

Seed Storage Management

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Rhino





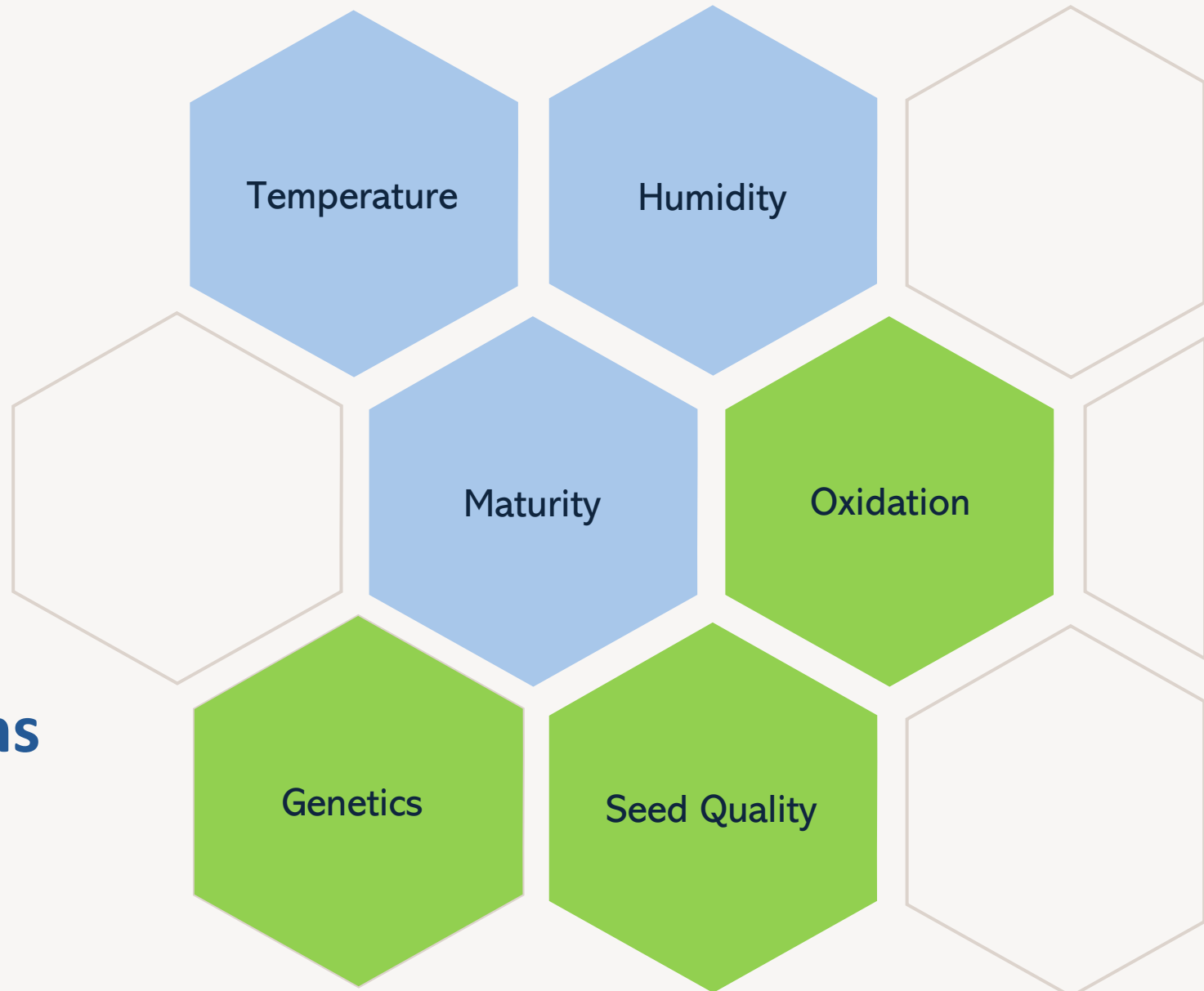
**How does your
company decide
what seed lots
should be stored
till next season,
and what seed
lots should be
sold this year?**



**2 major conditions,
both need to be perfect**

Environmental conditions

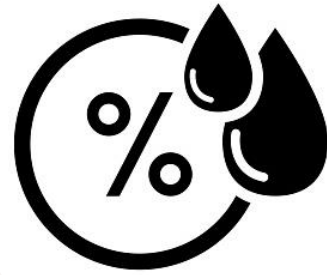
Seed attributes



The environment



Temperature



Humidity

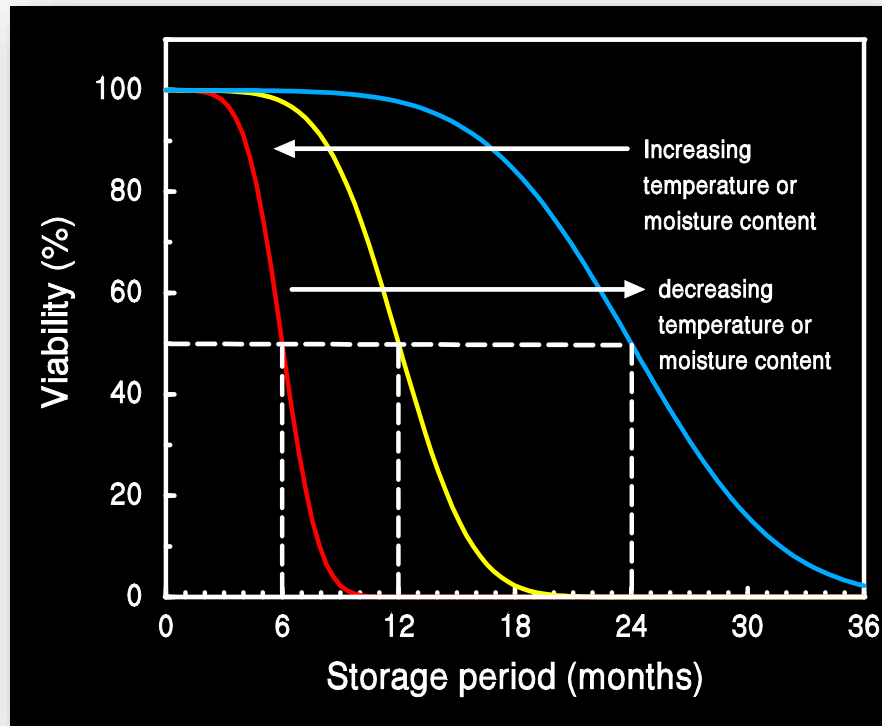


Oxygen



Packaging

Thumb Rules of Seed Storage



James' Rule:

$$\text{Temp (}^{\circ}\text{F)} + \text{RH (\%)} < 100$$

$$\text{Temp (}^{\circ}\text{C)} + \text{RH (\%)} < 60$$

Harrington's Rule:

Seed longevity decreases by one-half for every 1% increase in moisture content or every 10°F (6°C) increase in temperature.

Bradford's Metronome Rule:

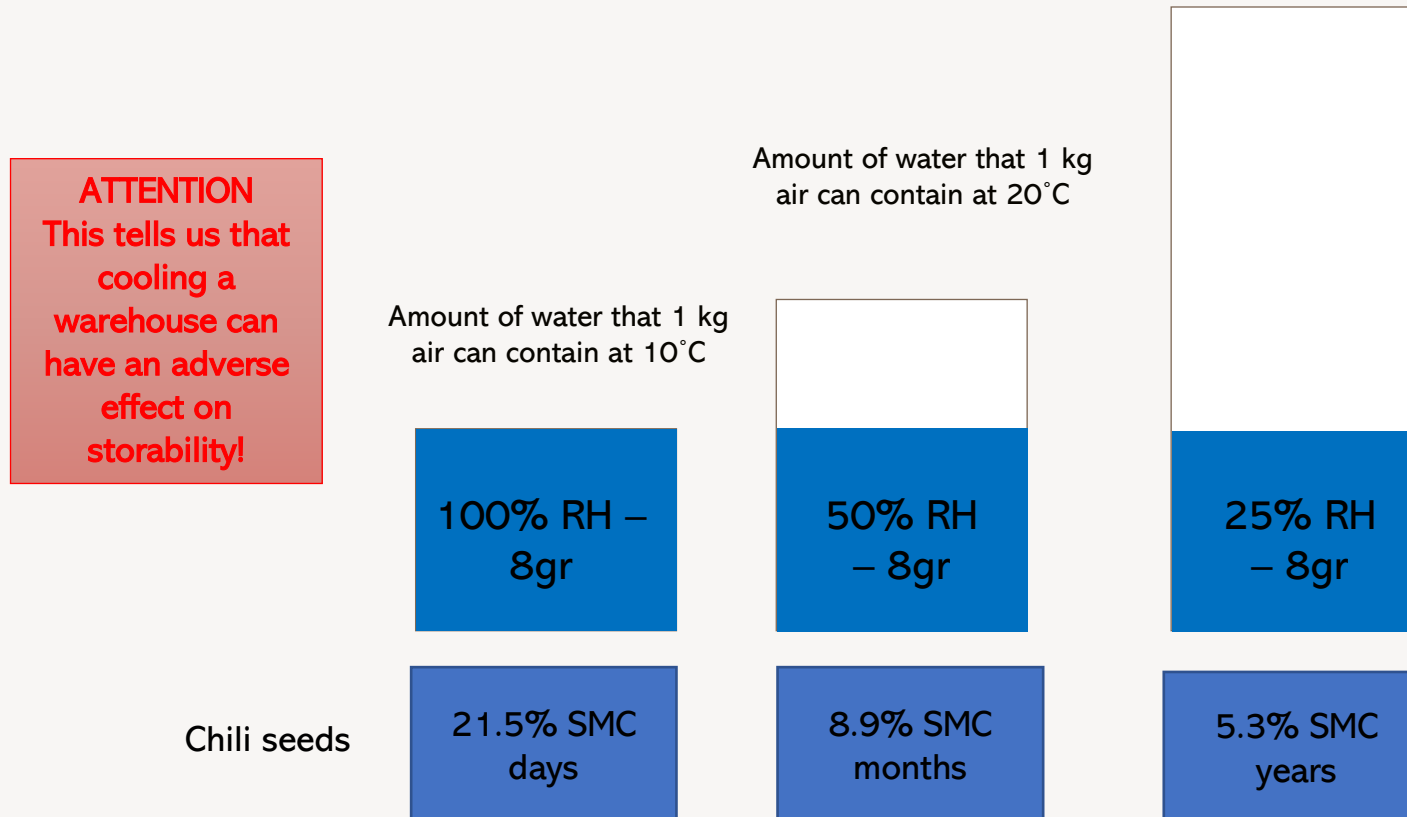
The "clock" starts running as soon as the seeds are mature and they have a total number of ticks before death. The rate at which the metronome ticks depends upon the temperature and moisture content.



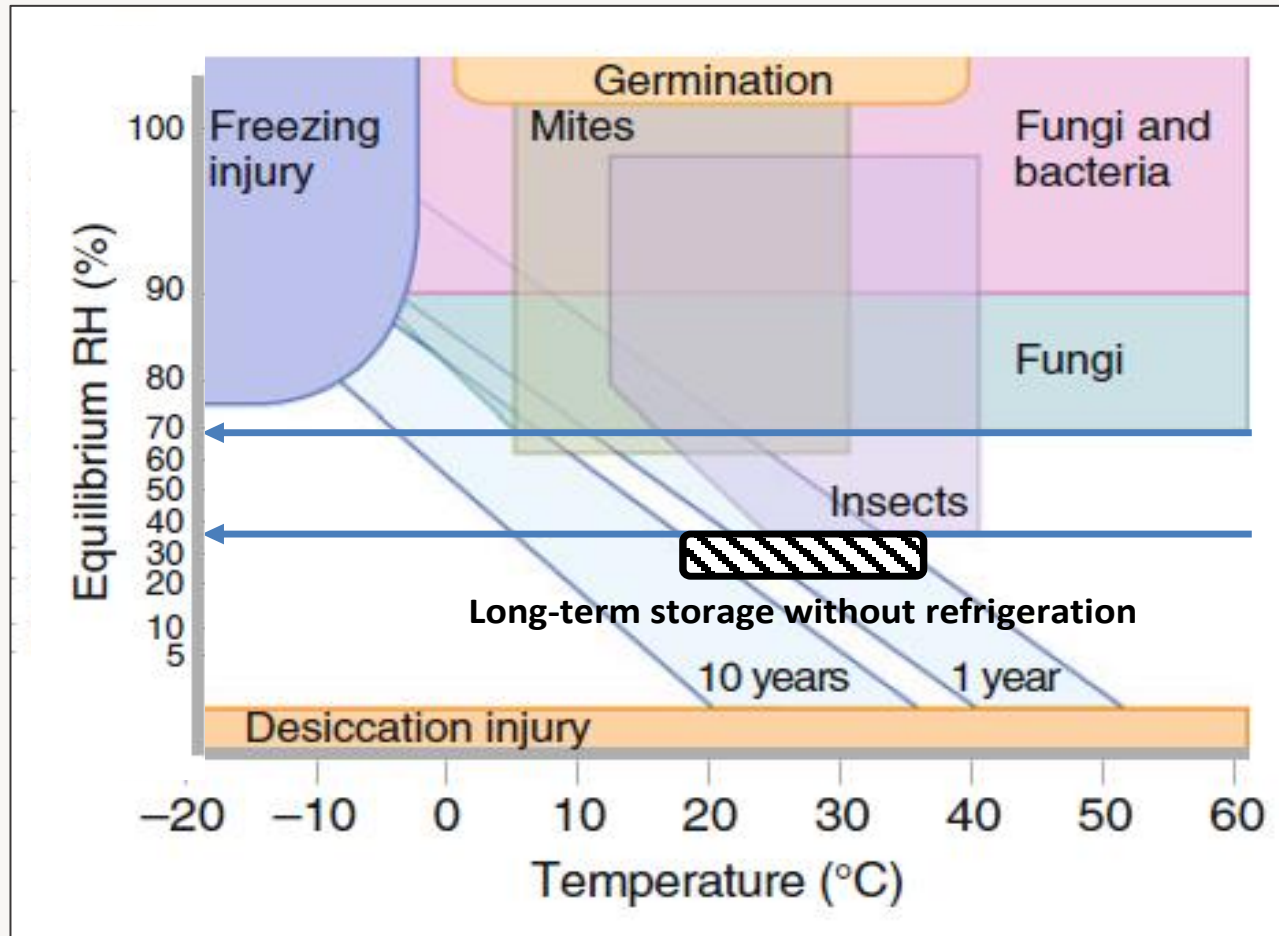
Water content of the air

And the impact of temperature

Amount of water that 1 kg
air can contain at 35°C



Other storage problems are reduced at low RH



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



Impact of oxygen

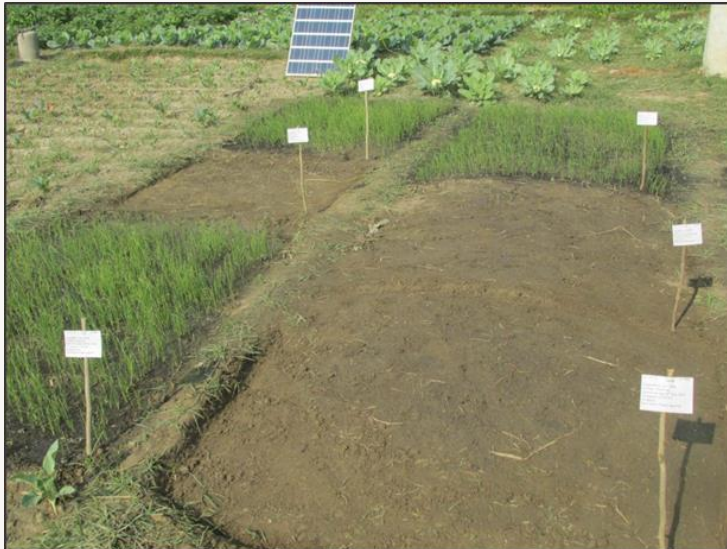
Positive

Oxidation of lipids, starch, sugars ... delivers energy , necessary to germinate and grow

Negative

Oxidation during storage can deteriorate important cell structures (DNA, mitochondria, membranes, lipids ...)
Oxygen levels ($>2\%$) is needed for insects, fungi ... to survive and reproduce

Impact of seed moisture and packaging



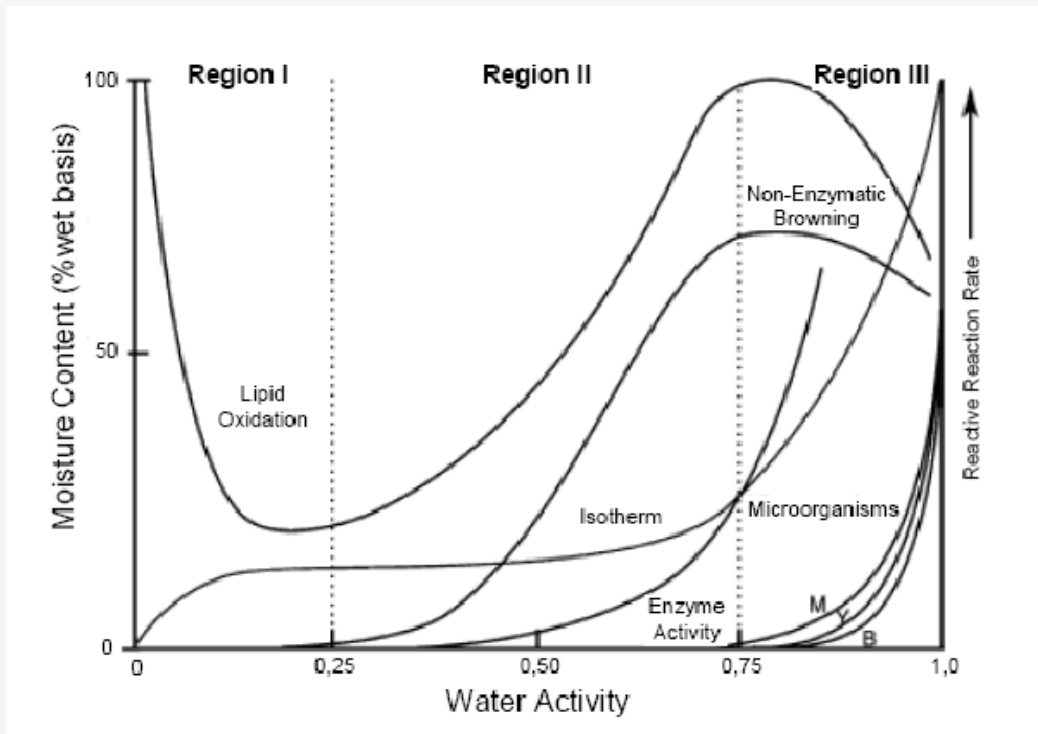
Onion seed storage field trial, Basantpur, Rupandehi, Nepal



Courtesy of Dr. Keshavulu Kunusoth, ANGRAU, Hyderabad, India

Open storage vs. bead storage of onion seeds in Nashik, India and Basantour, Nepal

Key constraint: Ideal moisture level



Water activity stability map (adapted from Labuza)

In order to minimize all metabolic activities, the water activity (or eRH) should be below 25% but higher than 15%

The corresponding moisture content can be calculated through the Cromarty equation and would be for:

At 20 Celsius	25% RH	15% RH
Rice	7.5%	6.0%
Corn	7.5%	5.5%
Chilies	6.0%	4.5%
Tomato	6.5%	5.0%
Cabbage	5.0%	4.0%
Onion	6.5%	5.0%
Melon	5.5%	4.0%

Seed Related Factors



Maturity



Seed Vigour



Energy



Genetics

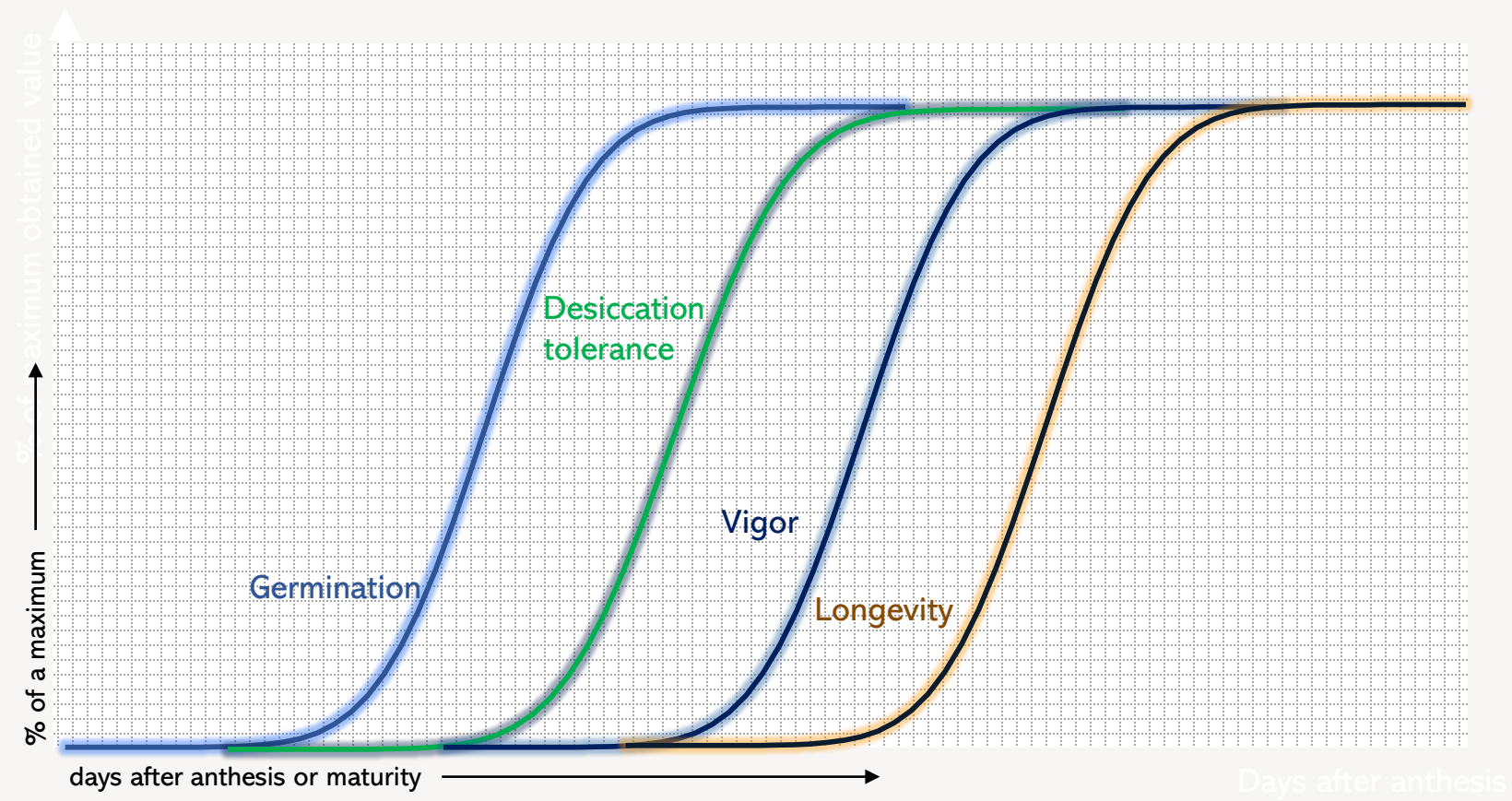
First, a seed will establish its final goal... the ability to germinate

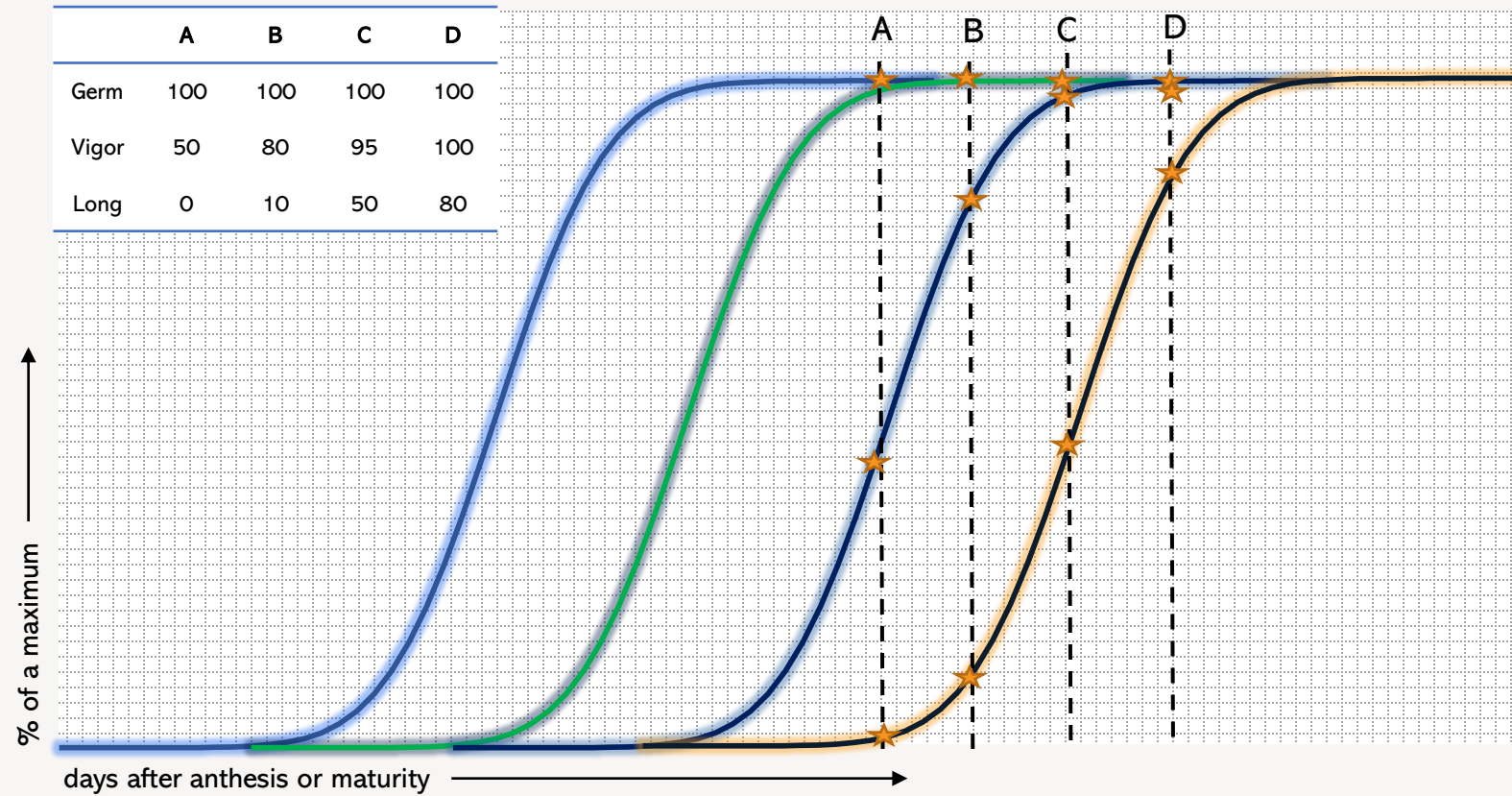
Second, it will develop a desiccation tolerance (orthodox seeds)

Third, it will produce energy reserves, seen as vigour

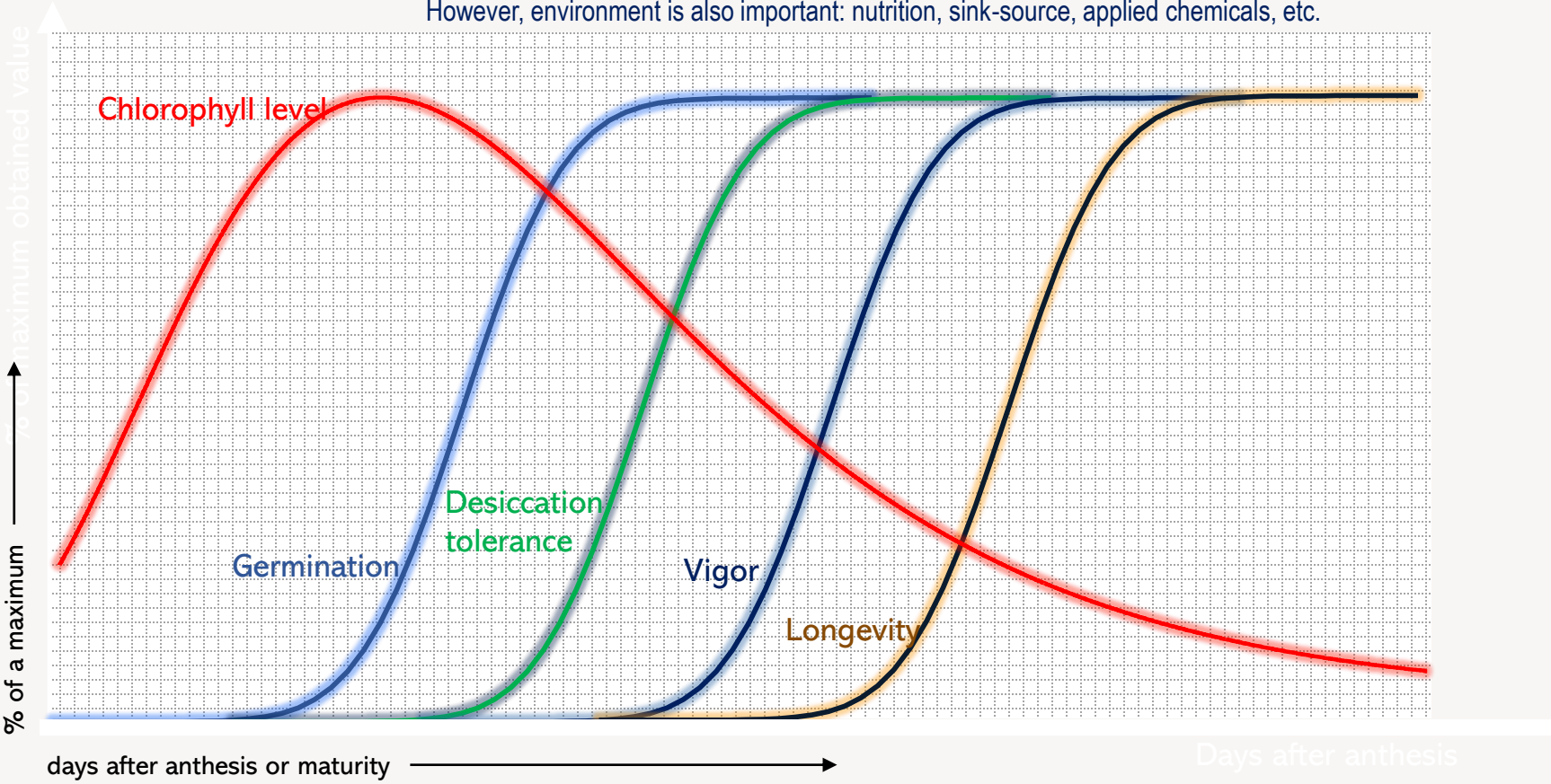
Last, but not least, it will prepare itself for lesser than optimal conditions (longevity, storability)



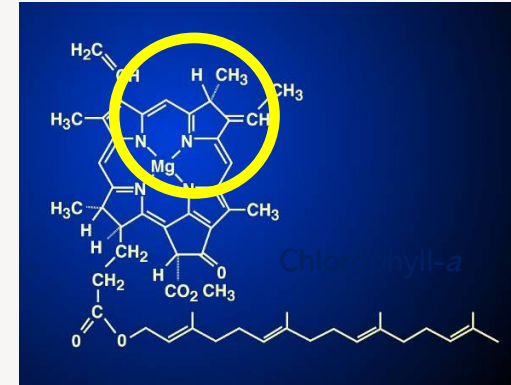
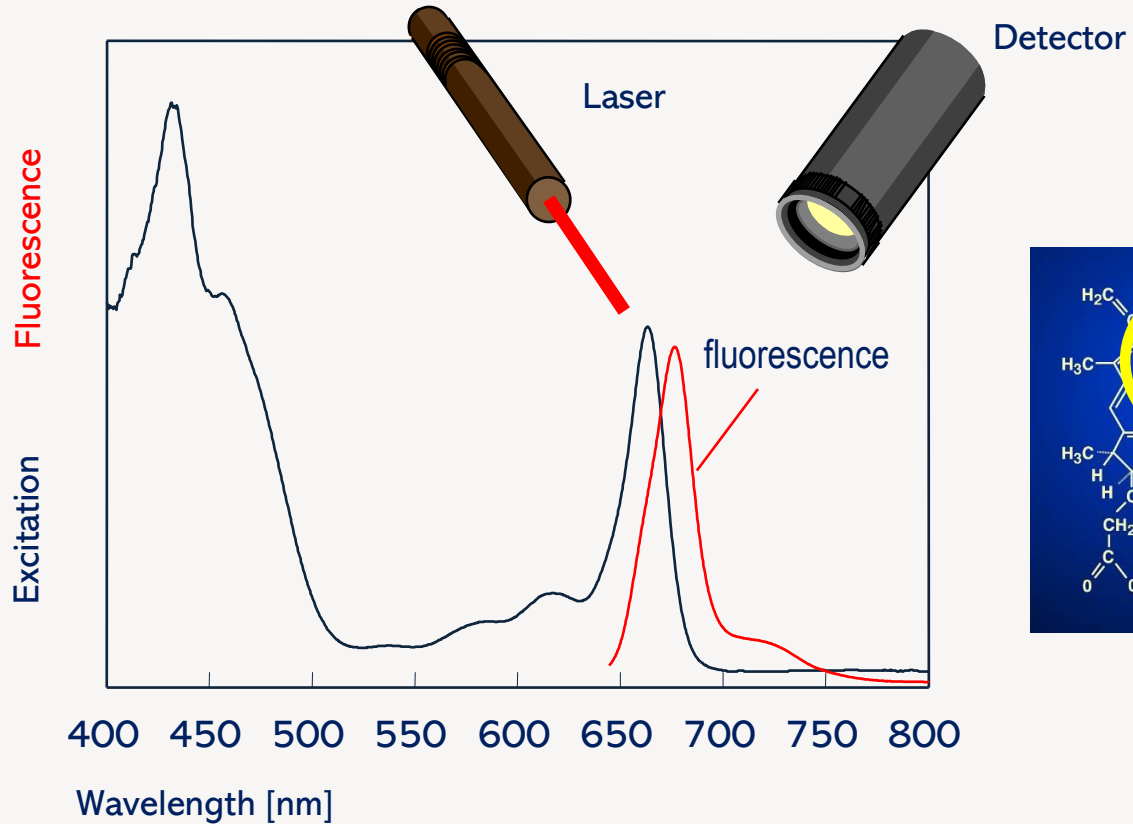




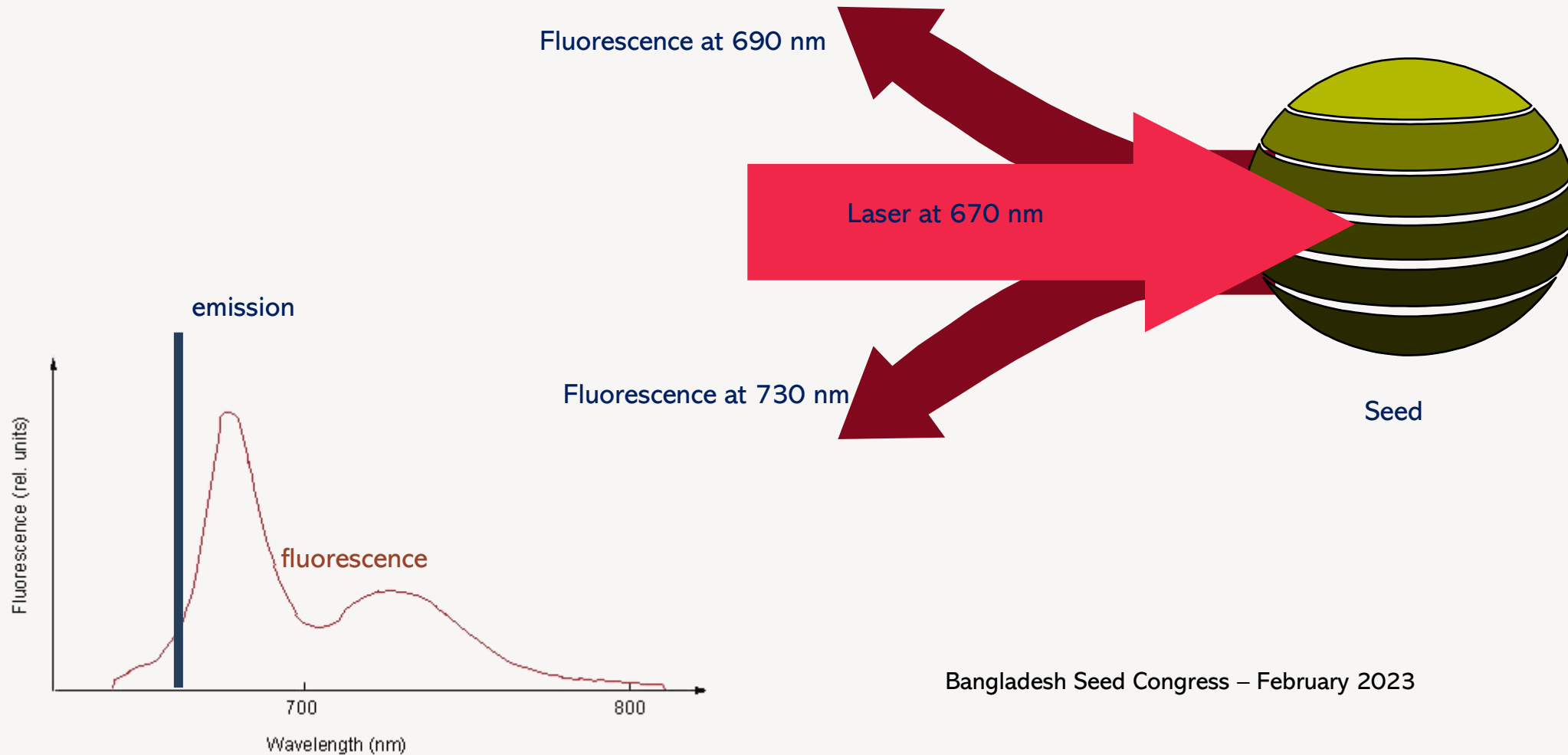
Time of harvest is very important in achieving desired seed quality.
However, environment is also important: nutrition, sink-source, applied chemicals, etc.



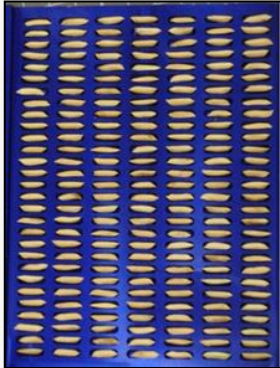
Spectral properties of chlorophyll



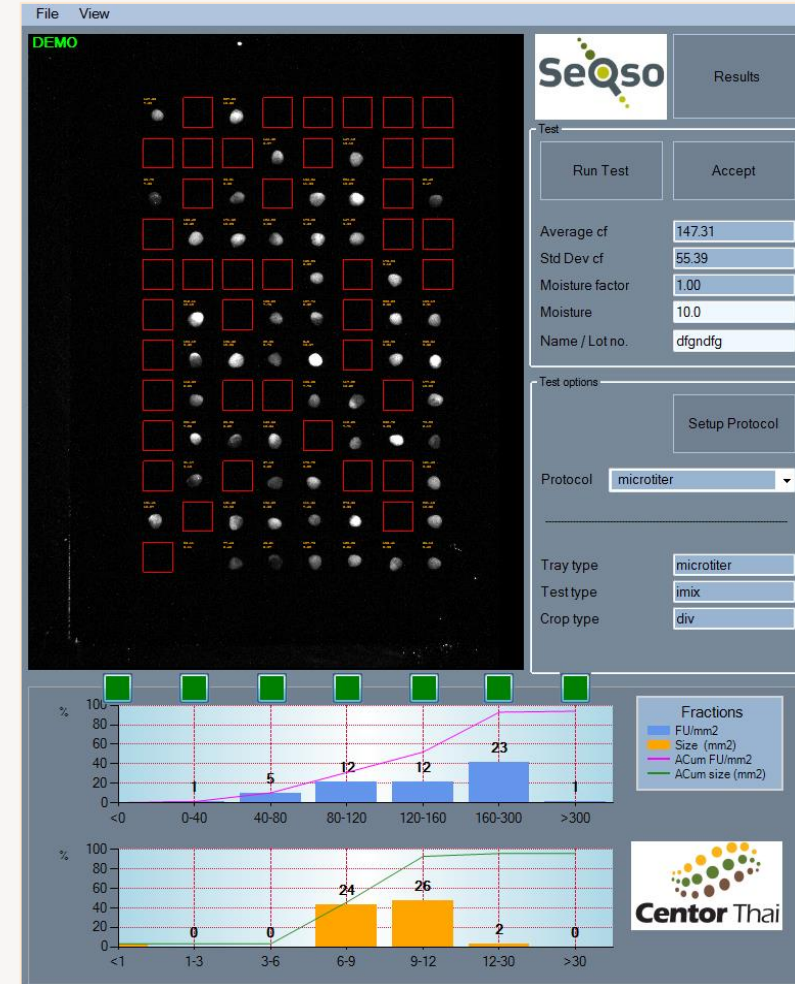
Principle of CF measurement



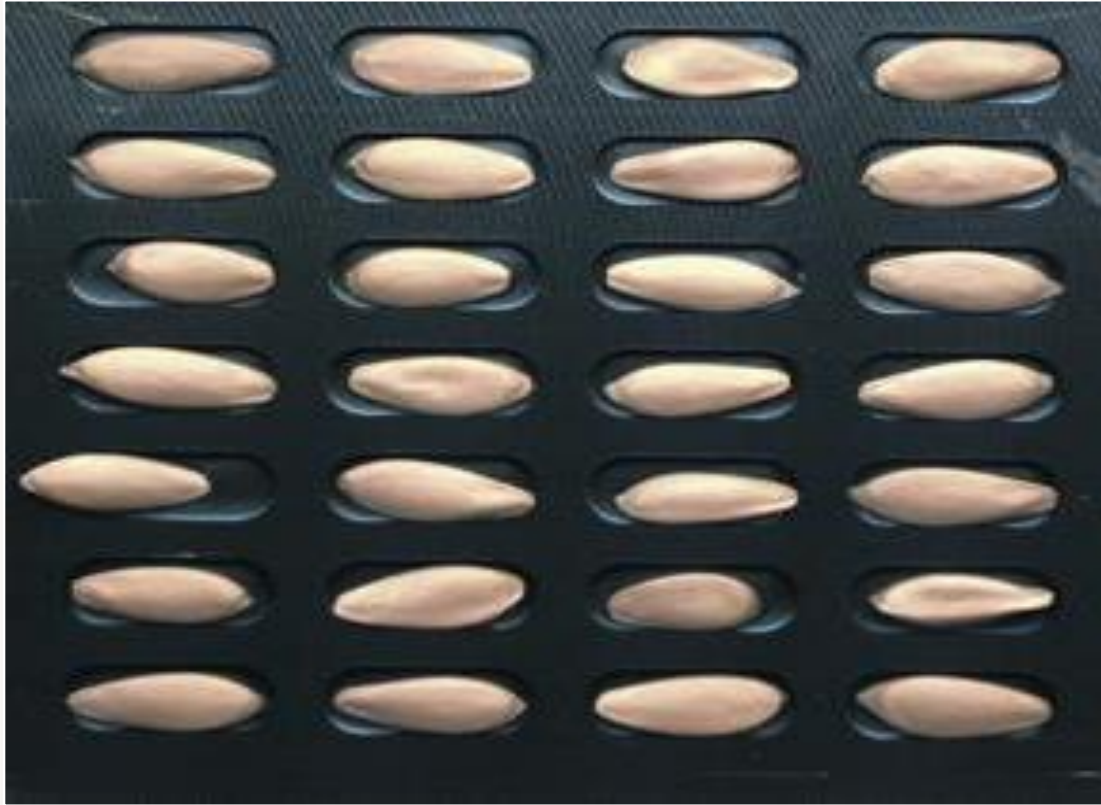
CF Mobile



Measurement of true single seeds
Fast and precise
Truly mobile
Correlated to SMC%
Correlated to seed size



CF Analyzer



Measurement of true single seeds or
sample averages
Fast and precise
Correlated to SMC%
Correlated to seed size



CF Sensor

Bangladesh Seed Congress – February 2023



Measurement of sample averages only
Simple, fast and precise
Display in mg chlorophyll per gram sample
Cost effective

**Making the CF technology available to all
seed technologists**



**Delivers the answer to what seed lot should I sell first? – and minimize my losses due to seed
inventory deterioration**

Meet our team



Johan Van Asbrouck

Executive chairman



Patcharin Taridno (Ann)

Sales & Technology
Director



Shakeel Imran

Sales lead for South Asia

International Seed
Academy



???

Bangladesh Sales
Manager



Thank you

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