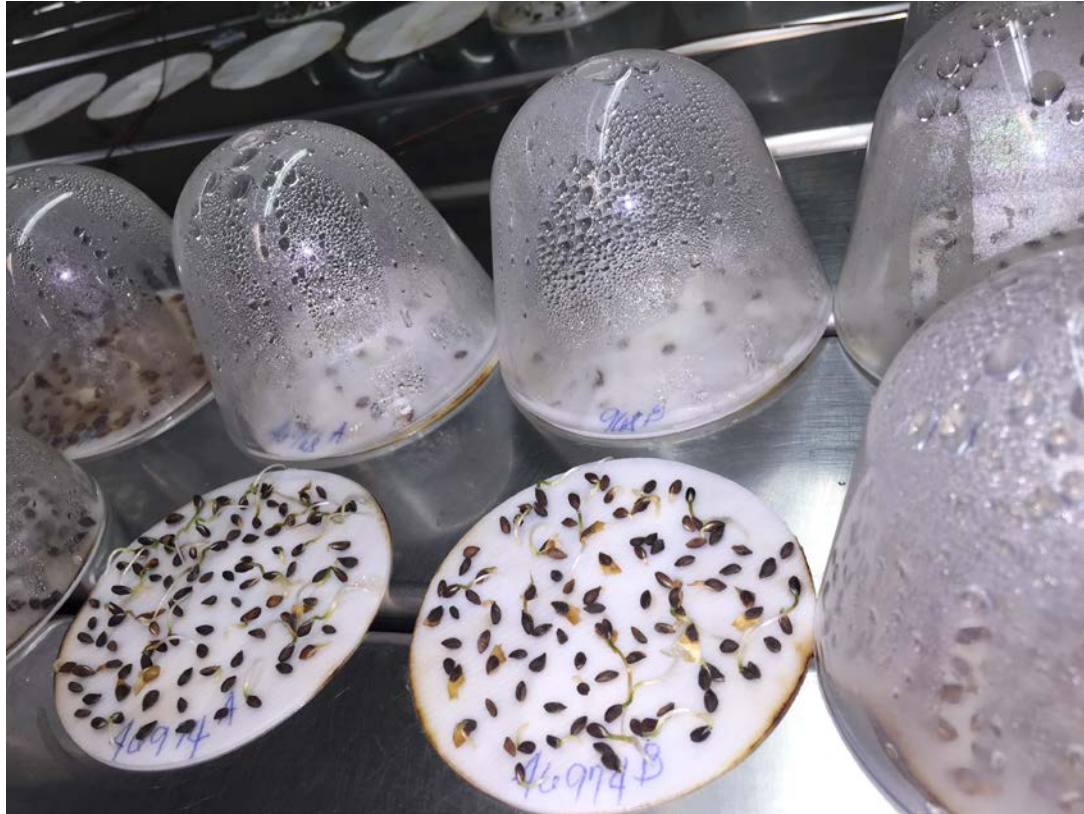




SKOGFRØVERKET

Stiftelsen Det norske Skogfrøverk



SKOGFRØVERKET

Stiftelsen Det norske Skogfrøverk

Senior advisor

Øyvind Meland Edvardsen, seed manager

ROUTINES IN TREE SEED HANDLING

B: Seed testing, storage and upgrading

Seed testing - Germination

- Testing by international, ISTA, standards (international trade)
- Random sampled seeds from seedlot
- 4 replicates (4 x 100 seeds) for variation analyzes
- 100% RH - 28 degrees 16 hour day and 20 degrees 8 hour night
- Germination counts: 7, 10, 14 & 21 days (28)
- Germination speed: 14/21 (vitality)
- Germination capacity: 21 (28) days
- Double tests for dormant seeds (stratification)



Seed testing - Other tests

- Moisture content (%)
- Purity (%)
- Seed weight = weight of 1000 seeds (g)
- TZ - Tetrazolium (test dormant seeds)
- Screening for fungii

Becoming more important

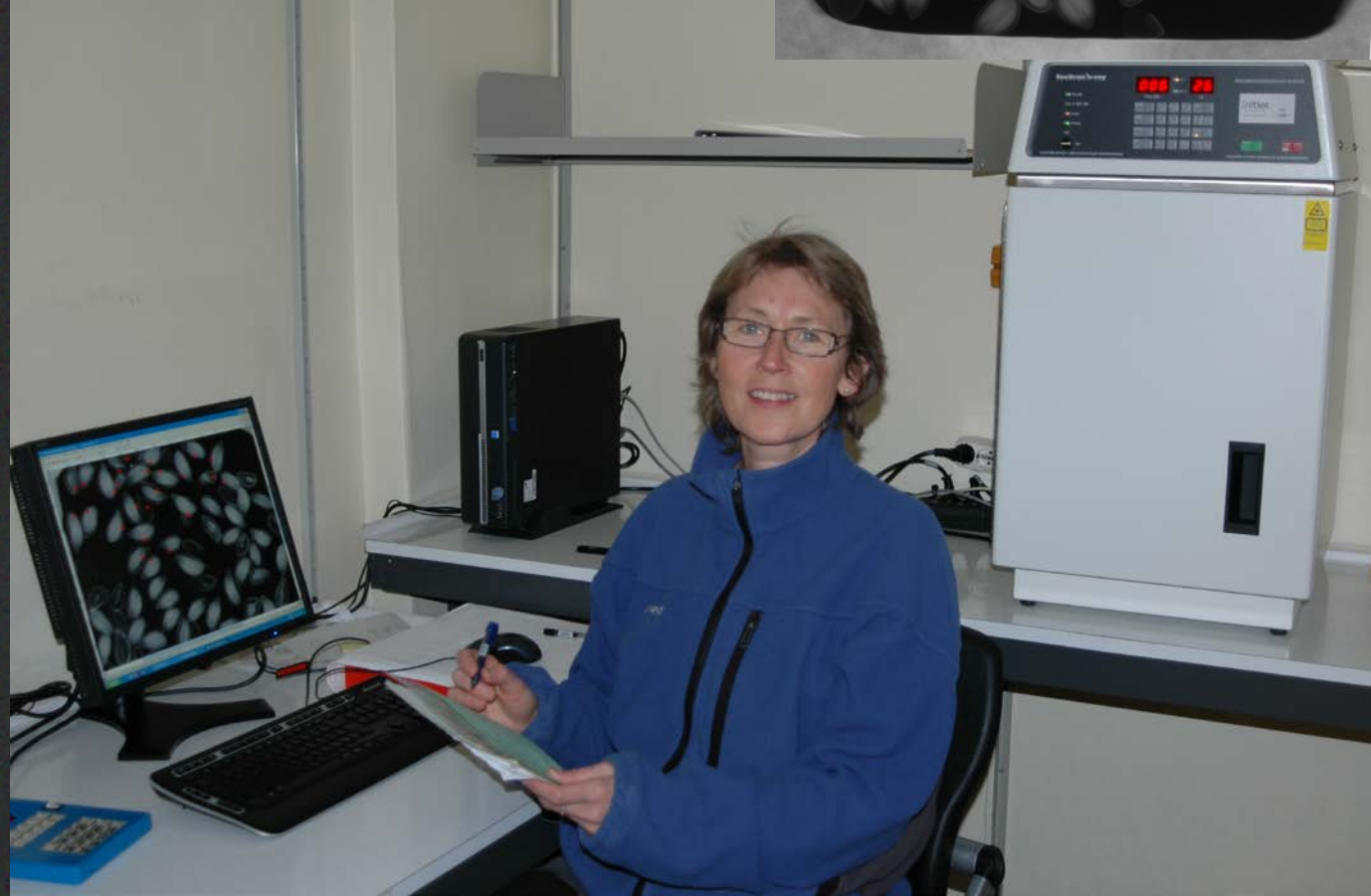
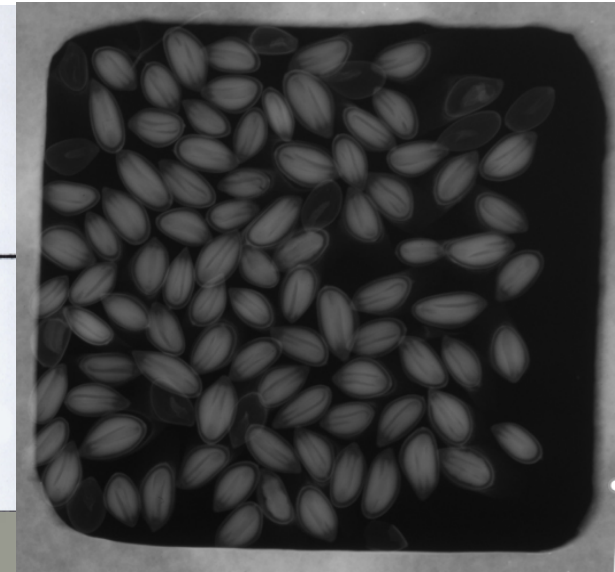
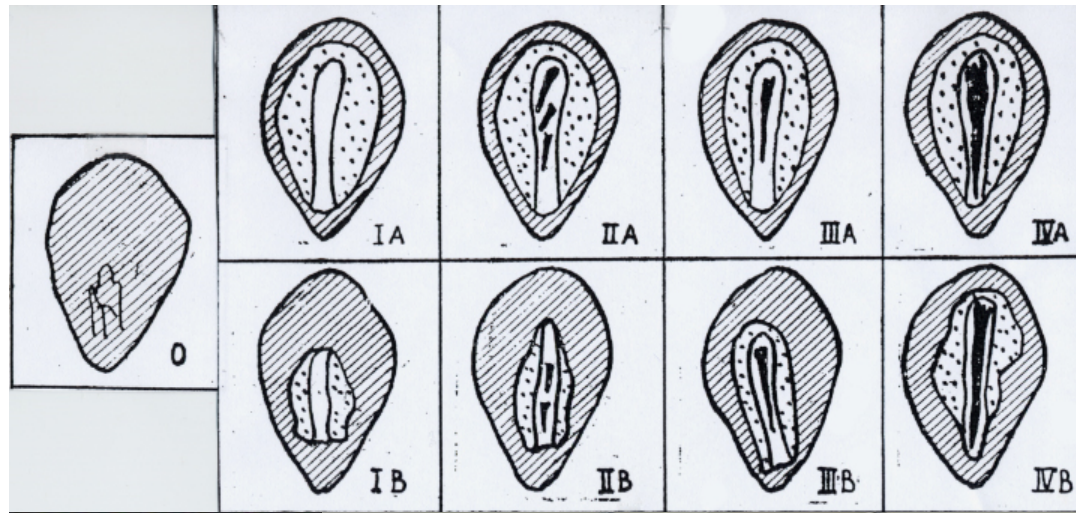


Cone tests



X-Ray tests

- X-ray of seeds - Important tool!
- 2 replicates (2x100 seeds)
- Info about
 - Nr of filled/empty seeds
 - Development of embryo and endosperm
 - Seeds damaged by insects
- Calculation of germination (Simak)
- Quick decision making in cone collections!
- Expensive to buy, but more expensive to fail!



Seed Storage - Conditions

Categories of tree seeds

- Orthodox seeds
 - Seeds that can be dried and stored at low temperatures
 - *Picea abies*, *Pinus sylvestris*, *Larix*
- Recalcitrant seeds
 - Seeds that can not be dried and stored
 - *Quercus*
- Seeds with properties from both categories above
 - Intermediate drying and cool storage a few years
 - *Abies nordmanniana*, *Fagus sylvatica*
- Good quality seeds of *P. abies* and *P. sylvestris* can be stored for a very long time at low temperatures maintaining germination properties

Moisture content thresholds and biological activity in seeds

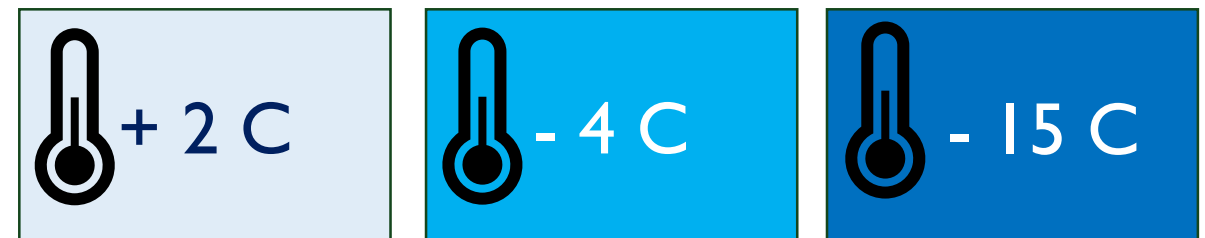
45-60% Seeds start germinating

18-20% Respiration and overheating

12-14% Fungi development

8-9% Insect activity

4-8% Storage in airtight containers possible



Seed storage - Monitoring



Anleggsstatus

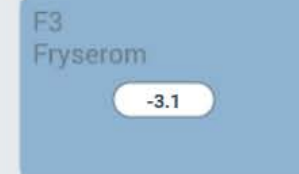
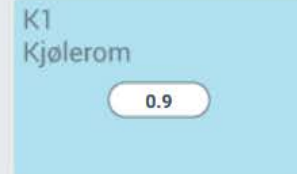
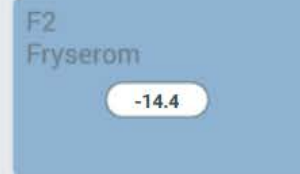
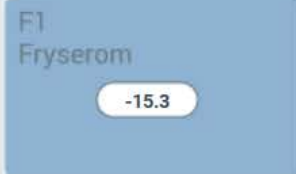
Oversikt

Driftsstatus

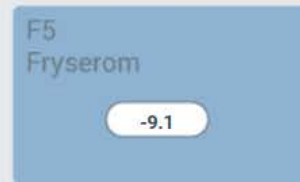
Vis siste

Oversikt

Frøbank



Siste hvile



Biobank

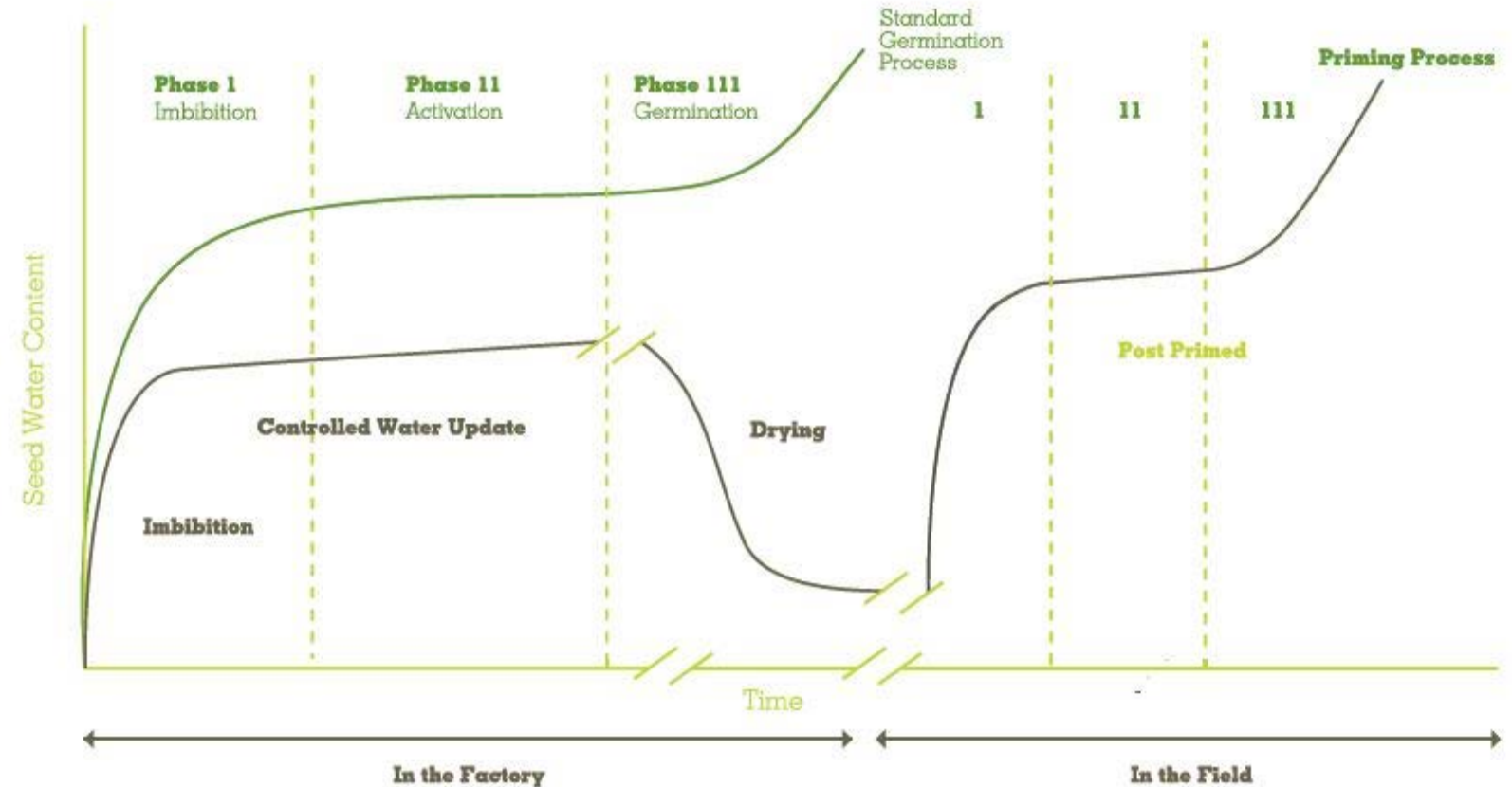


Symbolforklaring

- Varme
- Kjøl
- Frys
- Kommunikasjonsfeil
- Alarm
- Kjøl/Frys pågår
- Avriming pågår
- IWT
- Plugin

Seed pretreatment

- Vitalisation
 - Priming of seeds for improved germination speed
- Induction Drying Separation (IDS)
 - Removal of dead (pine) seeds by weight separation
 - Improved germination speed
- Prevac
 - Removal of mechanical damaged seed by vacuum
- Pelleting
 - Improving odd/small sized seed for sowing machines



Seed dormancy & stratification

Seed dormancy

- Defines as mature, viable, hydrated and healthy seeds that fail to germinate in suitable conditions
- Dormancy eliminates risk for germination in autumn
- Physiological dormancy
 - Seeds have to undergo biochemical changes in embryo and/or endosperm to germinate
 - Ex: *Picea sitchensis*, *Abies lasiocarpa*
- Physical dormancy
 - Restricts entry of water and oxygen
 - Restrains growth of the embryo
 - Ex: *Pinus cembra*
- Seeds can have a both types of dormancy mechanisms

Cold stratification

- Stratification = layering
- Dormancy release by copying the natural process
- Need for stratification varies between species, provenances and seedlots
- Hydration in running cold water for 24 hours
- Short surface drying before put in plastic bag with air access
- Store in cool environment for 3-4 weeks or longer
- Seed are rinsed after completed treatment and surface dried before sowing
- **RISK:** Potential seed borne diseases can spread in the seed lot!
- Alternative stratification after sowing in seedling containers and cool storage is favorable to avoid spread of disease

Seed sanitation

- Seed-borne diseases are well known on many species: *Abies* in particular
- Fungi on *P. sylvestris* and *P. abies* has until now not been considered an issue
- Growing seedlings in mini/micro containers may alter this
- *Sirococus* has recently shown to be problematic
- Screening of seed lots
- Seed coat sterilization (testing 2018)
- Treatment with fungicides (testing 2018)



Takk fyrir!

