LiveSeeding

Training in organic seed quality & health

Module 13: **Seed drying & storage**

Unit 13.1: **Why and how to dry seeds**

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UK Research and Innovation

Topic

12.1 – Introduction & Seed vigour, maturation and protection

12.2 – When to harvest

13.1 – Why and how to dry seeds

13.2 – What storage conditions to use

Maintaining seed quality

- Seeds deteriorate faster when kept at a hight humidity level
- Drying seeds soon after harvest is essential to maintain quality

- More information on the effect of moisture during seed storage in module unit 13.2

Picture from shutterstock.com

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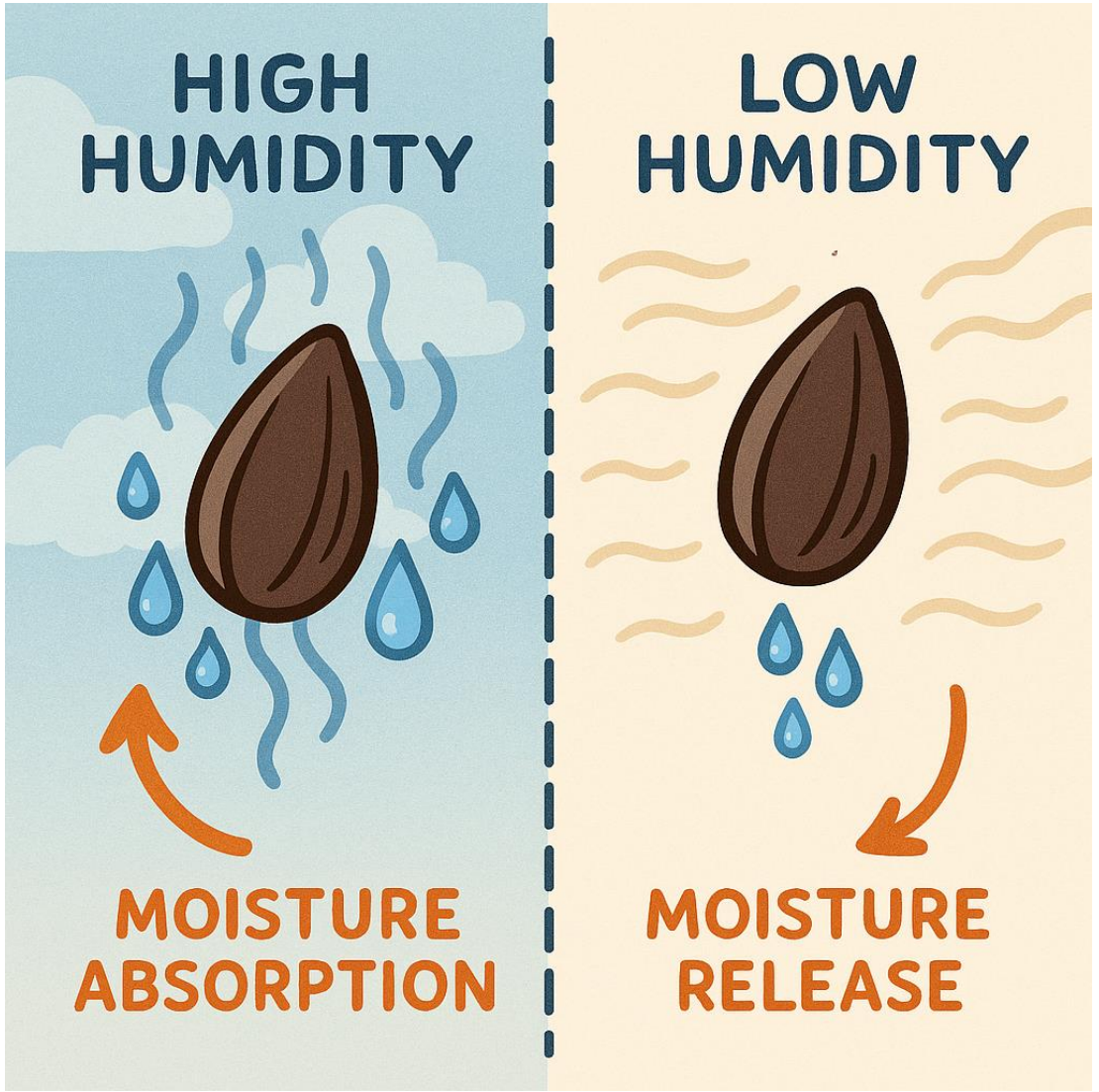
Seeds equilibrate with the environment



Cartoon generated using ChatGPT

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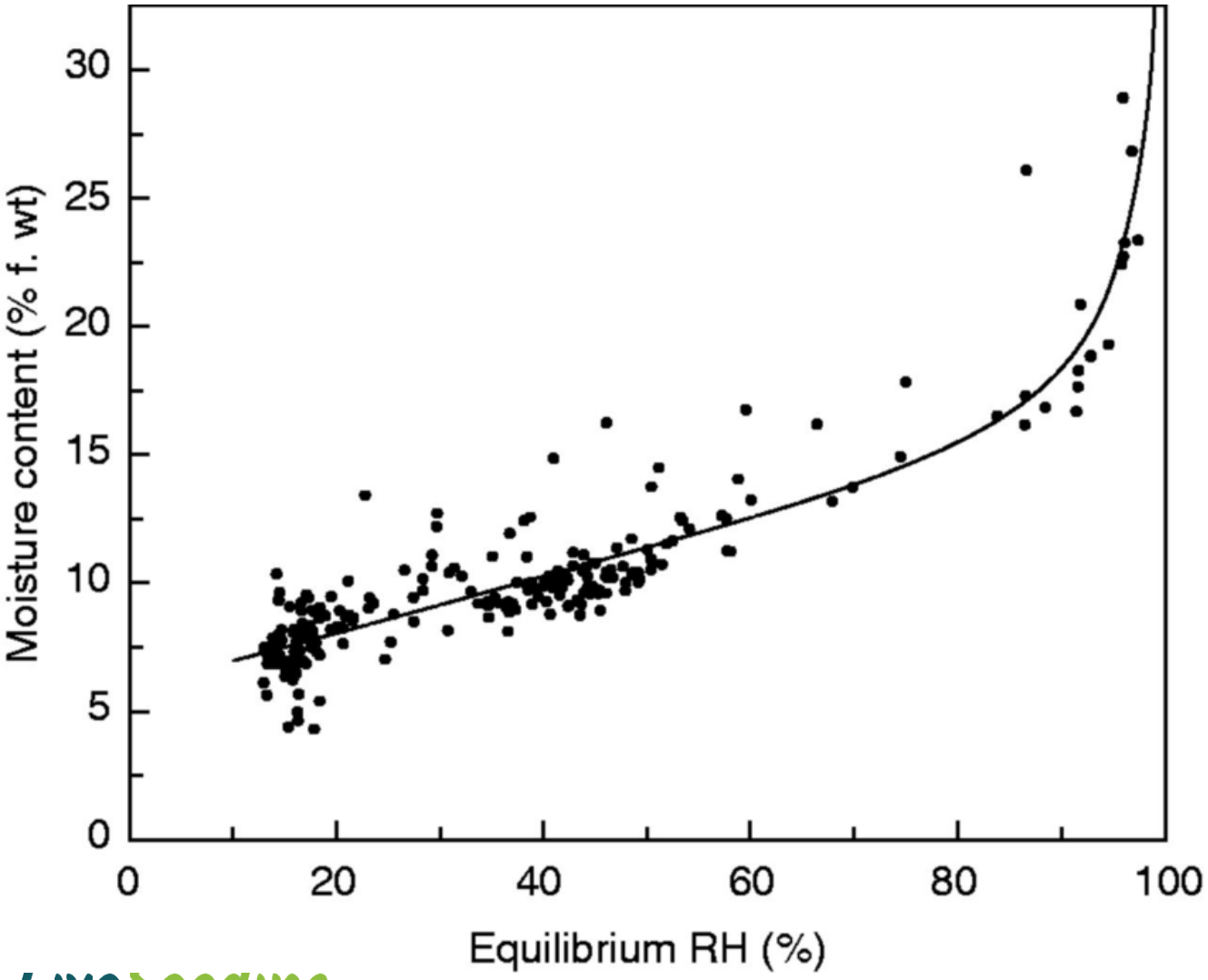
Relation Seed Moisture content and Relative Humidity



Relationship between seed moisture content and Equilibrium Relative Humidity (eRH) during seed drying for rice seeds

Source: Whitehouse et al. 2015, *Annals of botany, 116 p*247-259. https://doi.org/10.1093/aob/mcv091

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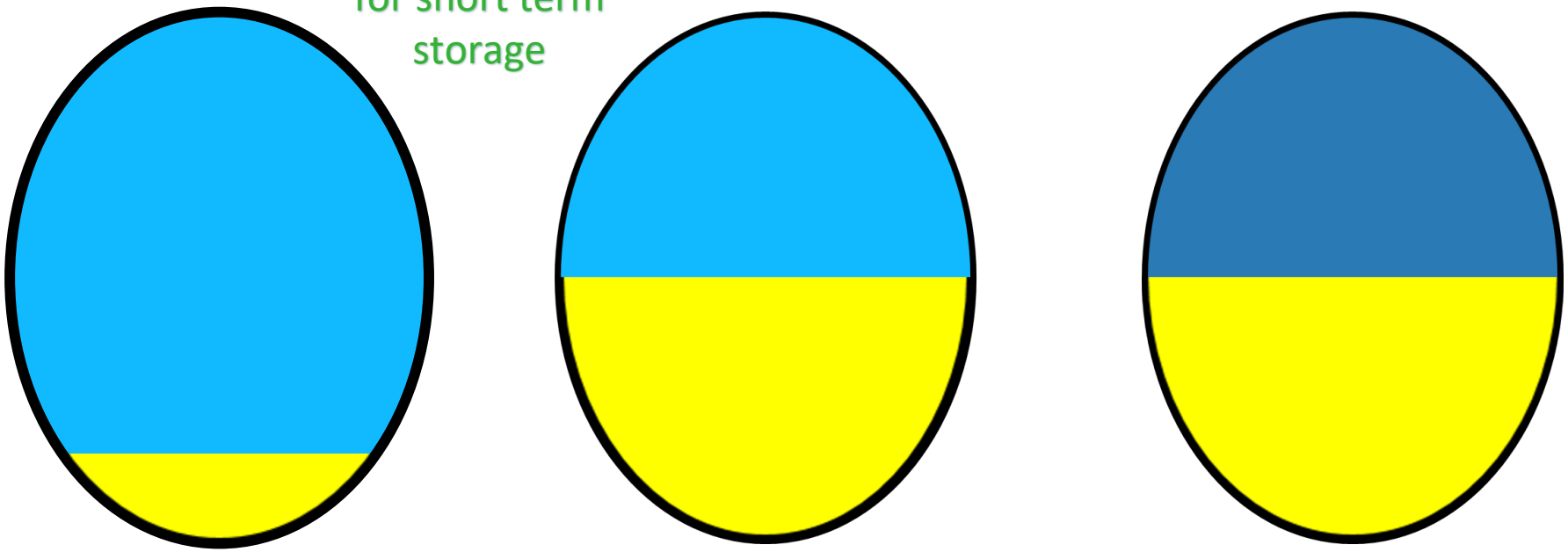
Relation between relative humidity and seed moisture content

60% equilibrium Relative Humidity

Relatively safe for short term storage



10% oil

50% oil

50% oil

14% MC

7.6% MC

14% MC

= 96% equilibrium RH

It is better to dry seeds till in equilibrium with a desired eRH than to a desired seed moisture content

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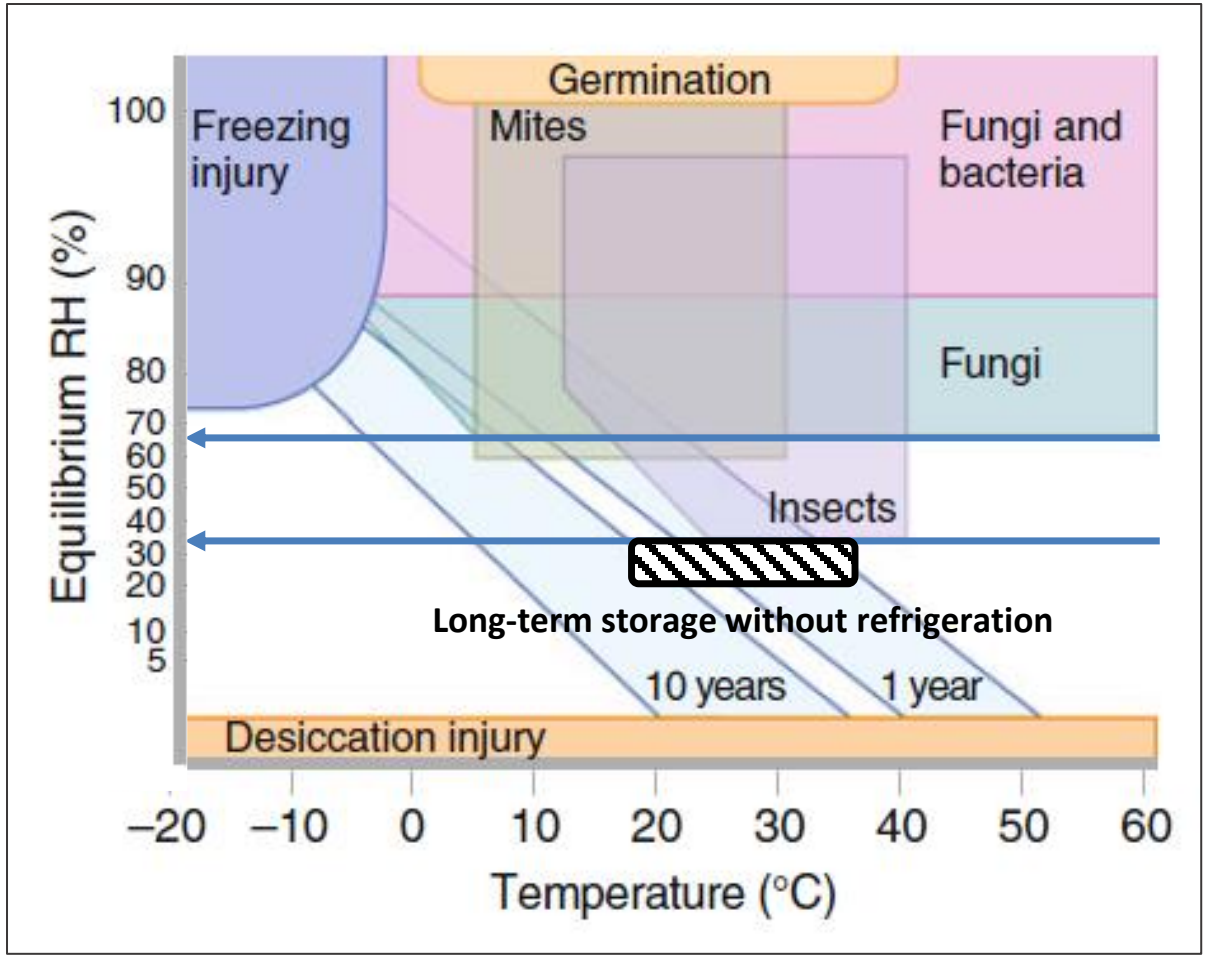
Drying is needed to prevent seed deterioration

- Above 70% RH moulds can ruin the seeds
- Seeds need to be dried below 60% RH to reduce metabolic activity
- Optimal humidity during storage is between 15 and 30% RH



Source: Roberts EH (1972) Viability of Seeds. Chapman and Hall Ltd., Syracuse, NY, pp 14-58.

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Drying methods

Natural drying: wind and sun

Forced drying with (heated) air

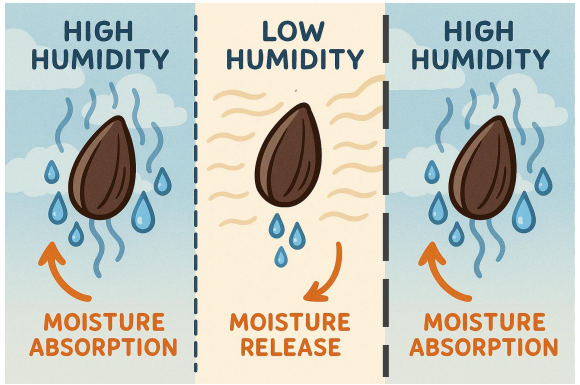
Drying with desiccants

Sun and wind drying

Seeds can be dried to the environmental RH

During the night RH increases and seeds reabsorb moisture

Avoid high temperatures when seeds are still rather moist



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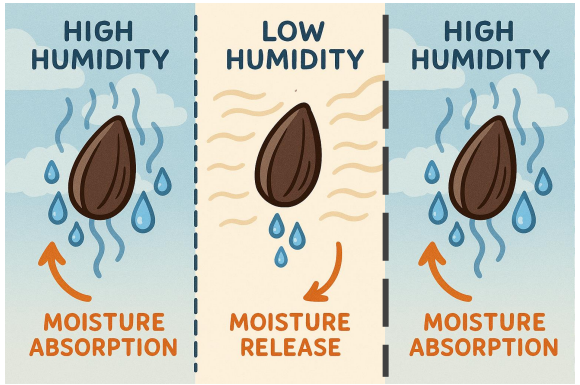
Shade drying

Seeds can be dried to the environmental RH

Seeds are protected from direct sunlight and rain



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Forced drying with air

Drying with a fan, using unheated air

Seeds can be dried to the environmental RH

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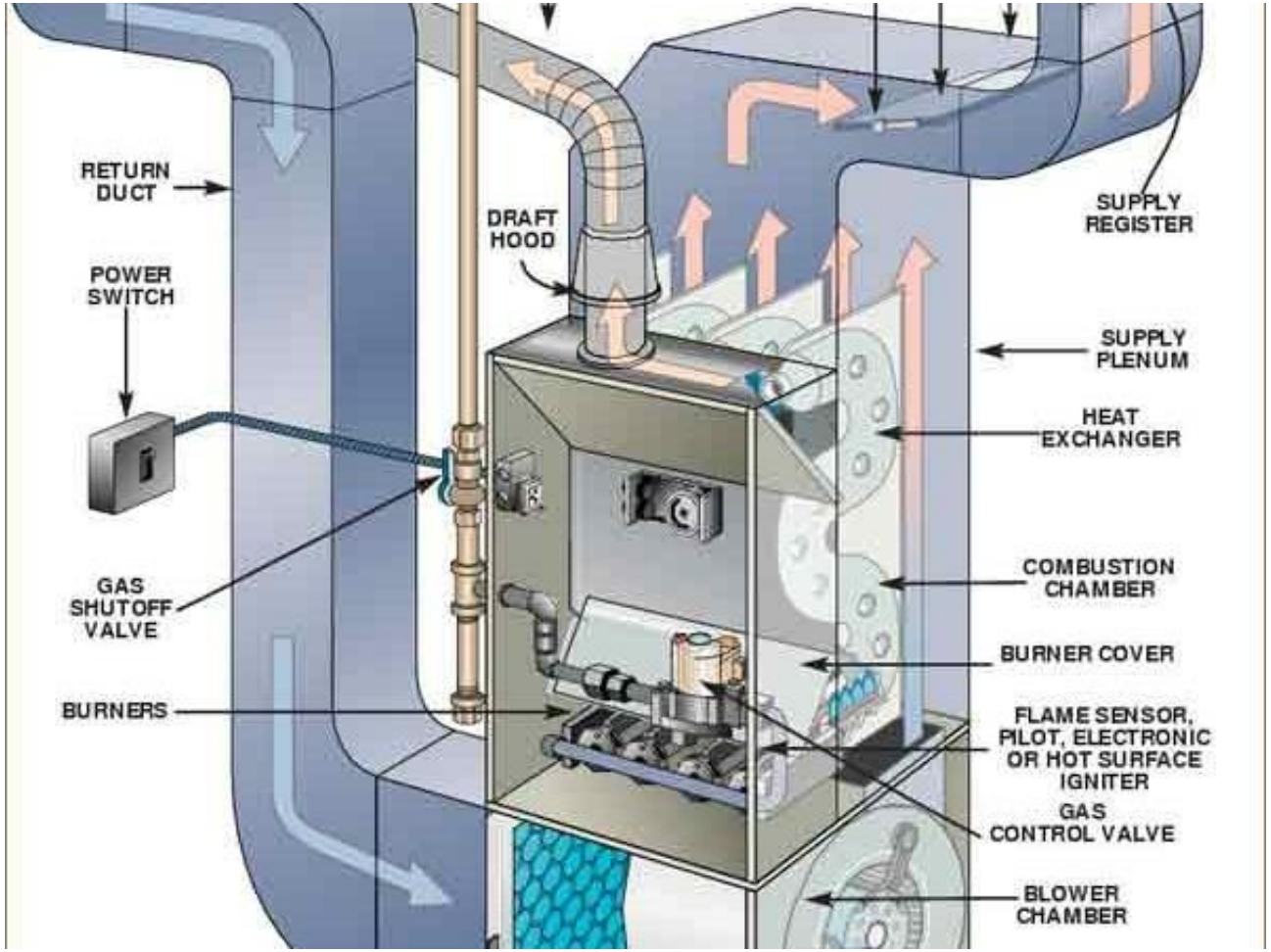
Forced drying with heated air

Outside air can be heated to reduce the relative humidity

Risky when the temperature gets too high, especially in the phase when seeds are still rather moist



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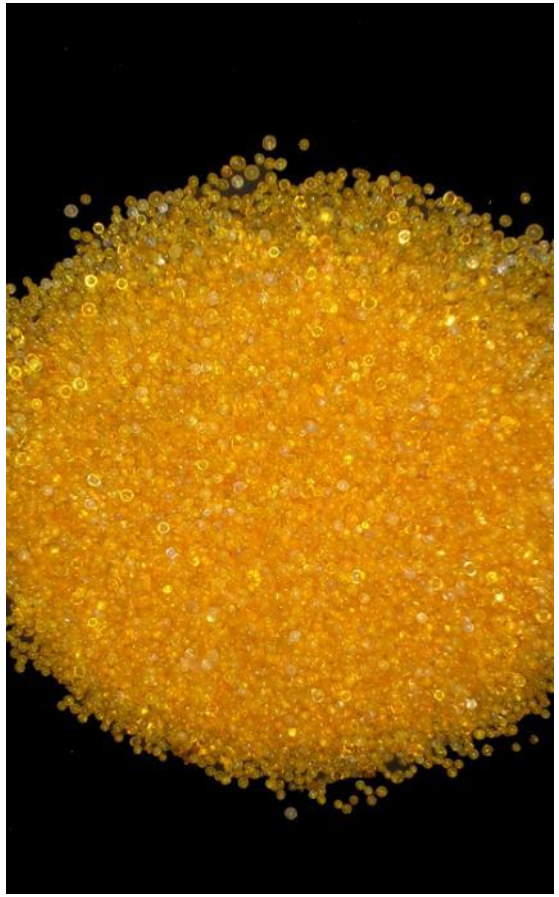
Drying with absorbers (mainly for small seed lots)

Moisture absorbers

- Silica gel
- Drying beads

Should be performed in a hermetic closed container

More efficient when the air is moving



Silica gel

Drying beads® (Rhino-Research, Thailand)

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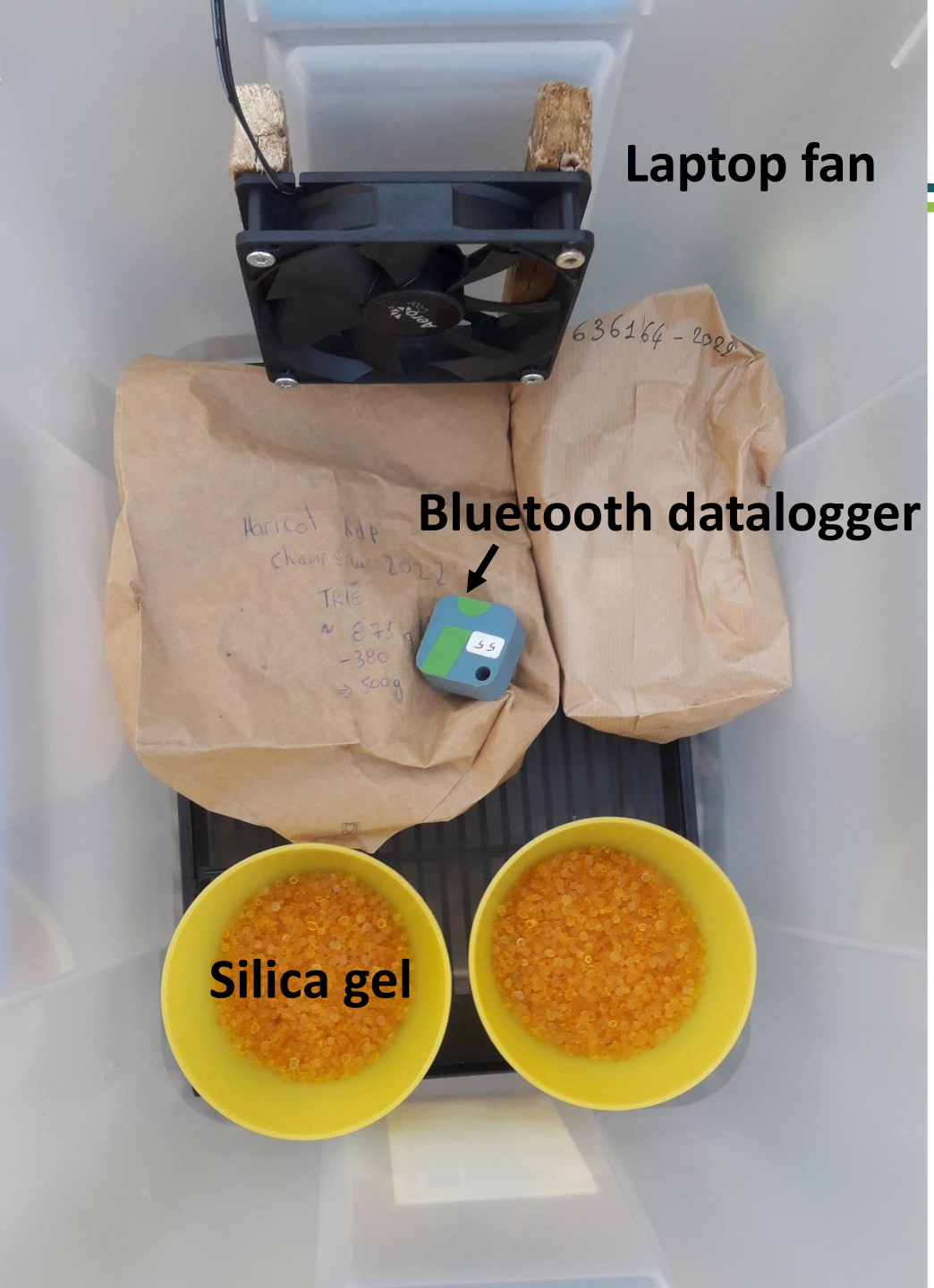

An example

Ventilation to speed up drying

Lid as air-tight as possible

Drying beads

Drying beads absorb till saturation

www.centorthai.com

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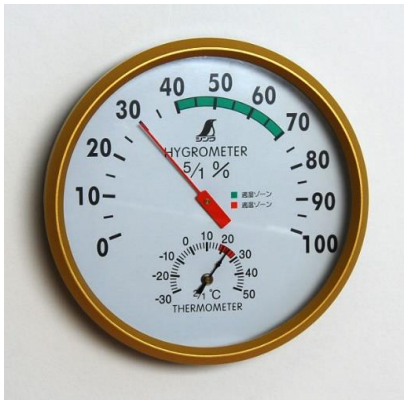
Seed equilibrium RH measurements

Simple method

- Seeds are placed with a hygrometer in a hermetically transparent airtight box
- The air in the box will equilibrate with the seed sample
- The equilibrium RH can be read using the hygrometer
- The method is non-destructive
- The method is not very accurate, but in practice often good enough



Moisture box (Rhino-Research, Thailand)

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Seed equilibrium RH measurements

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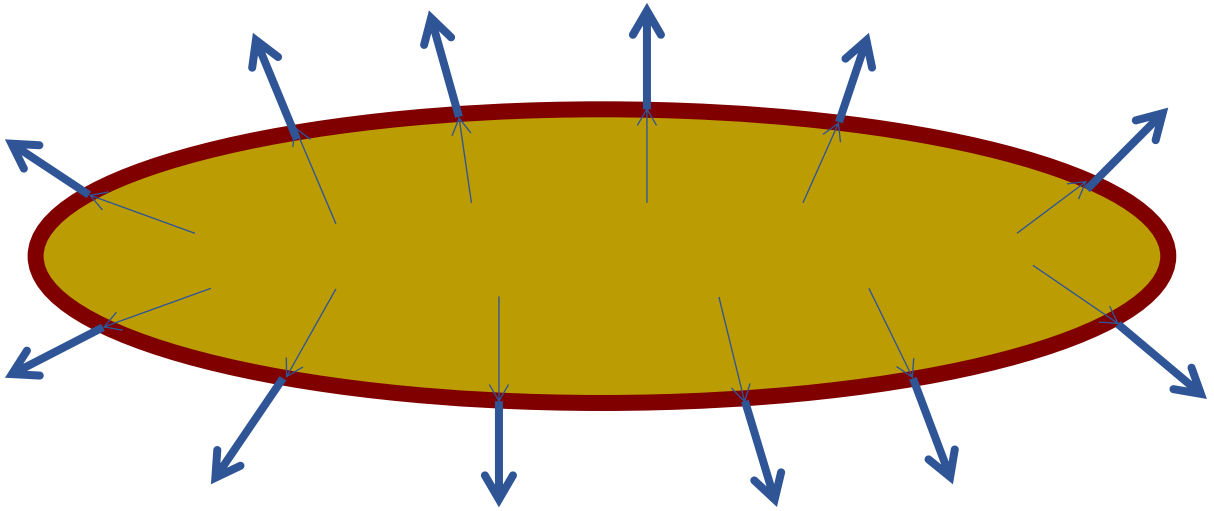
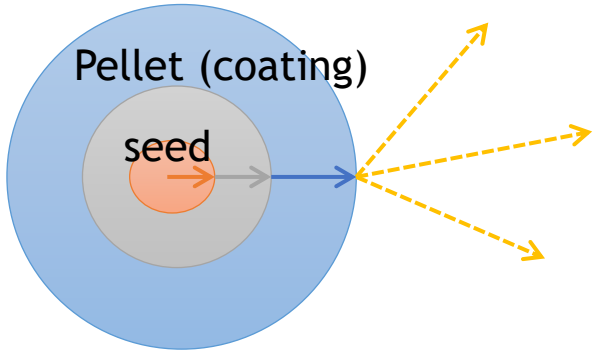
Moisture migration

- Water must diffuse from the core of the seeds to the surface. This takes time, depending on the size of the seed
- The seed coat can retard the water release
- Interval drying is more energy efficient





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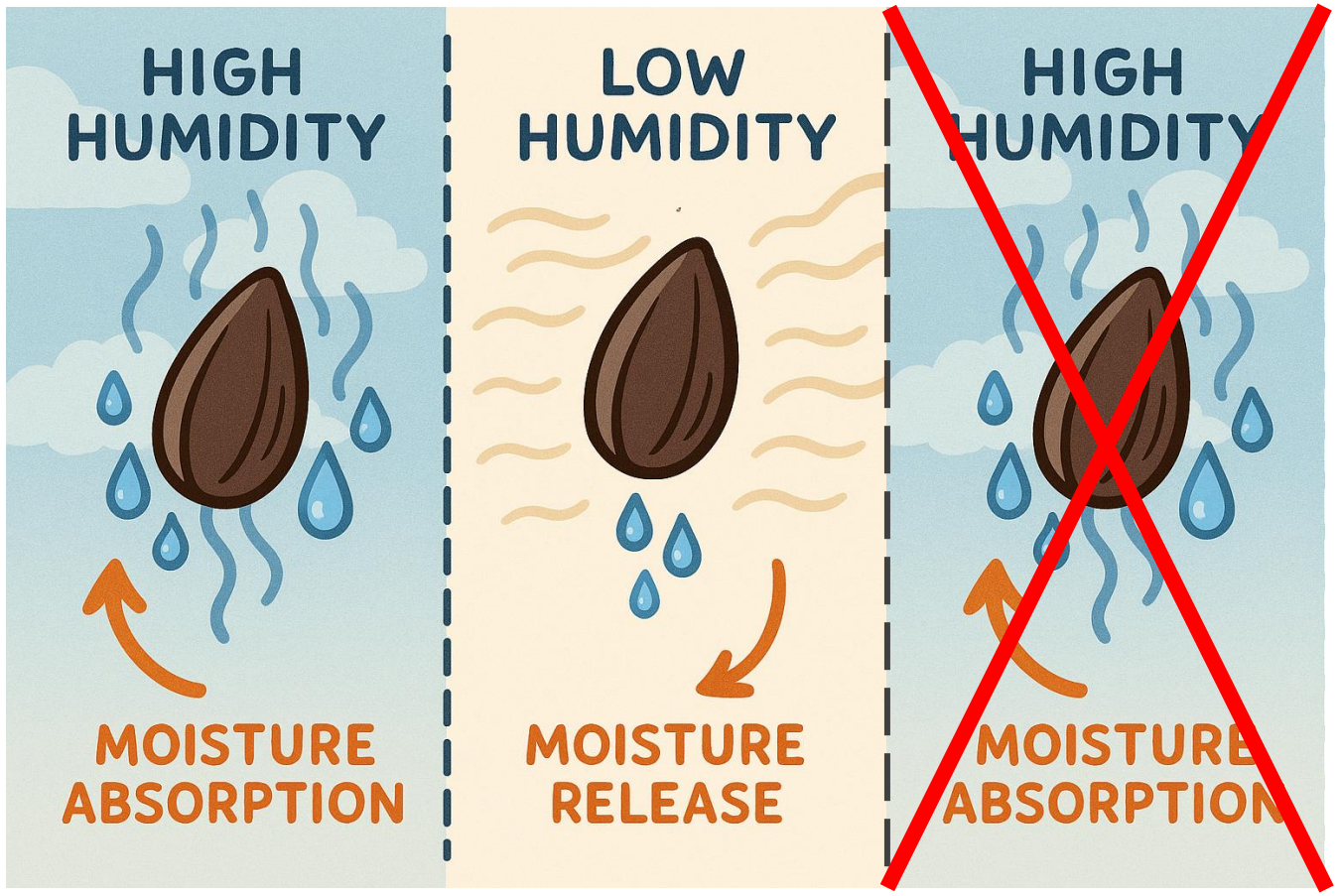
Make seeds dry and keep them dry!



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Why and how to dry seeds

recap

- Seeds deteriorate faster when kept at a hight humidity level
- Seeds are hygroscopic and rapidly adsorb moisture from the air
- Because seeds differ in oil content, the equilibrium RH is a better measure for physiological quality than seed moisture content (% water per seed weight)
- Seeds should be dried below 60% equilibrium RH
- Several methods can be used for seed drying: Natural drying using wind and sun, Forced drying with heated air, and drying with desiccants.
- The choice of drying depends on the humidity of the outside air, the value and the volume of the seeds batch.
- To keep quality: **Make your seeds dry and keep them dry**

Related Training Units & Modules

12.1 – Seed vigour, maturation and protection

12.2 – When to harvest

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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Contributions

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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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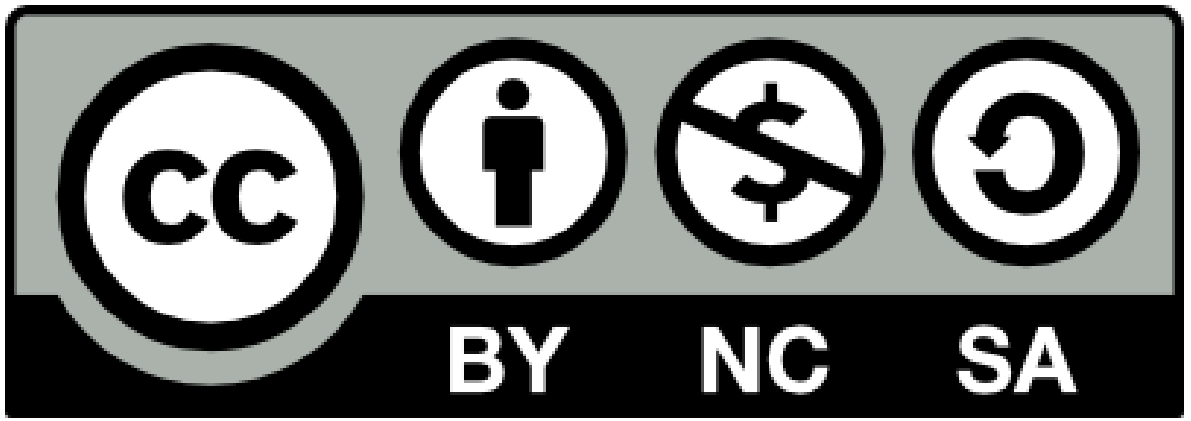

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www.liveseeding.eu

Sister project on organic fruit breeding: www.InnOBreed.eu

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Thank you!