LiveSeeding

Training in organic seed quality & health

Module 12: **Seed maturity and harvest**

Unit 12.1: **Seed vigour, maturation and protection**

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International Seed Academy Netherlands

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UK Research and Innovation

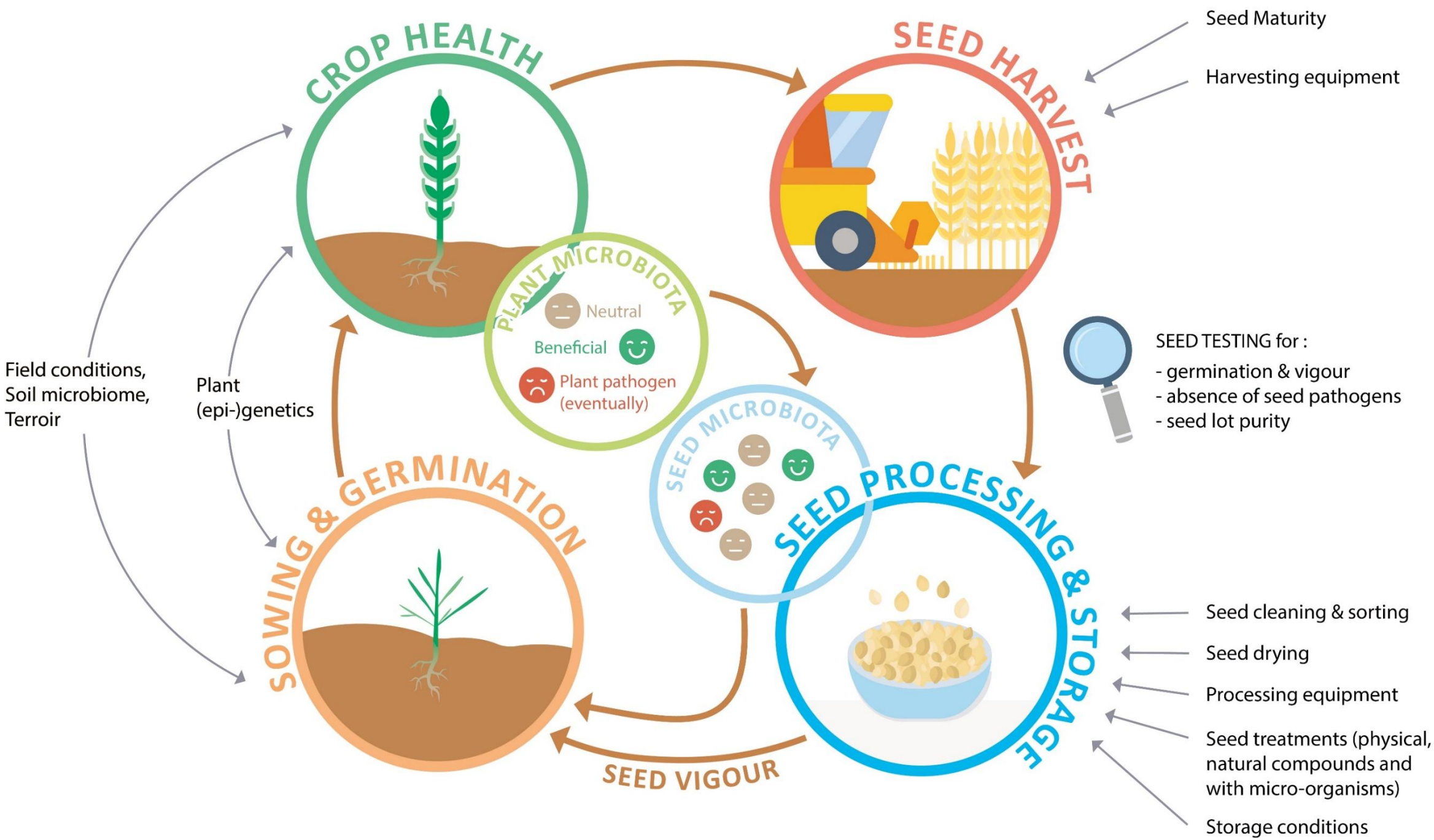
Topic

12.1 –Seed vigour, maturation and protection

12.2 – When to harvest

13.1 – Why and how to dry seeds

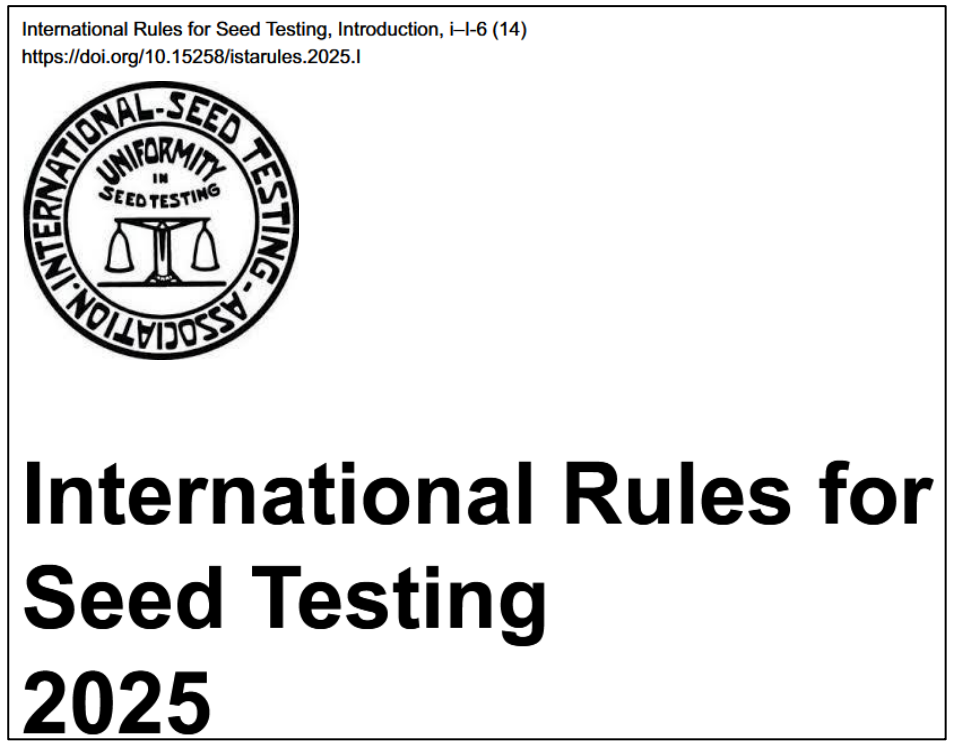
13.2 – Optimising storage conditions


CROP HEALTH
SEED HARVEST
SEED PROCESSING & STORAGE
SOWING & GERMINATION
PLANT MICROBIOTA
Neutral
Beneficial
Plant pathogen
(eventually)
SEED MICROBIOTA
SEED VIGOUR
Field conditions,
Soil microbiome,
Terroir
Plant
(epi-)genetics
Seed Maturity
Harvesting equipment
SEED TESTING for :
- germination & vigour
- absence of seed pathogens
- seed lot purity
Seed cleaning & sorting
Seed drying
Processing equipment
Seed treatments (physical,
natural compounds and
with micro-organisms)
Storage conditions

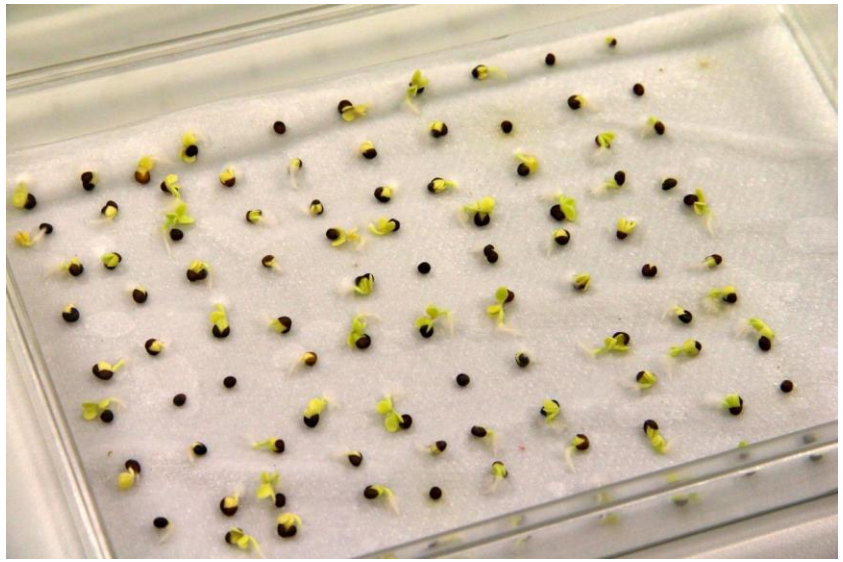
Seed quality certification

For the trade in seeds it is in most countries obliged that the quality of the seeds is guaranteed, by a certification process. This certificate is also needed for international transport of seeds.

This certification is performed by official labs, most often according to the rules of the International Seed Testing Association



Sampling
Purity
Variety
Germination
Viability Staining
Seed Health
Moisture Content
Seed Weight
Seed Size
Seed Vigour
…



Germination testing
Source: www.conviron.com

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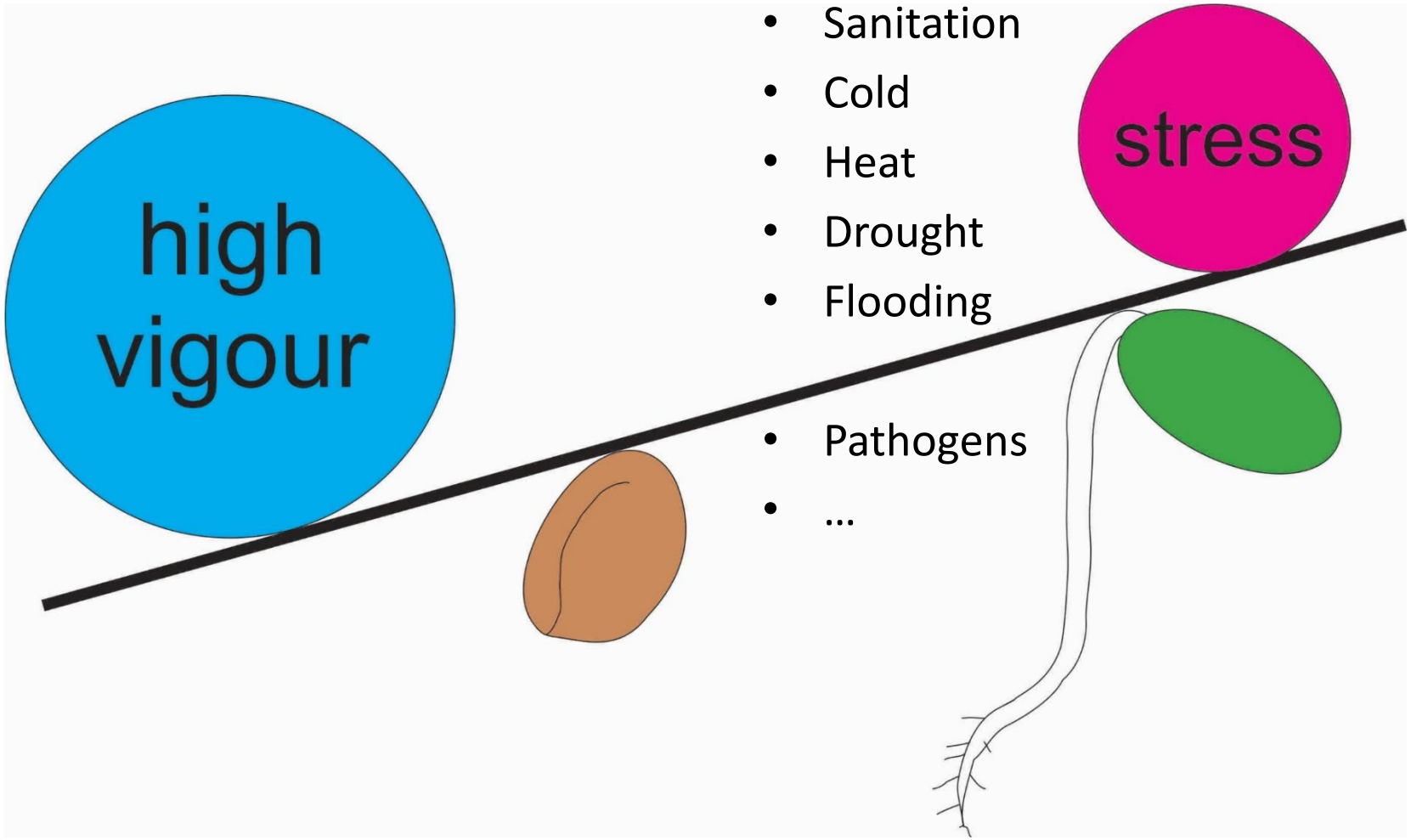
Seed vigour



- Storage
- Sanitation
- Cold
- Heat
- Drought
- Flooding
- Pathogens
- …

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Seed vigour

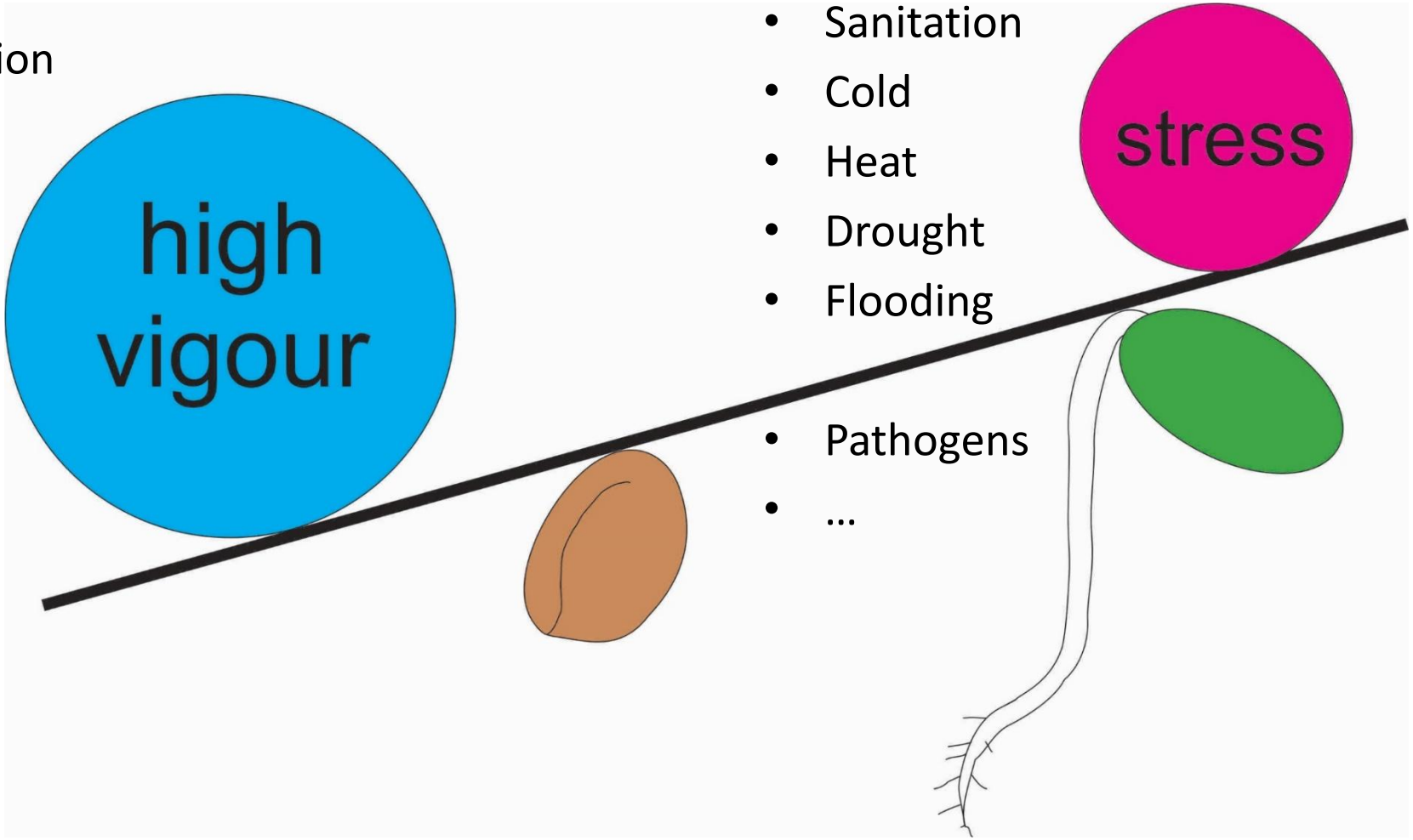
Seed production

Seed size

Maturity at harvest

Treatments

…



- Storage
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Seed vigour

Size

Seed production

Treatments

Maturity at harvest

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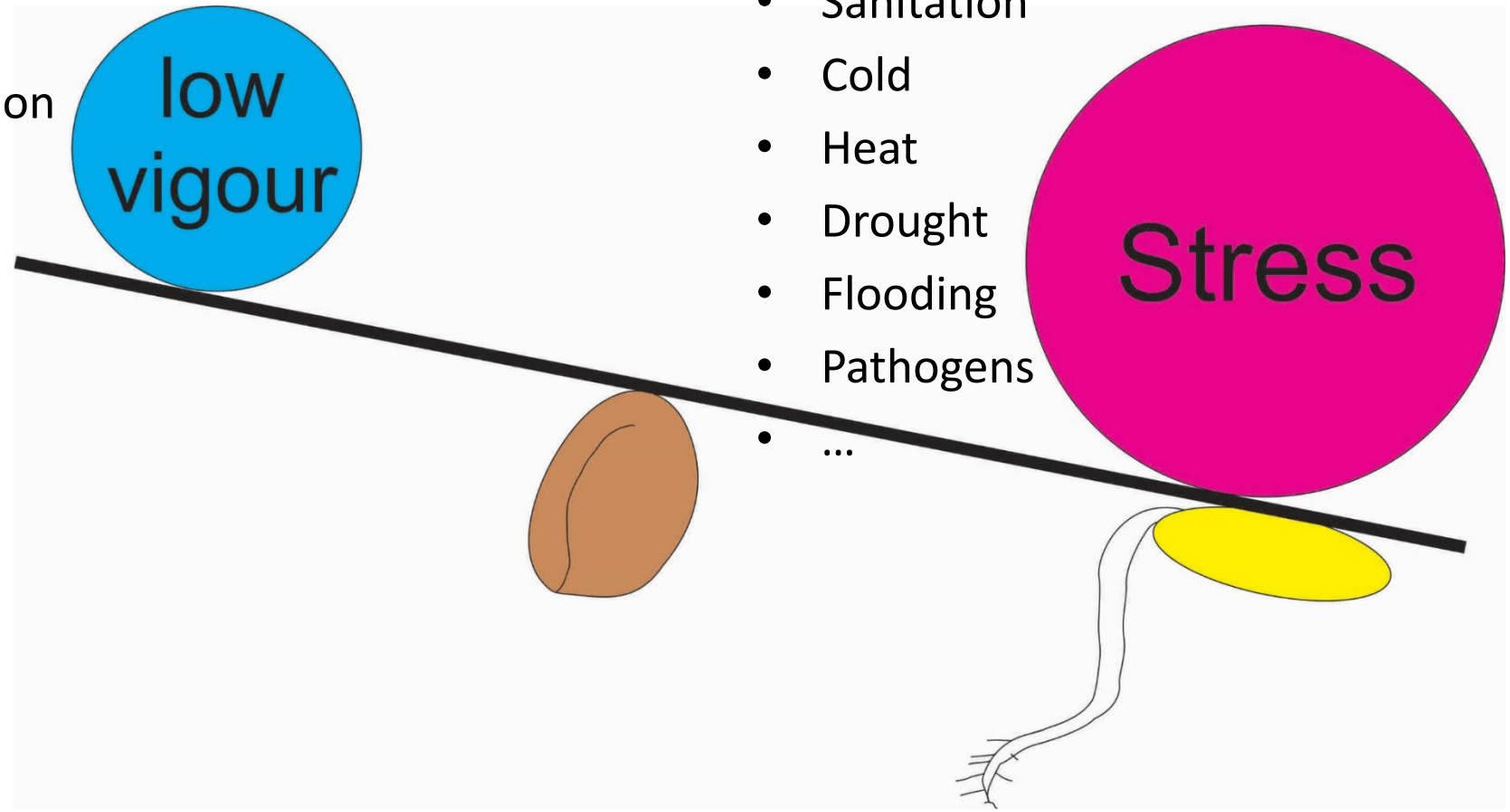

- Storage
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- …

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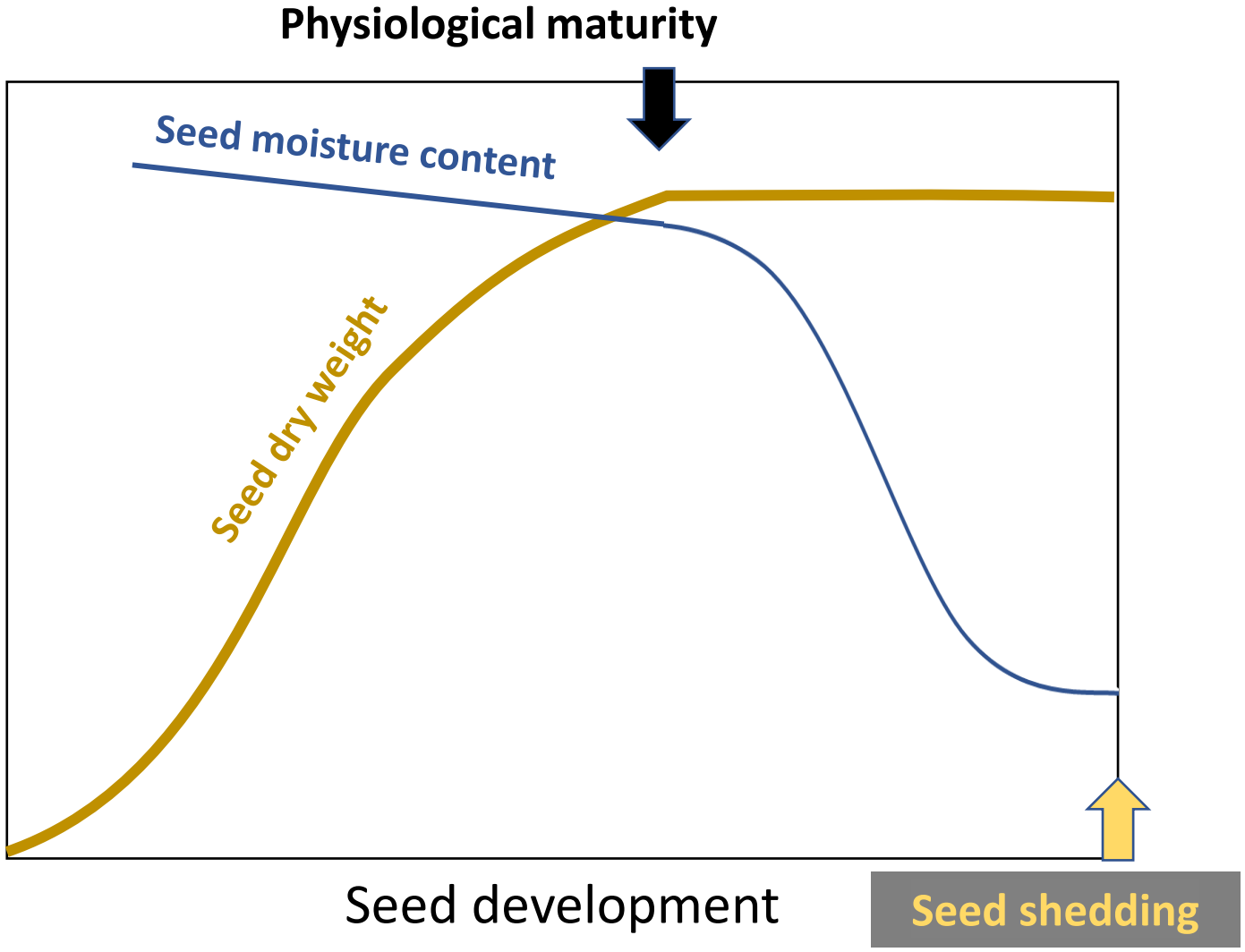
Seed maturation



The connection' with the mother plant for the import of nutrients is lost at 'physiological maturity'

Seed filling with storage proteins, oils and starch ends at 'physiological maturity'

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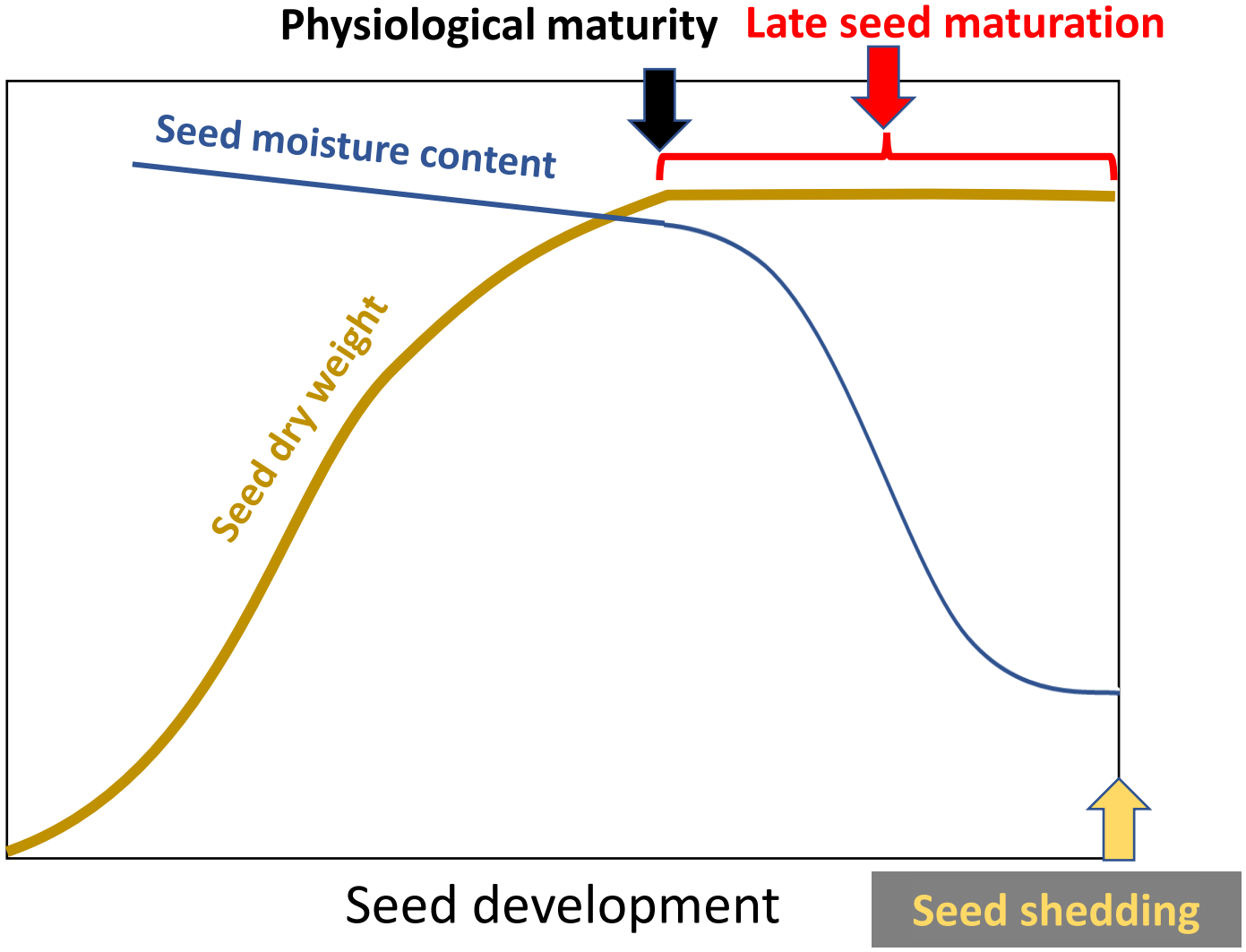
Seed maturation



The connection' with the mother plant for the import of nutrients is lost at 'physiological maturity'

Seed filling with storage proteins, oils and starch ends at 'physiological maturity'

Thereafter the seed switches to the production of protective mechanisms

This is the late seed maturation stage

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Protection

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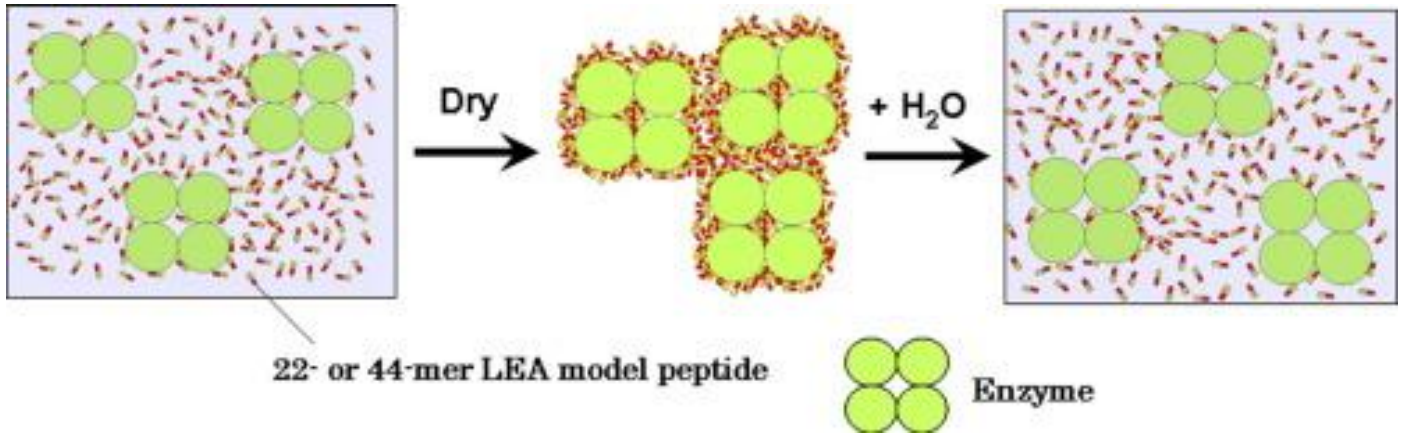
Protection induced during Late Seed Maturation



Source: Takao Furuki, Minoru Sakurai. 2026. Group 3 LEA protein model peptides protect enzymes against desiccation stress. Biochimica et Biophysica Acta (BBA) - Proteins and Proteomics. Volume 1864, Pages 1237-1243

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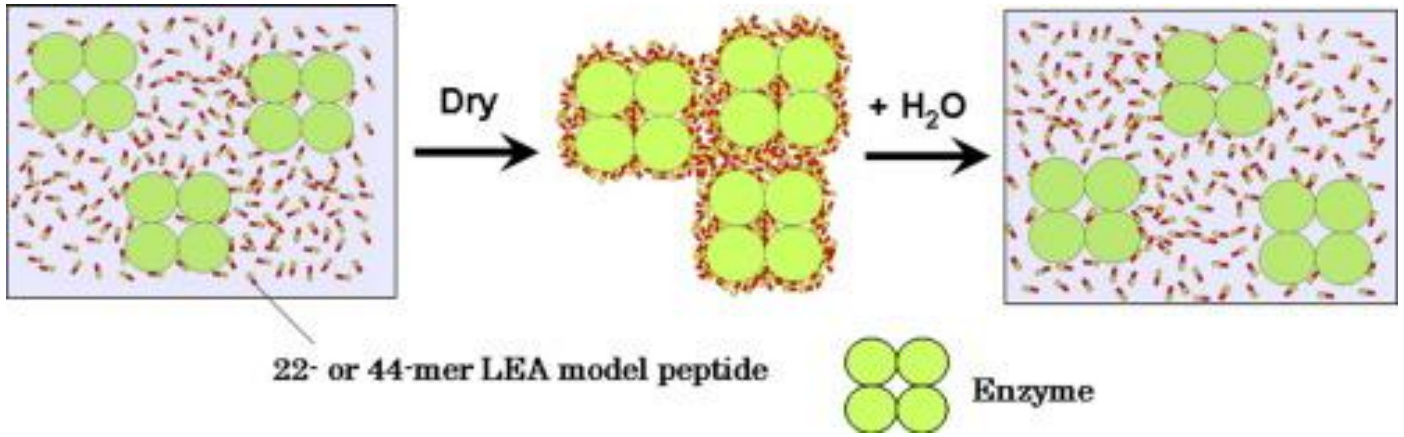
Protection induced during Late Seed Maturation



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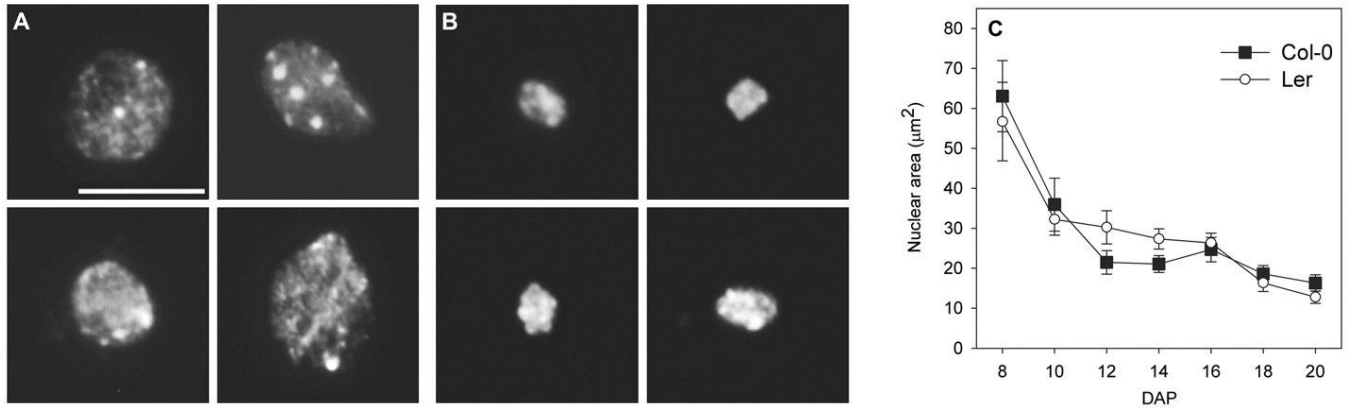

Source: van Zanten et al. (2011. Seed maturation in Arabidopsis thaliana is characterized by nuclear size reduction and increased chromatin condensation. PNAS 108, page 20219-20224.

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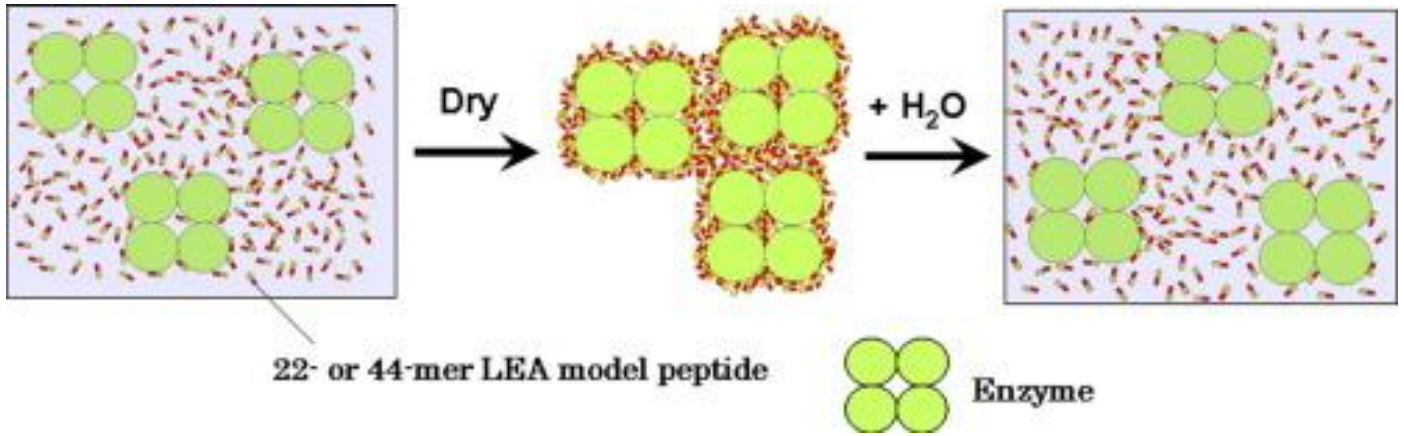
Protection induced during Late Seed Maturation



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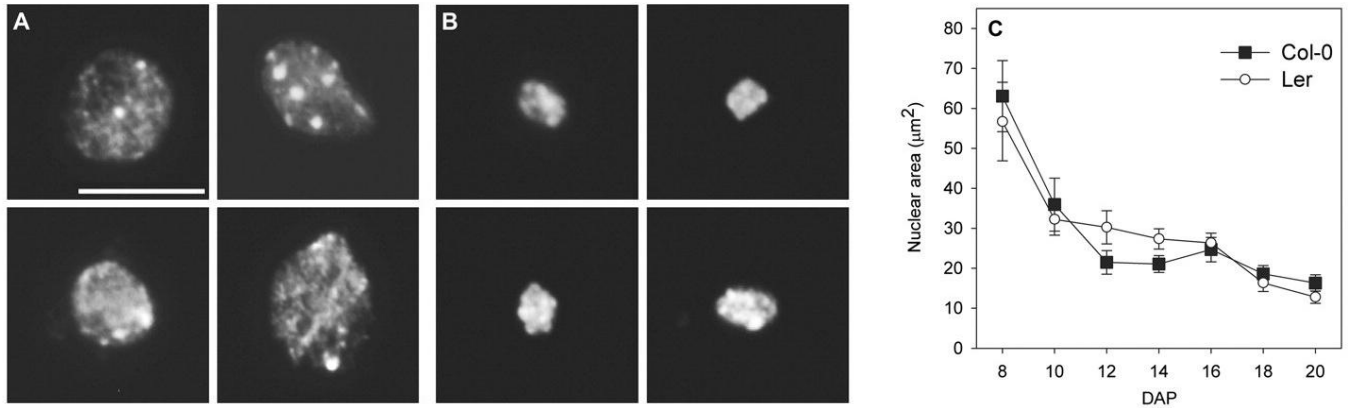

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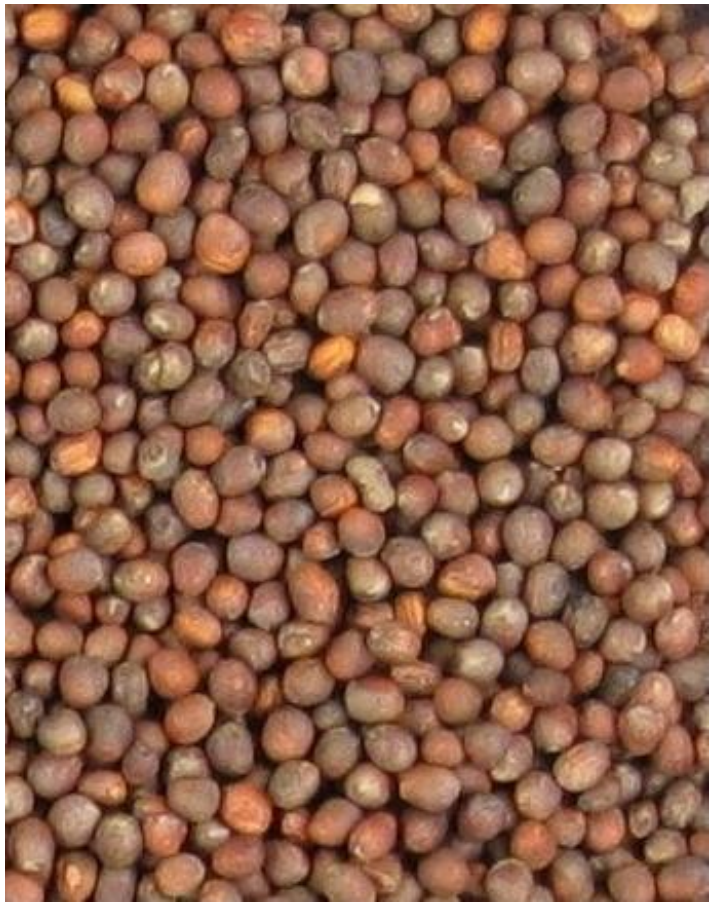

Seeds from *Brassica oleacea*

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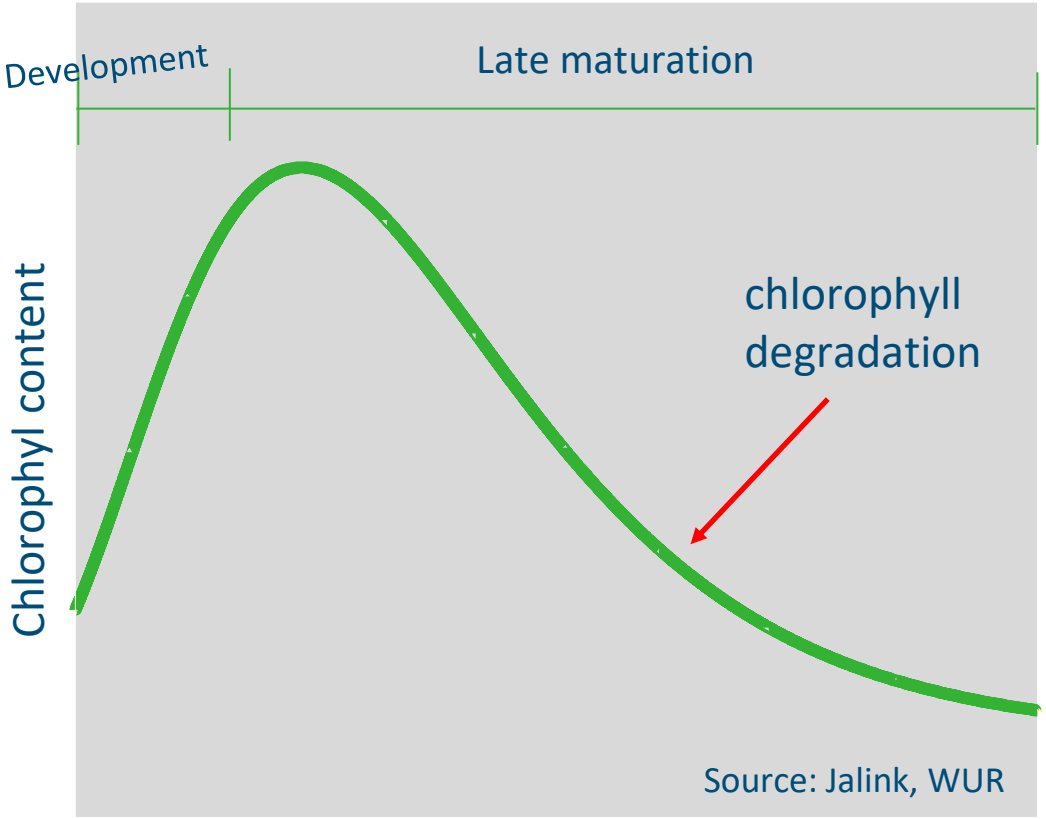
Degradation of chlorophyll during the late seed maturation phase

Most seeds are green during development



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Seed vigour, maturation and protection *recap*

- Seed are part of a circular system from mother plant to seeds to seedling that will grow to produce new seeds.
- Seed quality aspects, including germination capacity, seed vigour and its microbiome are important for crop establishment and producing new seeds.
- Seed vigour is largely determined during the late seed maturation phase, during which various protection mechanisms are imposed to aid the seed in survival after being released from the mother plant.
- It is important to allow this late maturation processes to occur before the seed is harvested.
- The protection mechanisms include the production of protective proteins, DNA condensation and degradation of the chlorophyll.

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Related Training Units & Modules

12.2 - When to harvest

13.1 – Why and how to dry seeds

13.2 – Optimising storage conditions

Other LiveSeeding training modules https://liveseeding.eu/trainings-summer-school/

For more information:

- LiveSeeding web page: https://liveseeding.eu/
- Steven P.C. Groot: https://www.researchgate.net/profile/Steven-Groot

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Thank you!