

**Vegetative propagation of conifers for
enhancing landscaping and tree breeding**
**Proceedings of the Nordic meeting held in September
10th-11th 2008 at Punkaharju, Finland**

Tuija Aronen, Teijo Nikkanen and Tiina Tynkkynen (eds.)

Working Papers of the Finnish Forest Research Institute publishes preliminary research results and conference proceedings.

The papers published in the series are not peer-reviewed.

The papers are published in pdf format on the Internet only.

<http://www.metla.fi/julkaisut/workingpapers/>
ISSN 1795-150X

Office

Post Box 18
FI-01301 Vantaa, Finland
tel. +358 10 2111
fax +358 10 211 2101
e-mail julkaisutoimitus@metla.fi

Publisher

Finnish Forest Research Institute
Post Box 18
FI-01301 Vantaa, Finland
tel. +358 10 2111
fax +358 10 211 2101
e-mail info@metla.fi
<http://www.metla.fi/>

| | | | |
|---|--------------------|--|--------------------------|
| Authors Aronen, Tuija, Nikkanen, Teijo & Tynkkynen, Tiina (eds.) | | | |
| Title Vegetative propagation of conifers for enhancing landscaping and tree breeding. Proceedings of the Nordic meeting held in September 10 th -11 th 2008 at Punkaharju, Finland | | | |
| Year 2009 | Pages 80 | ISBN 978-951-40-2154-1 (PDF) | ISSN 1795-150X |
| Unit / Research programme / Projects Punkaharju Research Unit / Projects: 3389 Biotechnology in forest genetics and tree breeding & 3018 Cultivation of exotic and special tree species | | | |
| Accepted by Juhani Häggman, Director of Punkaharju Research Unit, February 20 th , 2009 | | | |
| Abstract The Nordic meeting “Vegetative propagation of conifers for enhancing landscaping and tree breeding” was held at Punkaharju, Finland, in September 10-11 th , 2008. The aim of the meeting was to share ideas and experiences among researchers, tree breeders, and commercial plant producers /nurseries, together with customers acting in landscaping or in forestry on the potentials and challenges in vegetative propagation of the Nordic conifers. There were altogether 54 registered participants representing different stakeholders from six European countries. The meeting was hosted by Metla - Finnish Forest Research Institute, Punkaharju Research Unit, and kindly supported by GENECAR, Nordic Centre of Advanced Research in Forest Genetics and Tree Breeding, and The Foundation for Forest Tree Breeding in Finland. The information presented by the speakers during the meeting sessions, as well as by some of the posters is collected into this proceedings publication in the form of extended abstracts. The topics discussed are the following: I) Tree breeding framework, II) Landscaping framework, III) Technical issues – grafting and rooting of cuttings, and IV) Technical issues – potentials of tissue culture, and V) Collaboration and future sights containing also information on funding possibilities. In addition, the outcome of the group discussions focusing on the topics “How to facilitate the use of conifers as ornamentals?” and “Development of vegetative propagation techniques” is shortly reviewed. | | | |
| Keywords conifer, clonal testing, grafting, ornamental, rooted cuttings, tissue culture, tree breeding, vegetative propagation | | | |
| Available at http://www.metla.fi/julkaisut/workingpapers/2009/mwp114.htm | | | |
| Replaces | | | |
| Is replaced by | | | |
| Contact information Tuija Aronen, Finnish Forest Research Institute, Punkaharju Research Unit, Finlandiantie 18, FI-58450 Punkaharju, Finland. e-mail tuija.aronen@metla.fi | | | |
| Other information Contains active web-links | | | |

Contents

| | |
|---|----|
| Preface | 5 |
| Tree breeding framework | |
| A way to utilise the advantages of clonal forestry for Norway spruce? | 8 |
| Dag Lindgren | |
| Clones in Finnish tree breeding | 16 |
| Matti Haapanen | |
| Field behaviour of Scots pine cuttings compared to seedlings..... | 20 |
| Anna-Maija Niskanen, Niina Stenvall, Anne Pakkanen and Pertti Pulkkinen | |
| Landscaping framework | |
| Conifers in landscaping – Potentials and problems..... | 23 |
| Juha Raisio | |
| Hardy options for landscaping – domesticated exotics and special forms of Nordic conifers..... | 27 |
| Teijo Nikkanen | |
| Investigation of conifers mutation forms in Latvia and the possibilities in selecting new sorts..... | 31 |
| Janis Zilins, Janis Lapse and Andrejs Svilans | |
| Technical issues – grafting and rooting of cuttings | |
| Chip-budding and apical crafting – breeders’ tools..... | 34 |
| Jörgen Hajek | |
| Successes and failures in forest tree cutting production in Finland..... | 39 |
| Jouni Mikola | |
| Joint Scots pine cutting propagation project Finland-Latvia-Sweden | 44 |
| Karl-Anders Högberg | |
| Rooting Nordmann fir cuttings for Christmas trees? | 48 |
| Ulrik Bräuner Nielsen, Hanne N. Rasmussen and Martin Jensen | |
| Using buds from mature trees of <i>Pinus sylvestris</i> for budding young seedlings | 53 |
| Tapani Haapala | |
| Field performance of rooted Scots pine cuttings of fascicular shoot origin | 55 |
| Tuija Aronen and Leena Ryytänen | |
| Effect of stock plant pruning, hormone treatments and stock plant origin on the height of cloned Scots pine in a field trial | 59 |
| Anna-Maija Niskanen, Niina Stenvall, Anne Pakkanen and Pertti Pulkkinen | |
| Technical issues – potentials of tissue culture | |
| Production of Norway spruce somatic embryos – a practical point of view..... | 64 |
| Karl-Anders Högberg | |
| Somatic embryogenesis of Scots pine – advances in pine tissue culture at Metla | 68 |
| Tuija Aronen, Teresa Pehkonen, Ravindra Malabadi and Leena Ryytänen | |
| Integration of biotechnology, robot technology and visualisation technology for development of methods for automated mass production of elite trees..... | 72 |
| Jens Find and Peter Krogstrup | |
| Collaboration and future sights | |
| Possibilities for EU and Nordic research funding..... | 78 |
| Eeva Karjalainen and Maarit Kytö | |

Preface

It was a great pleasure to host the meeting “Vegetative propagation of conifers for enhancing landscaping and tree breeding” at Punkaharju, on 10th –11th September, 2008. Organisation of the meeting was a continuation of both national and international discussions on the significance and great potentials of vegetative propagation in tree breeding and production.



The meeting was opened by Research Director, Prof. Pasi Puttonen from Finnish Forest Research Institute, and there were altogether 54 registered participants representing different stakeholders from six European countries. Although the topic of the meeting, being focused on conifers, is challenging, we think we achieved the goal: During the meeting we were able to share ideas and experiences among researchers, tree breeders, and commercial plant producers /nurseries, together with customers acting in landscaping or in forestry. Also new initiatives for further collaboration and networking were presented and discussed.

The information presented by the speakers during the meeting sessions is collected into this proceedings publication in the form of extended abstracts of their talks. In addition to the talks given by the participants, some of the posters presented are included. The presentations were divided into the sessions on I) Tree breeding framework, II) Landscaping framework, III) Technical issues – grafting and rooting of cuttings, and IV) Technical issues – potentials of tissue culture. The last session in the meeting was V) Collaboration and future sights, that included information on funding possibilities together with group discussions. There were two discussion groups: one focusing on the topic “How to facilitate the use of conifers as ornamentals?” and the other one on the topic “Development of vegetative propagation techniques”. The outcome of the discussion session can be summarised as the following:

The group discussing about how to facilitate the use of conifers as ornamentals had a clear outlook that there is a strong need for exotic looking and hardy new material for landscaping in Nordic Countries and Baltic Area. At the moment the conifer material for ornamental purposes is rather limited, there is not very much possibilities you can choose from, and even more serious problem is that most part of the material is produced in Central Europe and is therefore often not hardy enough to use in harsh Nordic conditions. The group, consisting of participants from Metla, Taimityllilä Nursery and City of Helsinki, and Kalsnava Arboretum, Latvia, agreed that we have to increase our own production of ornamental conifers. But there are many problems to be solved before large-scale production of new, hardy ornamental conifers can start. We have to find the hardy and desired varieties to be produced, market them, and to solve technical problems concerning vegetative propagation of these new ornamental options for landscaping. For all this the co-operation is needed, and the group decided to find out possibilities for launching a Nordic-Baltic collaborative project on the topic.

The group focusing on the development of propagation techniques was unanimous on the need of good biological understanding of the key processes of plant development in order to be able to manipulate it by vegetative propagation methods. Especially ageing as a phenomenon affecting propagation ability would need more basic research e.g. through gene expression and hormone studies, but also the influence of the environmental factors was recognised. It was stated that the common problems with rooting and plagiotrophism are a consequence of predetermined development earlier in explants (cutting or seed embryo) life, and the key question is how to change predetermined fate of the plant cells or tissues? The group concluded that the development of propagation techniques should be combined with the research efforts addressing the basic development of plants both on genetic and physiological level. Continuation of this discussion and building of networks was expected to proceed e.g. through becoming European [TREEBREDEX](#) activities. In addition, a new [IUFRO unit “2.09.02 – Somatic embryogenesis of forest trees”](#) coordinated by Yill-Sung Park (Canada) has recently been launched, and will surely facilitate networking in this research field. Participation of the Nordic researchers in these activities is highly encouraged.

Finally: Vegetative propagation is a way to utilise both natural and man-made innovations, no matter if these are mutations found in forest, or born as an outcome of a long-term breeding programme. We believe that there is a lot we can do together to get all the potentials of vegetative propagation fully exploited to benefit both landscaping and tree breeding. We hope the meeting “Vegetative propagation of conifers for enhancing landscaping and tree breeding” together with this Proceedings publication to be useful for everybody interested in vegetative propagation of conifers, and also act as a step towards building active collaborative networks among professionals and friends.



Participants on the meeting venue Lusto's inner yard, 11th September, 2008 – except some early birds who escaped before the group photo. (Photo: Timo Kilpeläinen)

Acknowledgements

The meeting was hosted by Metla - Finnish Forest Research Institute, Punkaharju Research Unit, and kindly supported by [GENECAR](#), Nordic Centre of Advanced Research in Forest Genetics and Tree Breeding, and The Foundation for Forest Tree Breeding in Finland. We sincerely thank our sponsors for their valuable support, as well as the meeting venue Lusto, The Finnish Forest Museum, for good collaboration. We also would like to acknowledge all the people involved in organising the meeting and in preparation of these proceedings. Most important, however, are the contributions of all the participants. Thank you all for your personal input for making the meeting interactive and inspiring, and for sharing your knowledge and experiences by these proceedings.

February 16th, 2009

Tuija Aronen

Teijo Nikkanen