Cryopreservation of PGR in Finland

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Current Cryopreservation activities: Projects, funding, which organizations are involved
Cryopreservation of PGR at Luke

• Cryopreservation of PGR is being executed under the national plant genetic resources programme (Finnish National Genetic Resources Programme for Agriculture, Forestry and Fishery, 2018) at Natural Resources Institute Finland (Luke).

• The plant accessions chosen for long-term preservation by cryopreservation are maintained in Luke cryobank in gas phase tanks at below -150 °C.
Luke in brief

Vision
A sustainable future and well-being from renewable natural resources

Mission
Through research, we create value and solutions for our customers by solving local and global challenges

- Profitable and responsible primary production
- Circular bioeconomy
- Climate smart carbon cycle
- Competent personnel and motivating organisation
- Data-driven solutions
- Inter-disciplinarity and inter-sectorality
- Adaptive and resilient bioeconomy
- Modern research platforms

- CO₂
- N₂O
- CH₄

- 22 locations
- 1337 employees
- 133 M€ turnover
Finnish National Plant Genetic Resources programme
20 years anniversary
Luke PGR network for long-term cryopreservation, research and protocol development and safety duplication

- Haapastensyrjä
- Jokioinen
- Suonenjoki
Approaches to cryopreservation: Crop prioritization, cryopreservation methods, plant material, acclimation methods, recovery.
Cryopreservation of PGR at Luke, crop prioritization

• Vegetatively propagated horticultural plants, mainly
  • *Rubus*
  • *Ribes*
  • *Fragaria*
  • *Malus*
  • *Prunus*
  • *Solanum*

• also some ornamental plants

*On-going*
• *Allium cepa* Aggregatum group
• *Humulus*
• *Ribes rubrum*
• *Fragaria*
Cryopreservation materials of PGR

- Apical or lateral buds collected from micropropagated plants
- Dormant buds collected from the field or greenhouse (Ribes, Prunus, Malus…)
- Pollen (Rhododendron)
- Seeds (Rhododendron)
Steps of cryopreservation

• Testing and optimising the cryopreservation method
• Pretreatment and freezing of the materials for long-term preservation
• Checking the regeneration of the cryopreserved lots
• Controlling the long-term cryopreservation by thawing control samples at fixed terms.
Current Cryopreservation activities: Projects, funding
GEHO KRYO project - Cryopreservation backup of the national PGR collections
KASVIKRYO project - Development of the plant genetic resources cryobank
Strawberrycryo project
- Cryopreservation of the pre-basic mother materials of strawberry cultivars in the certified plant production
Strawberry Cryopreservation

• Years 2021-2023
• pre-basic mother materials of strawberry cultivars in the certified plant production
Strawberry Cryopreservation Aims

- Executed internally at Luke
- under the statutory services programme
- As part of the certified plant production scheme
- Mainly at Luke Haapastensyrjä
- Co-development with the National Food Authority
Strawberry Cryopreservation Aims

• As the cryobanked in vitro materials will serve as the pre-basic mother materials of the certified production

• -> Enhanced safety and secured true-to-cultivar preservation of the strawberry cultivar materials

• -> Reduced expenses of repeated in vitro initiations and plant enemy and true to type testing
Strawberry Cryopreservation Protocol

• Apical buds are excised from cold pretreated in vitro cultures
• Pretreatment on sucrose media
Strawberry Cryopreservation Aims

• One of the aims of the project is that the know-how of the strawberry cryopreservation protocol developed at Luke already in 2006 is passed on to the technicians at the Haapastensyrjä laboratory.

• Protocol can also be optimized.
Constraints that are limiting cryopreservation in Finland
Proposals/ideas for an European strategy
Good common goals

• Bringing together experts for cryoconservation of plant genetic resources around Europe
• Sharing information about cryopreservation in European countries
• Discussion on strategy for cryoconservation of PGR in Europe
• Discussion on strategy to broaden the routine use of cryopreservation methods

-Crobanking, genbanking, AEGIS, standards, back-ups, databases, prioritization, protocols, health status & cryotherapy, ....
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Thank you!