Genetic aspects linked to production and use of forest reproductive material

EUFORGEN-kirjaprojektin esittely

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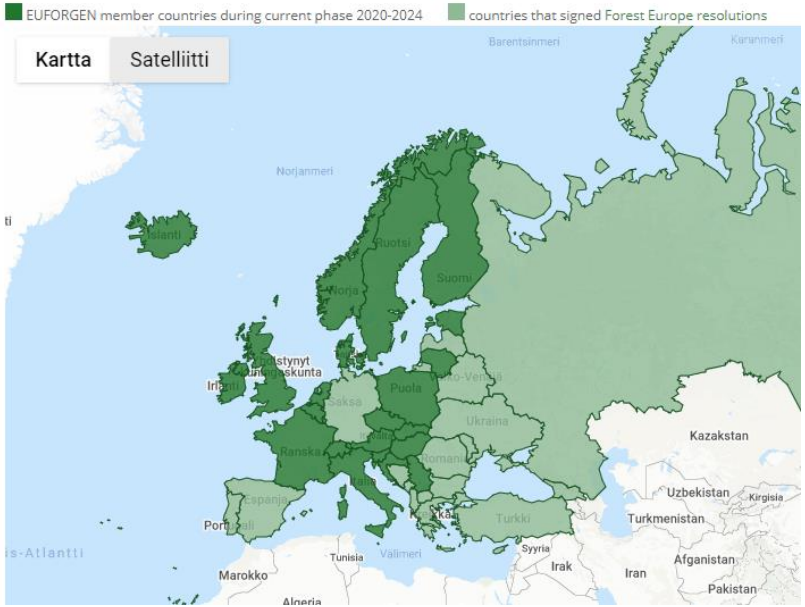
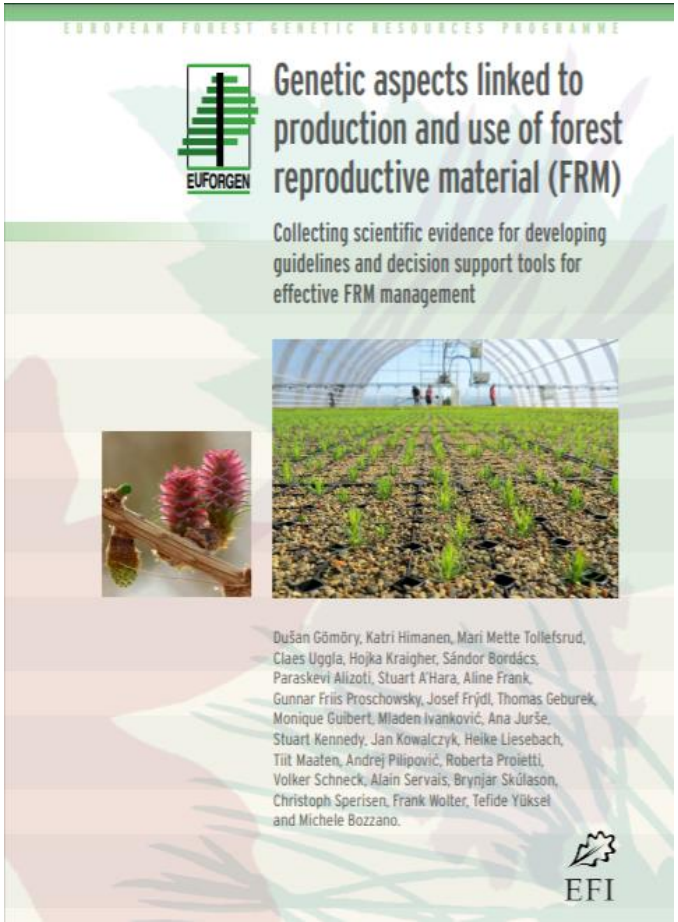
EUFORGEN

- European Forest Genetic Resources Programme
- *"An international cooperation programme that promotes the conservation and sustainable use of forest genetic resources in Europe as an integral part of sustainable forest management."*
- Perustettu 1994
- Sihteeristö toimii EFI:ssä





http://www.euforgen.org/publications/publication/genetic-aspects-linked-to-production-and-use-of-forest-reproductive-material-frm/

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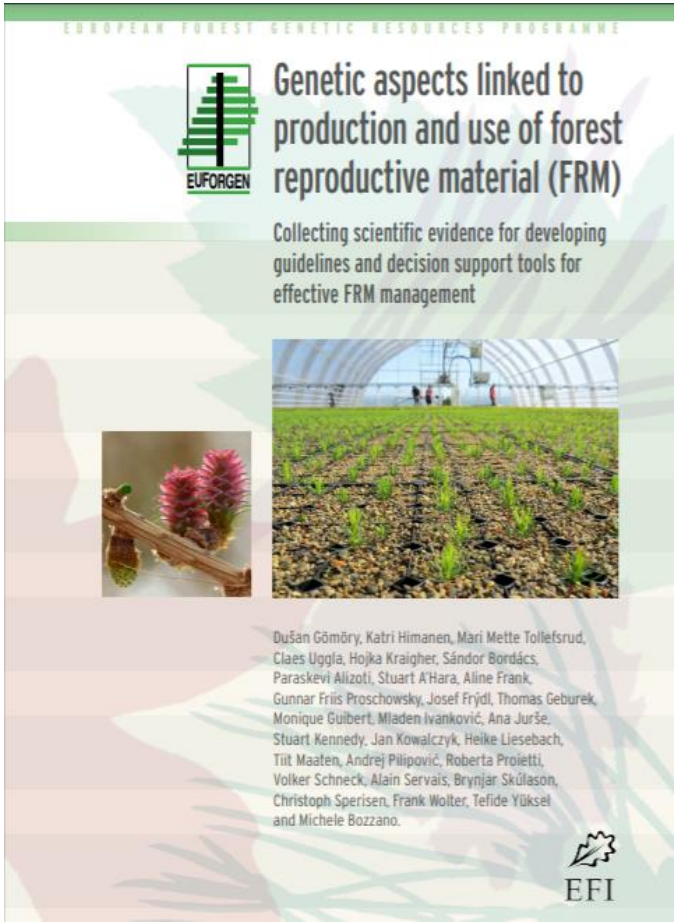

- Ydinkysymys: mikä on käyttöön menevän siemen- ja taimiaineiston geneettinen kokoonpano verrattuna oletettuun tai ideaaliin?
- Millä toimilla geneettinen monimuotoisuus voidaan tuotannossa säilyttää?
- Kirja kuvaa metsänviljelyaineiston tuotantoketjun eri vaiheet, ja niihin liittyviä vaaranpaikkoja.
- Painopiste toimintatapojen ja niiden vaikutusten kuvaamisessa, ei niinkään arvottamisessa tai täsmällisten ohjeiden antamisessa.

Suositukset

- Kirjan lopussa on 38 suositusta, joissa viitataan kirjan lukuihin.
    - Overarching recommendations
    - Policy
    - Research
    - Management: General
    - Management: Basic materials
    - Management: Seed production and nursery practices

Overarching recommendations

1. **Balance the goals of production and of genetic diversity conservation in all FRM management**

   Climate change poses several mitigation and adaptation challenges. FRM can be used effectively to ensure the production of biomass as a replacement for fossil fuels and as a carbon sink. At the same time, however, we must conserve the ability of forests to adapt to currently unknown and predicted threats and to maintain a high-level provision of ecosystem services. This requires striking a balance between using relatively small numbers of outperforming genotypes and using broader populations which help secure genetic diversity and thus adaptability.

Policy

3. Increase the knowledge about the potential benefits of not exclusively using natural regeneration in response to climate change [Ch. 1.2 & 3.1]

Many European forests are certified under two certification schemes: the Programme for the Endorsement of Forest Certification (PEFC) and the Forest Stewardship Council (FSC). In many countries, both schemes, as well as others related to the forest sector, have a strong preference for natural regeneration without considering additional regeneration methods. However, this may insufficient to effectively adapt forest to climate change. An exclusive focus on natural regeneration constrains the possibility of speeding up forest adaptation to climate change, which can be promoted by introducing better-adapted FRM from other locations. The scientific community needs to communicate more effectively so that all stakeholders learn about the potential benefits of adding non-local genetic material to the regeneration, taking into consideration the rapid rate of climate change and urgent need for mitigation.

Research

14. Emphasise adaptive traits in future studies [Ch. 3.1]

Current models dealing with FRM transfer are typically based on fitness proxies such as survival or growth. Although such traits are of primary interest for practical forestry, the resulting models are genetically complex and the relationship of the proxy traits to the environment is multifactorial. We recommend that future studies place greater emphasis on phenology and physiological traits, to obtain a more reliable picture of adaptive responses and phenotypic plasticity of populations, and their geographical patterns.

Management: Basic materials

29. Make available as much information as possible on Source-Identified and Selected Stand FRM [Ch. 2.1.1 - 2.1.2]

In addition to the legislative requirements, specific, relevant information about the genetic background and the origin of basic material should be made available whenever possible. This particularly includes the effective size of the population from which it was sourced. Data about the performance of the material from the selected stand, specifically related to its provenance (i.e., ecological adaptation and health condition), are very important for further reference. General information about number of stands per provenance region (or climate zone) and elevation zone in each country is also needed when relevant.

30. Manage seed orchards to promote genetic diversity and genetic mixing [Ch. 2.1.3]

Seed orchards need to be established with a enough clones or families to guarantee a high level of genetic diversity of seed orchard crops. This recommendation also requires the actual minimum numbers as defined in legislation or commonly accepted practice to be reconsidered. Whenever possible, high-performing ('plus') trees should be used to establish them. Selecting plus trees and genotypes with similar environmental triggers to flower would avoid precocious or late flowering and thus might improve genetic mixing among clones in a seed orchard. Flowering induction management methods and pest control may prohibit the loss of genetic diversity. Collection of seed should be avoided in poor crop years. To even-out seed lots, we recommend that seeds from different years be carefully mixed. The share of seed-orchard FRM may need to be carefully monitored during reforestation and afforestation to ensure that the material does not come only from a restricted pool of genetic diversity.

Management: Seed production and nursery practices

37. Consider carryover effects of nursery activities [Ch. 1.2 - 2.1.3 - 2.6]

Producers need to understand and consider the potential risks associated with raising FRM under climates substantially different from those of plantation sites. Recent research has demonstrated that the adaptive traits of forest trees are affected by conditions during germination and early growth. Considering this, the production of seedlings in nurseries that make use of optimised microclimates may affect further performance of the planted seedlings. We recommend monitoring the outcomes in order to evaluate the epigenetic effects of nursery activities and to understand how genetic diversity affects them. The research community should also inform producers and others of any such carryover effects.

Suomi vs. muu Eurooppa

- Metsänviljelyaineiston tausta hyvin tunnettua, markkinoiden toimintatavat vakaat.
- Alkuperien valintaan hyvät ohjeistukset, kyky mukautua ilmastonmuutokseen.

- Toimintatavoissamme poikkeavaa:
  - **Suuri metsikkösiemenen käytön osuus ja siemenkeräysmetsiköiden käytön vähäisyys. Metsikkösiementä ei osassa maita saa käyttää.**
  - **Siemenkeräyksiä tehdään myös ”välivuosina”.**
  - Joissain maissa siemeneriä jaetaan kokoluokittain, taimien kasvatus tehdään näiden ositteiden mukaan, mutta myyntierissä nämä ”alaerät” yhdistetään.

Kiitos!

Luke
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