

Training in organic seed quality & health

Module 12: Seed maturity and harvest

Unit 12.2: **When to harvest**

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Topic

12.1 – Introduction & Seed vigour, maturation and protection

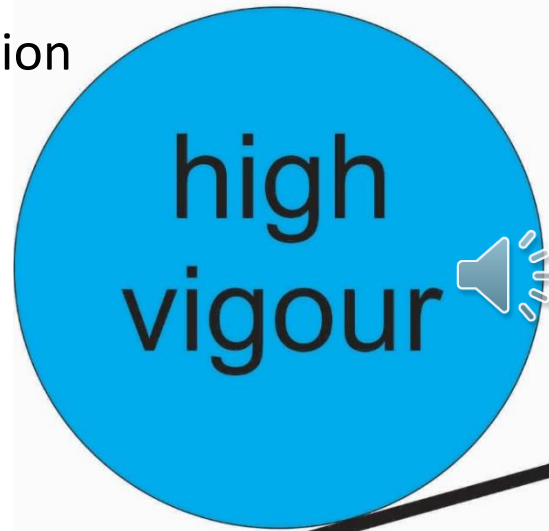
12.2 – When to harvest

13.1 – Why and how to dry seeds

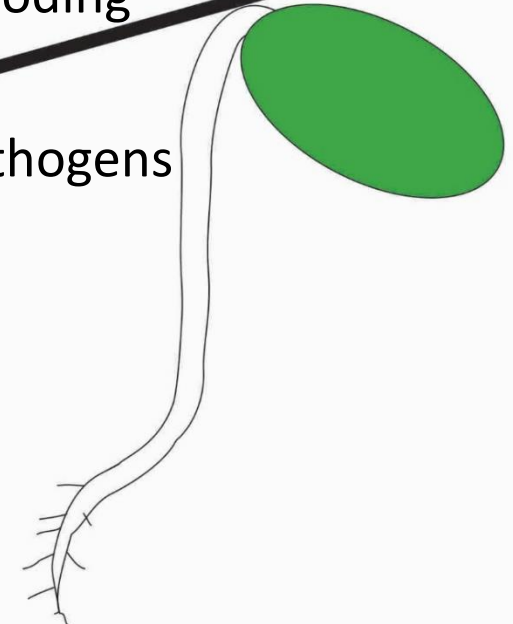
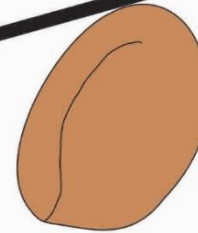
13.2 – Optimising storage conditions

Seed vigour

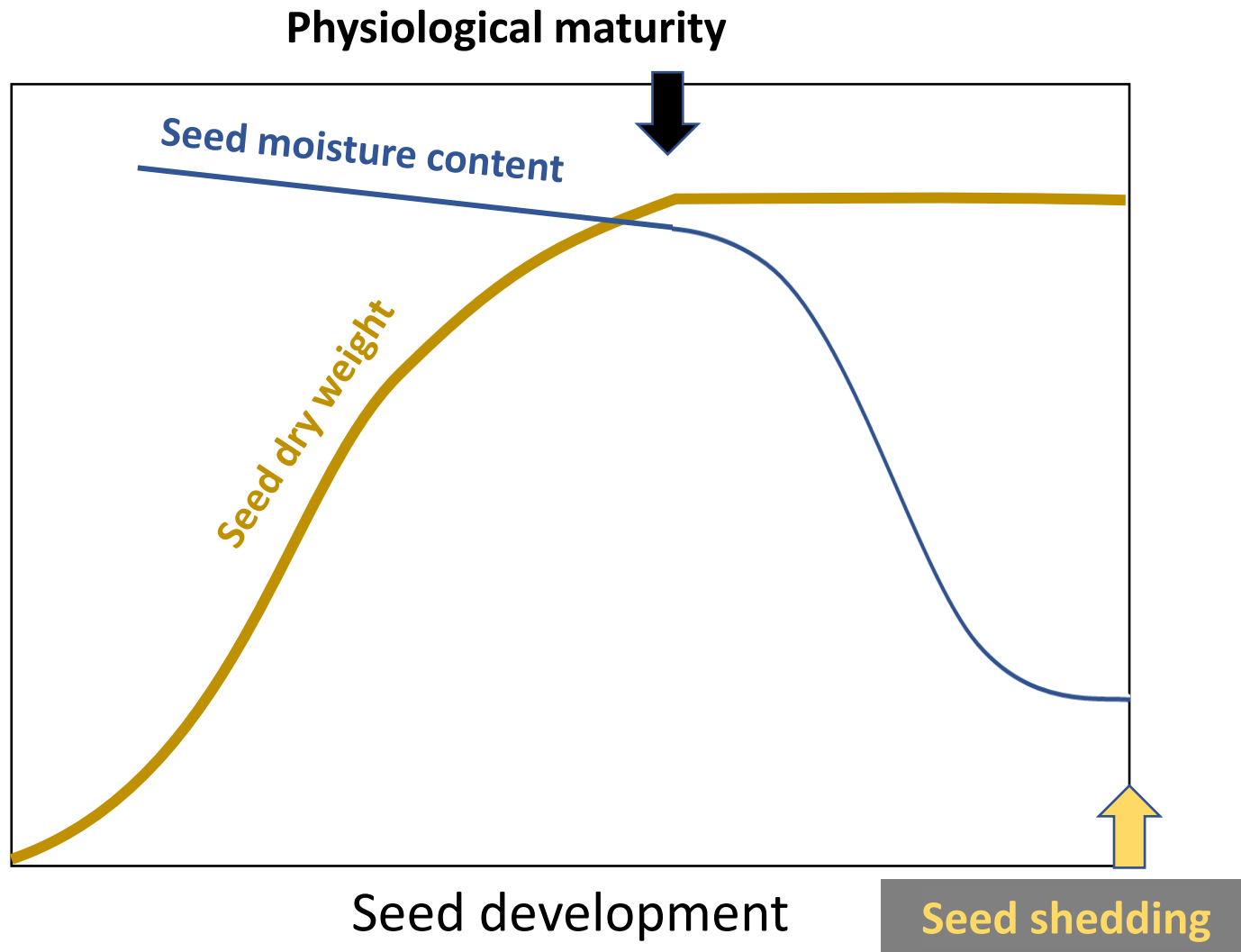
Size
Seed production
Treatments
Maturity at
harvest
...



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



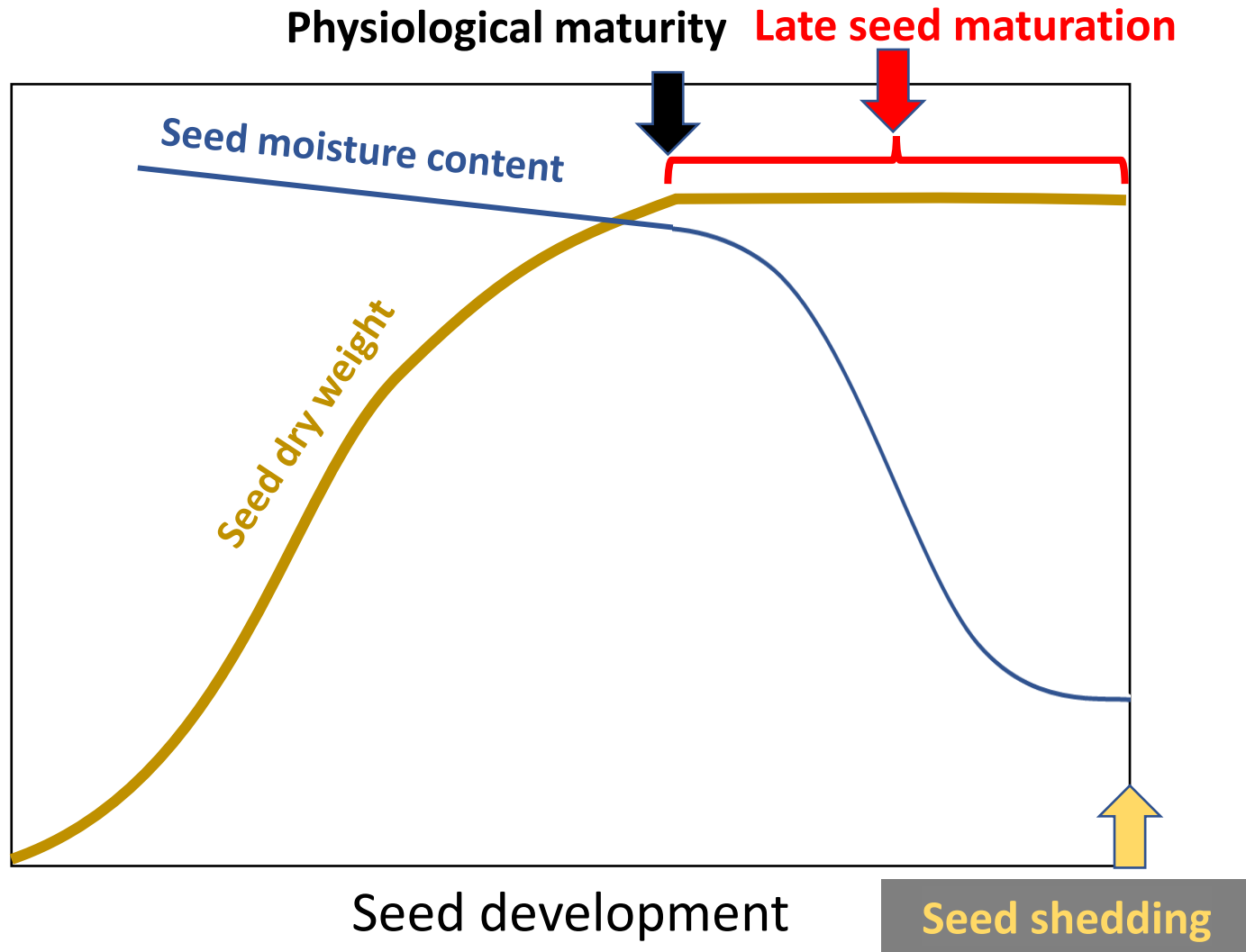
Seed maturation



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

The connection' with the mother plant for the import of nutrients ends at PM

Seed maturation



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

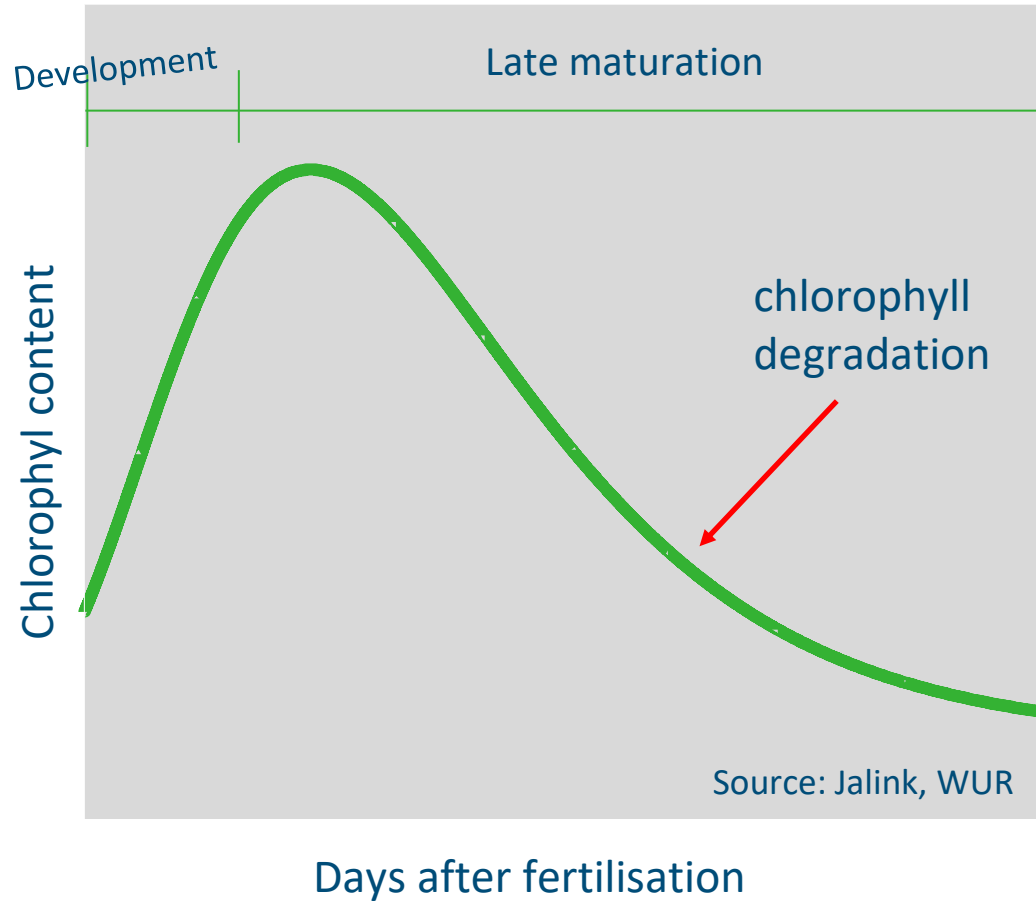
The connection' with the mother plant for the import of nutrients ends at PM

Thereafter the seed switches to the production of protective mechanisms

This is the late seed maturation stage

Degradation of chlorophyll during the late seed maturation phase

Most seeds are green during development

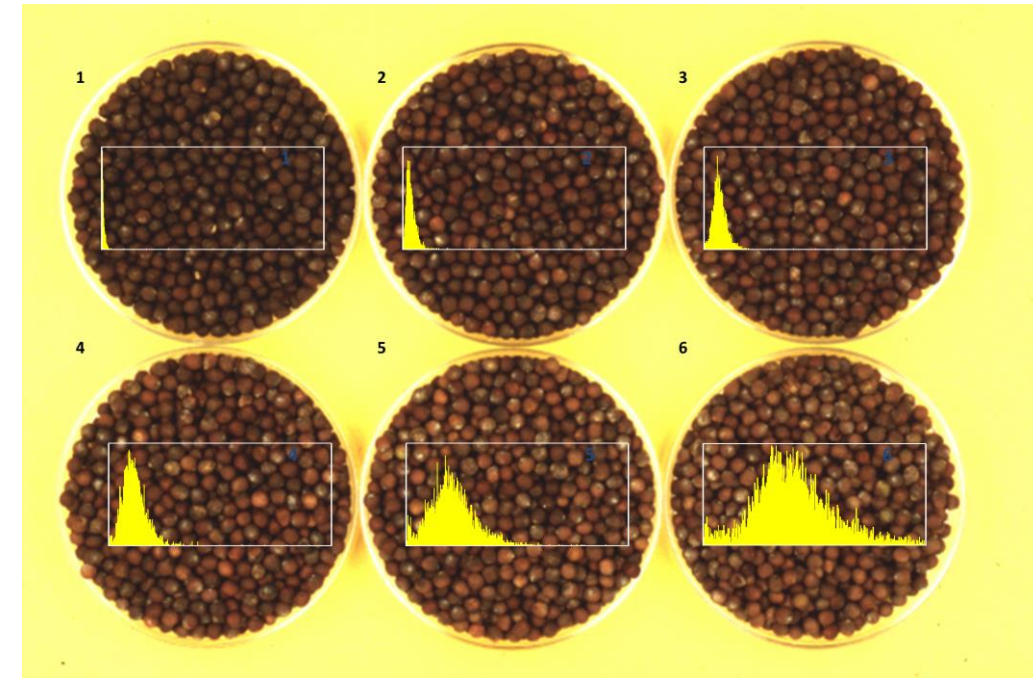
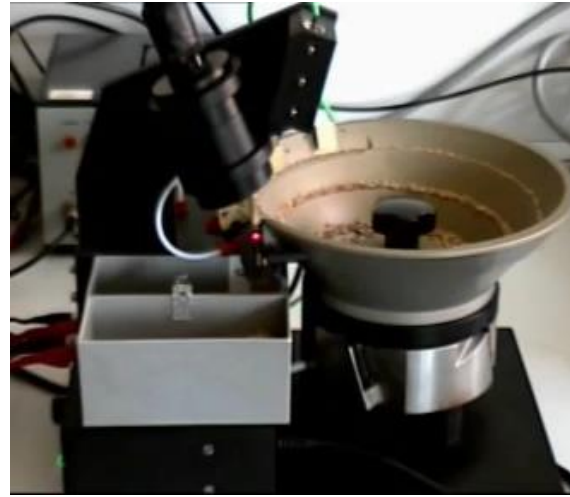
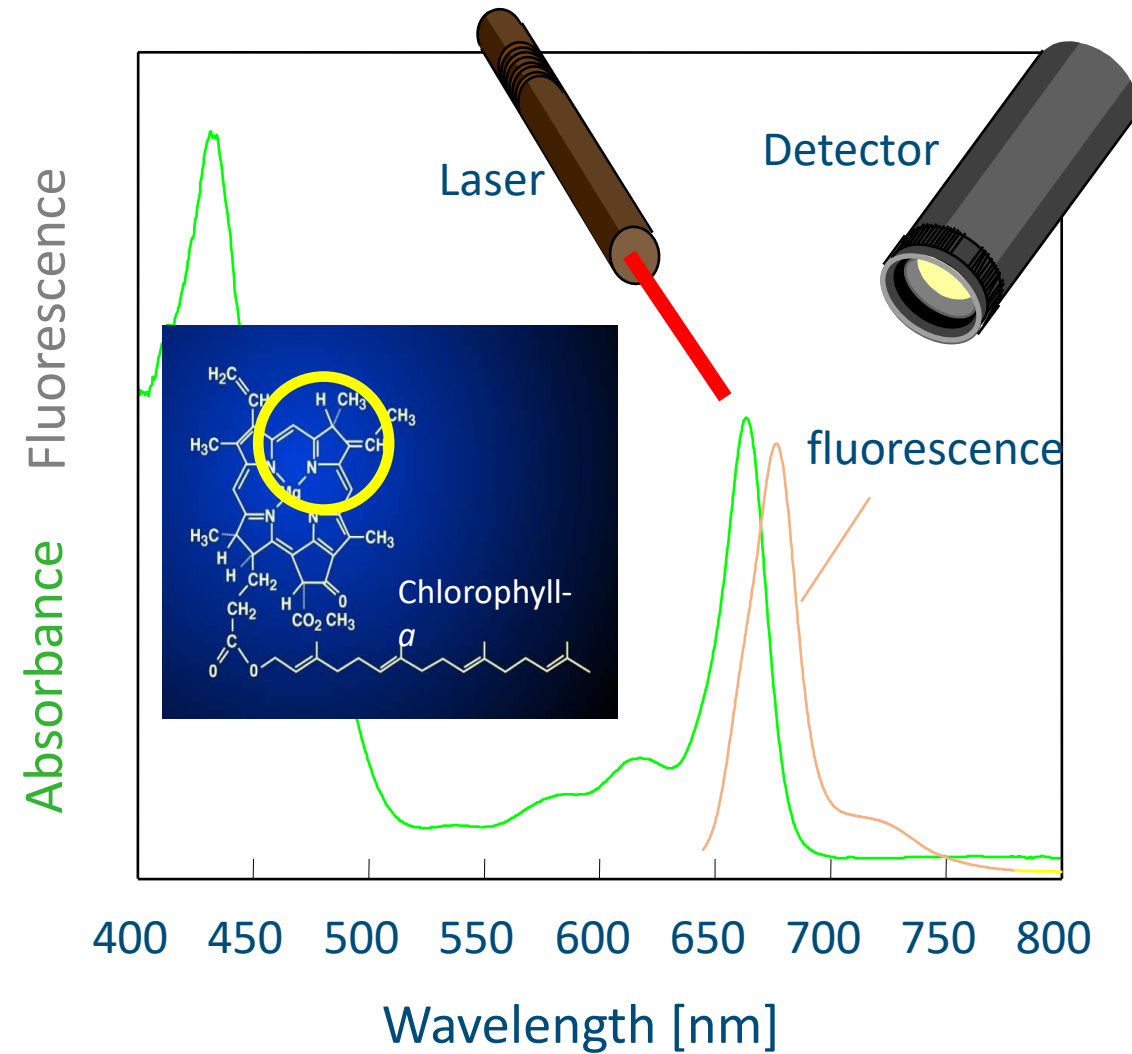


Seed maturity with cabbage seeds

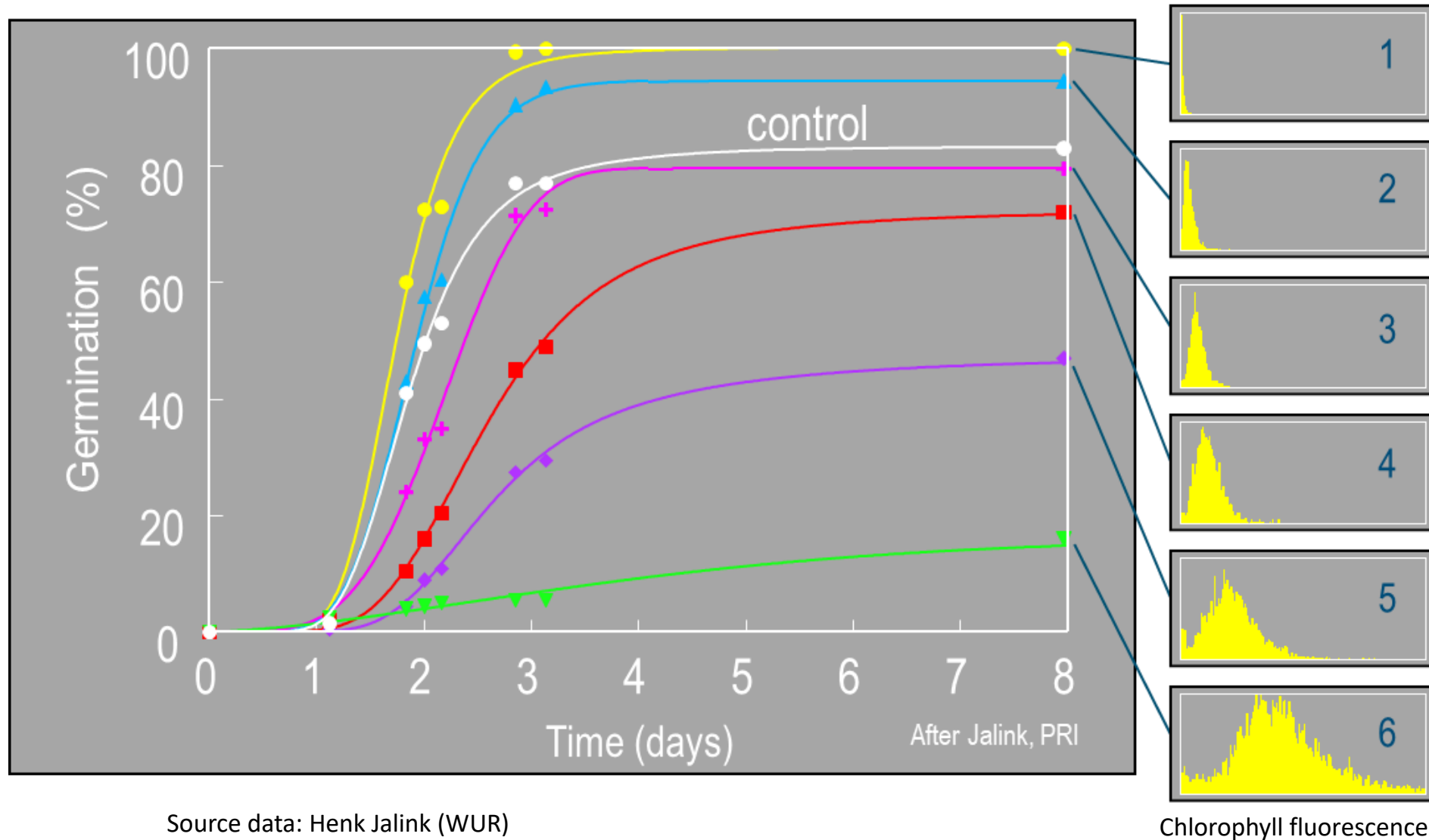


Seeds from *Brassica oleracea* (Steven Groot)

Sorting cabbage seeds of different maturity level



Germination of cabbage seeds of different maturity level





Harvest seeds from fruit crops?

With fruit crops, by nature, seed maturation is synchronised with fruit maturation

- Tomato, sweet pepper, chili's, cucumber, melons, apples, ...



Harvest seeds from fruit crops?

With fruit crops, by nature, seed maturation is synchronised with fruit maturation

- Tomato, sweet pepper, chili's, cucumber, melons, gourds, apples, ...

However, in some occasions by breeding for faster maturing fruits this synchronisation may have been lost.

With pumpkins it seems best to store the 'mature' fruits a period before seed extraction



When to harvest seeds from shedding seed crops?

At physiological maturity the seed has loses its 'connection' with the mother plant for the import of nutrients

Import of nutrients (sugars) to the seed stops

But the seeds are still metabolically active

Production of protective mechanisms

- Late Embryogenesis Abundant proteins
- Sugars in the cytoplasm to replace water
- Condensation of the DNA
- Production of anti-oxidants (vitamin E, polyphenols,...)
- Degradation of chlorophyll

} Seed vigour

When to harvest seeds from shedding seed crops?

➤ The production of protective mechanisms for seed vigour requires enzyme activity and energy production, thus:

- Time
- Minimal moisture level

How to handle?

- Fast drying at harvest fixes the situation (at non-optimal protection)
- Slow drying can prolong the build-up of seed vigour
- Plants with fruits (!) can be harvested when the first seeds start to be dispersed, put the cut plants e.g. on a tarp, to dry slowly
 - But take care of mould growth !
- After some period, further drying is needed and the dry seeds can be retrieved from the fruits
- Size sorting can be used to remove the underdeveloped seeds.
- With many crops chlorophyll fluorescence can be used as a marker for testing and protocol development and even sorting



Photo: Steven Groot

When to harvest

recap

- Seed vigour is an important trait for crop establishment and yield
- Finishing the late maturation phase in seed development is essential for acquiring high seed vigour
- With most fruit crops fully mature seeds can be harvested coinciding with fruit maturity
- With crops where seeds are shed at maturity, the entire crop can be cut once the first seeds are dispersed
- Dry the crop slowly, with the seeds covered by the fruit tissue. This will allow the seeds to continue some period with their metabolic activity and finish the induction of protective mechanisms
 - Be aware of the risks of moulds developing if drying is too slow
- After the slow drying a faster and more deep drying can be performed to allow seed extraction by threshing

Related Training Units & Modules

12.1 – Seed vigour, maturation and protection

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>

Contributions



Scientific project management : Monika Messmer (FiBL-CH)

Project leader: Mariano Iossa (FiBL-EU)

Designer of training modules on the production of high-quality organic seed (modules 11 to 18) : Stephanie Klaedtke and Stéphanie Mothes (ITAB)

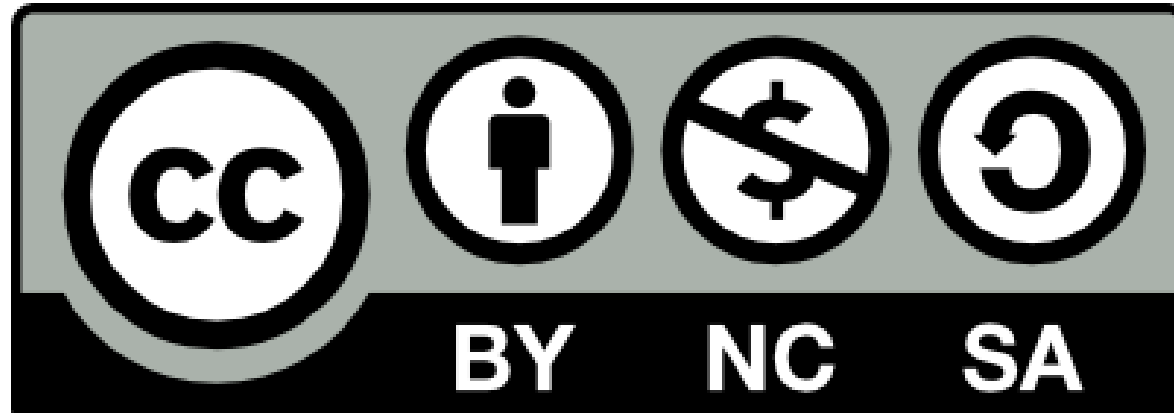
Authors of videos, questionnaires, exercices : module 11 Stephanie Klaedtke (ITAB), modules 12 et 13 Steven Groot (WUR & International Seed Academy), module 14 Gaspard de Tournemire and Stephanie Klaedtke (ITAB), Jan Kodde (WUR) and Valentin Gfeller (FiBL-CH) module 15 Jelena Baćanović-Šišić (Bingenheimer Saatgut AG) module 16 Mária Megyeri module 17 Györéné Kis Gyöngyi (ÖMKi) and Diego Guidotti (Aedit SRL) module 18 Maike Bender and Carl Vollenweider (Dottenfelderhof)

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 fruit breeding:
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Thank you!

