, soy, cabbage, radish
Procedure: Crush or thresh the pods, clean the seeds with sieves

Seeds without hull



Examples: corn salad, carrot, parsley, beetroot, chicory, endive, onion, leek
Procedure: Thresh or shake the seed bearers, clean the seeds with sieves

Technical advice for seed cleaning 1

General advice:

- Extract the seeds that come out easily, these are the ripest ones
- Extract and clean 80 percent of seeds which will take 20 % of the time and leave the remaining 20 percent which will take 80 % of the time
- Have all your tools perfectly clean to avoid mixing seeds of different varieties
- Don't pick up seeds fallen to the ground unless they're clearly recognisable (e.g. beans)
- Don't use brushes to pick up seeds - seeds can get stuck in the hairs and seeds of different varieties can get mixed together



Technical advice for seed cleaning 2

Sorting seeds:

- Sort out:
 - damaged or spotty seeds
 - small and empty seeds
 - all the remains of leaves and flowers as well as the dust
- Use sieves:
 - sieves with bigger mesh hold the dirt back and let the seeds through
 - sieves with smaller mesh hold the good seeds back and let small seeds and the dust through

Cleaning spinach seeds with sieves



Technical advice for seed cleaning 3

Why should we clean and sort our seeds?

- Clean seeds give you an idea of the number of seeds (calculate by thousand grain weight)
- Sorting out the small and empty seeds increases the germination rate
- Clean seeds are better for seed swaps and indispensable for marketing
- Clean seeds increase the external recognition of your seed initiative



Perfectly clean onion seeds



Seeds of
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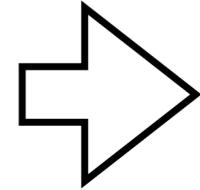
Ensuring seed quality: seed storing



How to store seeds correctly: sing your seeds to sleep

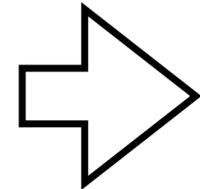
Good conditions for seed storage → long shelf life of seeds

Humidity



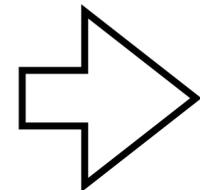
Stop enzymatic activity and metabolic processes: keep the seeds at 20-40 % of ERH* to continue

Oxygen



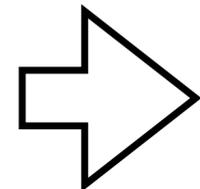
Stop metabolic processes and oxydation: keep the seeds at a low oxygen level

Temperature



Ideally stored at 15°C, the most important is to keep seeds at a stable temperature

Light



Light can only affect seed quality when at the same time the levels of oxygen and humidity are high

* ERH: Equilibrium Relative Humidity: Seeds absorb the moisture corresponding to the air humidity present.

Technical advice for seed storing 1

Before storing your seeds, use a desiccant such as silica gel to reduce the humidity to below 40 % - ideally to around 30 %.

Photos:

1. Open seed bags with silica gel and a hygrometer in an airtight container
2. Different airtight containers



Plastic buckets in an underground cellar as storage room



Technical advice for seed storing 2

Store small seed batches in small airtight recipients, such as glass jars or plastic boxes. Check humidity levels with hygrometers.



Technical advice for seed storing 3

Central points:

- Good drying and storing will prolong seed life significantly. Seeds will maintain a good germination rate and vigour for many years.
- In general, you may renew the seeds of your varieties every three years, but good seed storage may extend the shelf life of seeds by the double.
- Lowering humidity and oxygen levels is more important than lowering temperature and light.



Technical advice for seed storing 4

Aiming at long-term conservation:

- To prolong germination and vigour in the context of a Community Seed Bank, you can store the seed in a deep freezer or vacuum it in small plastic enveloppes.
- The advantage of vacuum packing is the significant reduction of the oxygen content in the seed batch. Oxygen fosters oxidation processes resulting in loss of vigour and finally germination capacity.



Technical advice for seed storing 4

Further professionalisation:

- You can use professional seed cabinets to keep a stable atmosphere concerning temperature and humidity.
- Similar conditions can also be achieved by simpler means, for example by storing seeds in airtight containers in a cool cellar room.





Seeds of
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Seed testing



Seed harvest: wake up call

General aspects

1. Seed testing consists of
 - Evaluating the **germination rate** (How many seeds will sprout?)
 - Evaluating **seed vigour** (Will seeds sprout evenly? How do the seedlings look like?)
2. You can test the germination rate of your **freshly harvested seeds** and of your **seeds from former years**.
3. You can use paper, sand or soil/potground for seed testing.



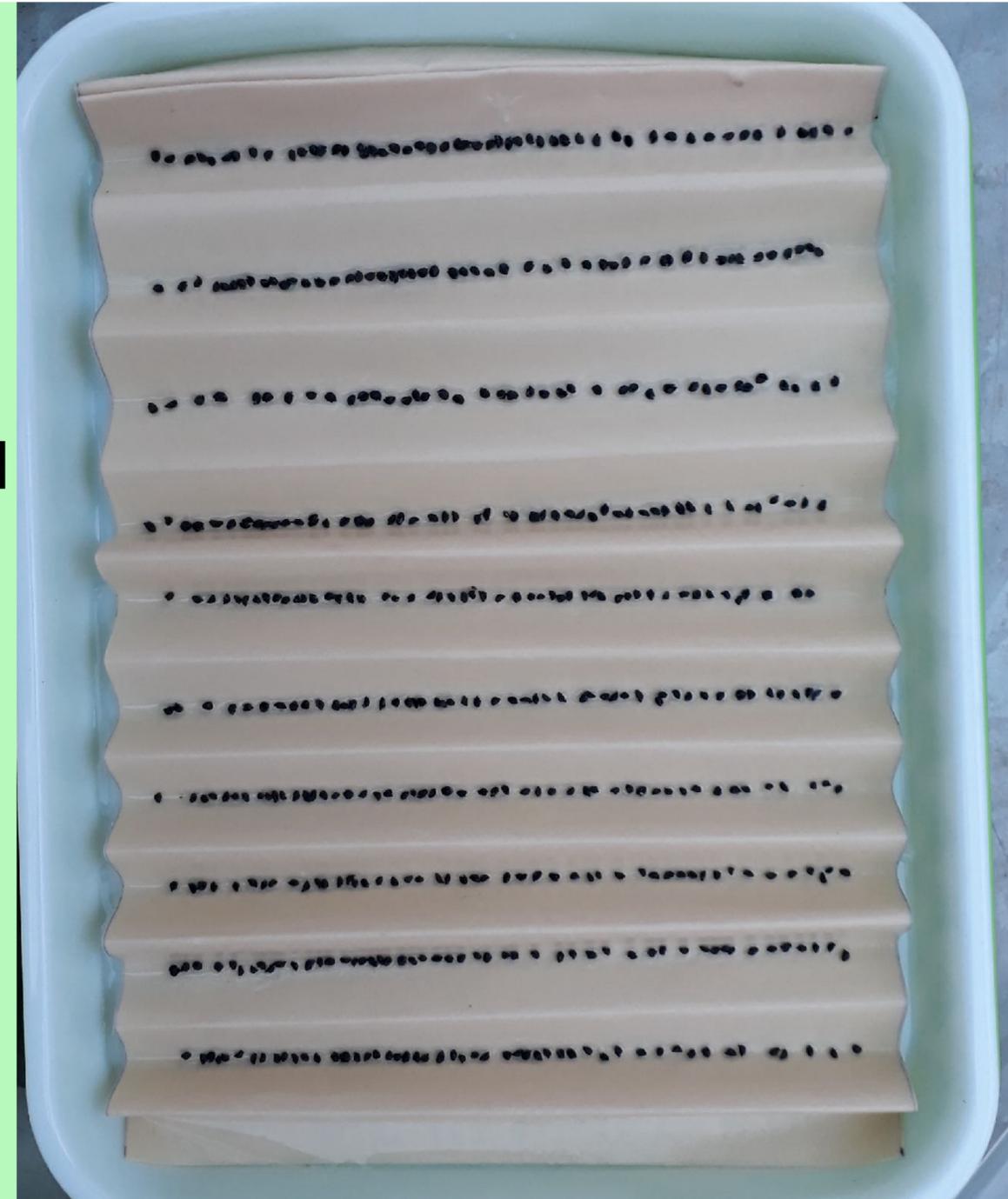
Seed harvest: wake up call

General aspects

ISTA (International Seed testing Association) fixes the international standard on **4 x 100 seeds for a relevant germination test.**

In the case of **CSB** and **small seed producers**, you would **reduce the number** to:

- 20 seeds for bigger seeds bean, pea, pumpkin, courgette, cucumber, tomato
- 30 to 50 seeds for medium size seeds like beetroot, swiss chard, radish
- 50 to 100 seeds for small seeds like lettuce, cabbage, leek, onion, parsley, carrot, celeriac, corn salad, chicory



Seed harvest: wake up call

What is essential for a relevant germination test?

- Keep a stable temperature (20-25 °C)
- Ensure even humidity

What is the right time frame for a germination test?

Different plant species have different germination phases in terms of duration.

When preparing germination tests you can put the seeds that sprout quickly together in a box as well as those which will take longer.



Seed harvest: wake up call

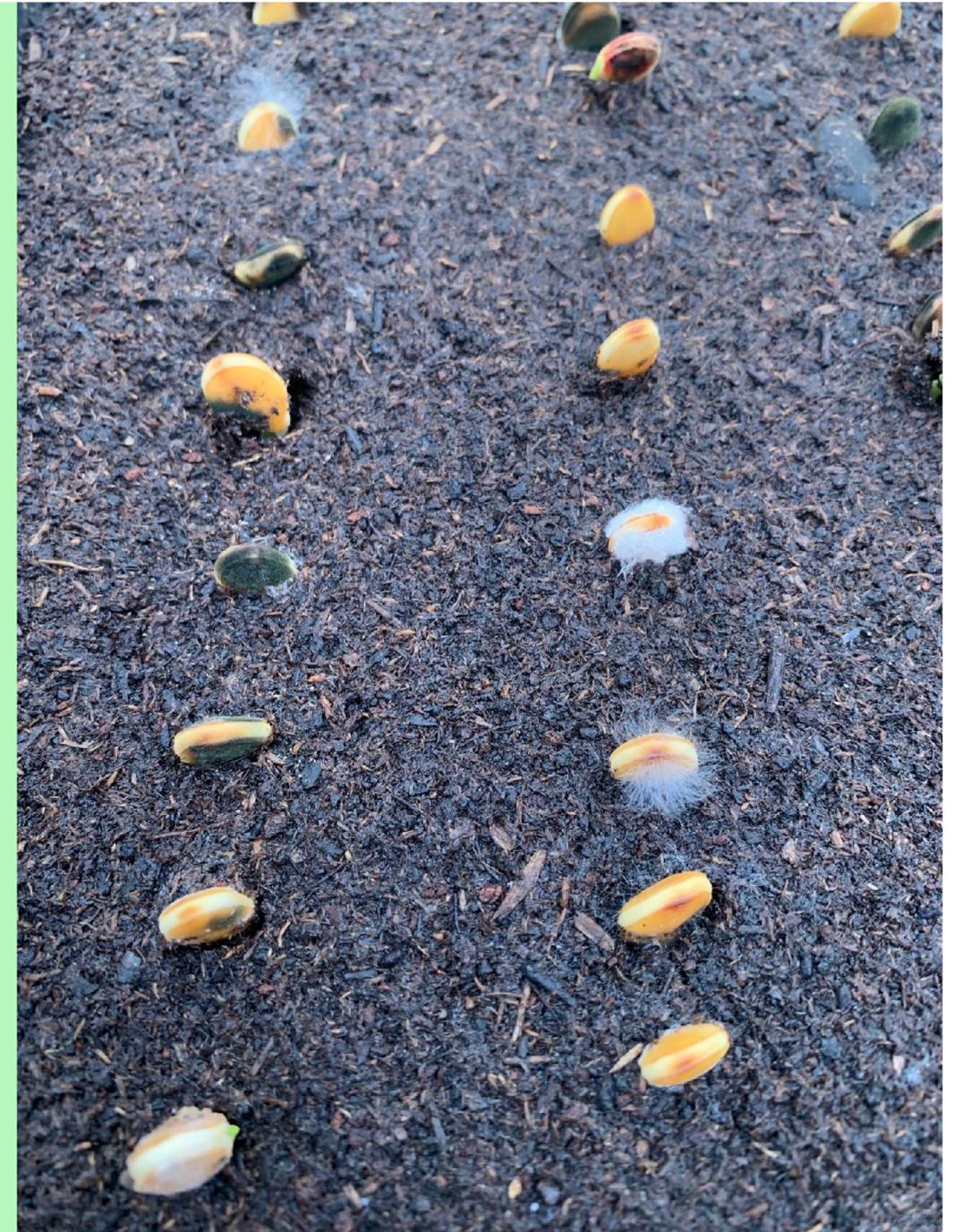
Trouble shooting in case of unsatisfying results

1. Less than 70 % of germination:

- Make the test one more time
- Clean the seeds more strictly

2. Mould developing on the seeds:

- Fresh seeds: wash the seeds with diluted vinegar (4-5 %), rinse and dry them thoroughly afterwards
- Older seeds: discard them from your stock as their vigour has decreased over time





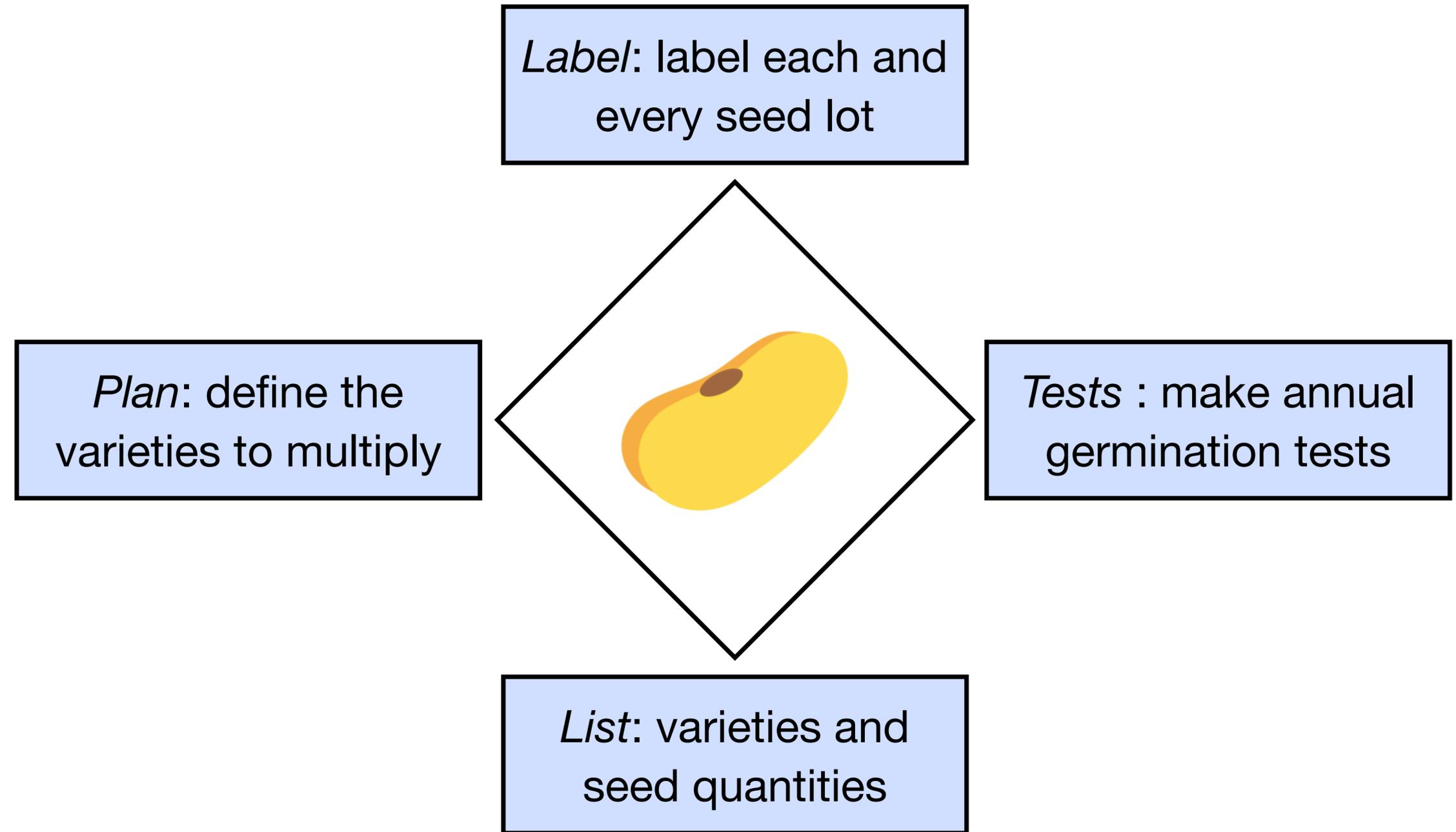
Seeds of
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Organising your seed stock



How to organise your seed stock?

- Seeds need to be well labeled: strict minimum: name of the variety, year and place of seed harvest.
- Keep record of the quantities of your seed batches and the germination rates.
- Make an annual plan of multiplication and renewal of varieties.



Thank you for your attention!

- Dadlani, Yadava (editors), Seed Science and Technology - Biology, Production, Quality, Springer, 2023
- George, Raymond, Vegetable Seed Production, 3rd edition,
- Lehmann, Cornelia, Leitfaden zur Qualitätsprüfung von On-farm erzeugtem Saatgut von Gemüsearten, Humboldt Universität Berlin, VERN, 2014
- ISTA, Handbook for Seedling Evaluation, 1969, 1979, 2003/2006/2009/2013, 2018
- Lehmann, Cornelia, Leitfaden zur On-farm Erhaltung alter Gemüsesorten, Humboldt Universität Berlin, VERN, 2016
- LiveSeeding: Practical Guide for drying and storing vegetable seeds in organic small-scale and on-farm seed production <https://organic-farmknowledge.org/tool/52128>
- Lycée Technique Agricole, Leitfaden für die Einrichtung einer Gemüse-Saatgutproduktion, Luxemburg, 2026