



Seed orchards

Proceedings from a conference at Umeå, Sweden, September 26-28, 2007

Editor: Dag Lindgren



The photo is from a Scots pine seed orchard, which has reached the commercial seed productive phase, close to Umeå airport shot by Davorin Kajba 2007.

The conference was hosted by Swedish University of Agricultural Sciences, Faculty of Forest Sciences, Department of Forest Genetics and Plant Physiology (Umeå Plant Science Centre), 901 83 Umeå, Sweden. Under auspices from the EU funded consortium Treebreedex.

Umeå 2008

ISBN:978-91-85911-28-8

| | |
|---|----|
| Table of contents | 2 |
| Preface | 5 |
| List of participants | 7 |
| Group photo | 8 |
| Presentations published in proceedings: | |
| DNA and seed orchards - Darius Danusevicius, Yousry El-Kassaby, Maria Gaspar, Øystein Johnsen and Xiao-Ru Wang | 9 |
| Seed Orchard Planning and Management in Turkey - Murat Alan, Hikmet Ozturk and Sadi Siklar | 11 |
| Synchronization and Fertility Variation Among <i>Pinus nigra</i> Arn. Clones in a Clonal Seed Orchard - P.G. Alizoti, K. Kilimis and P. Gallios | 13 |
| Practical use of GA _{4/7} to stimulate flower production in <i>Picea abies</i> seed orchards in Sweden - Curt Almqvist | 16 |
| Seed orchards and seed collection stands of Scots pine in Turkey - Nebi Bilir and M. Denizhan Uluhan | 25 |
| Do we need flower stimulation in seed orchards? - Władysław Chałupka | 37 |
| Using SYNCHRO.SAS, a program to facilitate phenological data processing, in a radiata pine seed orchard in northern Spain. - Veronica Codesido and Josefina Fernández-López. | 43 |
| A New Generation of Clonal Seed orchards of wild cherry - Bart de Cyuper | 53 |
| PROSAD a tool for projecting and managing data about seed orchards - Vladimír Foff and Elena Foffová | 60 |
| The Swedish Scots Pine Seed Orchard Västerhus - Anders Fries, Dag Lindgren and Bengt Andersson | 70 |
| Coancestry among wind pollinated progenies from a <i>Pinus pinaster</i> seed orchard in a progeny trial. - Maria João Gaspar; Ana de-Luca; Santiago C González-Martínez; Jorge Paiva; Elena Hidalgo José Lousada and Helena Almeida | 79 |
| Contribution of seed orchards to timber harvest in the short-run and in the long-run - Peichen Gong, and Ola Rosvall | 83 |
| Planter's guide - a decision support system for the choice of reforestation material - Mats Hannerz and Tore Ericsson | 88 |
| Pomotechnical treatments in the broadleave clonal seed orchards - Davorin Kajba, Nikola Pavičić, Saša Bogdan and Ida Katičić | 95 |

| | |
|--|-----|
| Mixing of seed crops from different years is an effective management strategy for enhancing effective population size in Eucalyptus seedling seed orchard crops - R. Kamalakannan and M. Varghese | 104 |
| Management of Seed Orchards considering Gain and Diversity and how it is Applied in Korea - Kyu-Suk Kang and Chang-Soo Kim | 114 |
| Gene conservation through seed orchards - a case study of <i>Prunus spinosa</i> L. - Jörg R.G. Kleinschmit, Ludger Leinemann and Bernhard Hosius | 115 |
| Combining production of improved seeds with genetic testing in seedling seed orchards - Jan Kowalczyk | 126 |
| Deployment of clones to seed orchards when candidates are related - Dag Lindgren and Darius Danusevičius | 135 |
| The Swedish seed orchard program for Scots pine and Norway spruce - Dag Lindgren, Bo Karlsson, Bengt Andersson and Finnvid Prescher | 142 |
| Advanced-Generation Seed Orchard Designs - Milan Lstibůrek and Yousry A.El-Kassaby | 155 |
| Problems with seed production of European larch in seed orchards in Poland - Piotr Markiewicz | 161 |
| A review of the seed orchard programme in Poland - Jan Matras | 165 |
| Seed Orchard Management Strategies for Deployment of Intensively Selected Loblolly Pine Families in the Southern US - Steven E. McKeand, Davis M. Gerwig, W. Patrick Cumbie, and J.B. Jett | 177 |
| Paternal gene flow in <i>Cryptomeria japonica</i> seed orchards as revealed by analysis of microsatellite markers - Yoshinari Moriguchi, Hideaki Taira and Yoshihiko Tsumura | 183 |
| Fertility Variation across Years in Two Clonal Seed Orchards of Teak and its Impact on Seed Crop. - Abel Nicodemus, Mohan.Varghese, B. Nagarajan and Dag Lindgren | 189 |
| A review of Scots pine and Norway spruce seed orchards in Finland - Teijo Nikkanen | 195 |
| Finnish Birch Seed Production 1970-2007 - Sirkku Pöykkö | 199 |
| British Columbia's Seed Orchard Program: Multi Species Management With Integration To The End User - David J.S. Reid | 204 |
| Pest insects and pest management in Swedish spruce seed orchards - Olle Rosenberg and Jan Weslien | 215 |
| New Swedish Seed Orchard Program - Ola Rosvall and Per Ståhl | 216 |

| | |
|---|-----|
| Comparison of seed orchard and stand seed of Scots pine in direct seeding - Seppo Ruotsalainen | 218 |
| Temporal and Spatial Change of the Mating System Parameters in a Seed Orchard of <i>Pinus tabulaeformis</i> Carr. - Xihuan Shen, Dongmei Zhang, Yue Li and H. X. Zhang | 221 |
| Challenges and Prospects for Seed Orchard Development in South China - Run-Peng Wei | 229 |
| Factors affecting effective population size estimation in a seed orchard: a case study of <i>Pinus sylvestris</i> - Dušan Gömöry, Roman Longauer, Ladislav Paule and Rudolf Bruchánik | 242 |
| Pollen contamination and after-effects in Scots pine - Jan-Erik Nilsson | 254 |

Presentations (posters or lectures) at the conference, which are not in the proceedings:

Mats Berlin, Johan Kroon & Jon Hallander: Estimation of economic weights for an elite Scots pine seed orchard in northern Sweden

T.D. Byram: Economic Orchard Replacement: The Advancing-Front Orchard and its Implications for Group Merit Selection and Half-Sib Family Forestry in the Southeastern USA

Burcu Cengel, Y Içgen, G Kandemir, E Veliouglu, MURAT ALAN & Z Kaya: Efficiency of genetic diversity capturing from seed stands vs seed orchards of *Pinus nigra* plantations in Turkey

Barbara Fussi, Agnieska Koziel & Berthold Heinze: Selection of seed orchard parents in common ash (*Fraxinus excelsior*): A genetic comparison of seed orchard composition with commercial seed lots

Matti Haapanen: Synchronising tree breeding and seed orchard programs in Finland

Henrik Hallingbäck: Grain angle breeding values obtained from seed orchard clones and their progeny: a comparison

Ole Hansen: Paternity studies in Danish Conifer seed orchards

Āris Jansons, Imants Baumanis & Arnis Gailis: Pollen contamination effect on growth of Scots pine clone progenies

Øystein Johnsen: Practical implications for seed orchards and seed orchard crop deployment of after effects

Richard Kerr, GREG DUTKOWSKI, Tony McRae: SEEDPLAN: a modular approach to seed orchard deployment

Erik D Kjær, Lars N Hansen & Bjerne Ditlevesen: Seed Orchard functioning in Danish Hybrid Larch Seed Orchards 2000-2007 - an overview of results and their implications

Johan Kroon, Jon Hallander & Mats Berlin: Establishment of an elite Scots pine seed orchard in northern Sweden

Ulrik Bräuner Nielsen: Estimated gains in seed orchards for Christmas tree and greenery production

Johanna Siitonen, TIINA YLIOJA & Teijo Nikkanen: Functioning of Norway spruce seed orchards: do insects matter?

J Šindelář, JOSEF FRYDL, P Novotný, J Chládek: Testing of Seed Orchards in the Czech Republic.

Mulualem Tigabu: NIR Spectroscopy as a tool in seed orchard management

Kristine Vander Mijnsbrugge: Seed orchards for autochthonous gene conservation

Ulfstand Wennström: Direct seeding of orchard and stand seed

(Presenter in CAPITALS if not first author)

These proceedings can currently (2008-01-30) be read and downloaded in .pdf format starting from the link: <http://www-genfys.slu.se/staff/dagl/Umea07/> (Dag Lindgren web). They are unlikely to vanish before mid-2009, and the file may be updated and corrected, so downloads are recommended from where in first hand. The proceedings file is posted in an open archive on: <http://pub-epsilon.slu.se/151/> . Reporters made summaries of some of the presentations, including some which are not in the proceedings, which are currently on the Treebreedex web <http://treebreedex.mediasfrance.org/pages/body/homePage.jsp> and these proceedings may be there also.

Preface

Seed orchards constitute the cradle for most cultivated forests. Often seed orchards are needed or preferred just to get a reliable and reproducible seed supply, but as forest tree breeding has left its infancy, the genetic gain becomes often of major importance. Seed orchards are by far quantitatively the most important interface between forestry on one side and tree breeding and supporting research on the other. By seed orchards we create resources future generations will need: seed orchards are one tool in the fight against global warming and for sustainability; and better seed orchards means a better future World. Seed orchards can also have an important role for gene conservation. Seed orchards have through the past decades not been regarded as a new research frontier, but as a mature science and a matter for stump-jumpers and not scientists. However, knowledge and experiences of seed orchards and their role and management have accumulated during the last decades. Many developments have not got much attention, because they seldom reach fancy journals and are a concern only for a few specialists and managers. The time has come for a conference to synthesize and debate this new knowledge and amalgamate it into the old.

An opportunity arose, as seed orchards was an issue for Treebreedex, Activity 6. Treebreedex is a consortium of 28 organizations involved in tree breeding and forest genetics in Europe supported by the European Union 2006-2010. Participation in the conference was however open to anybody.

At the conference 36 Oral presentations and 17 posters were presented on different aspects of seed orchards. There were 90 registered participants from 27 countries. All oral presentation were given the same time lot and they were presented in alphabetic order according to the presenter. There were no concurrent sessions. Besides the lectures it was discussions about possible forest genetic consequences of recent fires in Greece and possible use of DNA techniques associated to seed orchards based on a conference immediately preceding the seed orchard conference. The public defense of a PhD thesis (Prescher F 2007 Seed Orchards – Genetic Considerations on Function, Management and Seed Procurement. *Acta Universitatis Agriculturae Sueciae* 2007:75) took place so participants could attend. A half-day excursion to seed orchards around Umeå was done.

The manuscripts published in these proceedings were submitted as word files and included in the proceedings as received, except pagination and sometimes minor formatting and

conversion to PDF files. The content of the contributions is the responsibility of the authors. The manuscripts have not been reviewed except for some technical considerations. Of the presentations, 36 are documented as papers in these proceedings.

With advances in digital technology, proceedings are often published online because of obvious advantages: It is hassle free. It is a marginal cost for the publisher and almost free for the customer. It is easily accessible for anyone. The downside of online publishing is that sites hosting the material will sooner or later vanish or change URL! It is unpredictable how long the proceedings will be public available, so it is a good idea to download it. Anyone may place it available on another web.

Sponsoring is acknowledged from Treebreedex and The Swedish Forest Tree Breeding Association. Staff from my own department (like Jan-Erik Nilsson and Anders Fries) has done a great job assisting me in organizing the conference! Much help is acknowledged from Skogforsk (in particular Bengt Andersson who organized the excursion). Swedish University of Agricultural Sciences and its Faculty of Forest Sciences and Umeå Plant Science Centre are acknowledged for hosting the conference. Organizational help and discussion about the arrangements have been received from several participants. The main cost and main effort with a conference is the time and dedication of the participants and contributors and those funding their time and effort, and the most important acknowledgement is to their contributions.

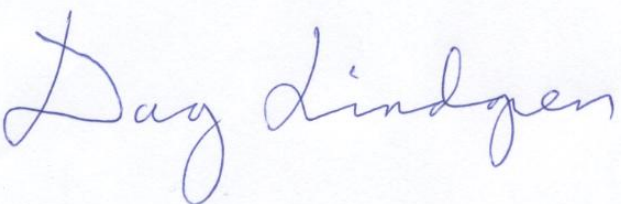
An example of a possible way to make a citation:

Hannerz M and Ericsson T 2008. Planter's guide - a decision support system for the choice of reforestation material *In* Lindgren D (editor) Proceedings of a Seed Orchard Conference, Umeå, Sweden, 26-28 September 2007. p 88-94.

Organizing a conference is a lot of work, but it is also a lot of fun. I truly enjoyed the seed orchard conference. I hope the other participants liked it as much as I did. I see it as a great privilege to be allowed to arrange a conference about such an important, but still neglected subject, as seed orchards.

Umeå 10th February, 2008

Dag Lindgren,
Conference chair, proceedings editor



Participants

| | | | |
|-------------------------|----------------------|-----------------------------|---------------------------------|
| Abrahamsson, Sara | Frýdl, Josef | Karlsson, Bo | Prescher, Finnvid |
| Ackzell, Lennart | Fussi, Barbara | Kjær, Erik D. | Pöykkö, Sirkku |
| Alan, Murat | Gailis, Arnis | Kleinschmit, Jörg | Reid, David |
| Alizoti, Evi | Garcia Gil, Rosario | Klintenäs, Maria | Rosenberg, Olle |
| Almqvist, Curt | Gaspar, Maria J | Kowalczyk, Jan | Rosvall, Ola |
| Andersson, Bengt | Gomory, Dusan | Kroon, Johan | Ruotsalainen, Seppo |
| Andersson, Jörgen | Gong, Peichen | Li, Yue | Shen, Xihuan |
| Berlin, Mats | Granlöf, Jonatan | Lindgren, Dag | Sigurgeirsson, Adalsteinn |
| Bilir, Nebi | Haapanen, Matti | Markiewicz, Piotr | Steffenrem, Arne |
| Byram, Tom | Hall, David | Martinsson, Owe | Stener, Lars-Göran |
| Chalupka, Wladyslav | Hallander, Jon | Matras, Jan | Tigabu, Muluaalem |
| Chládek, Jan | Hallingbäck, Henrik | McKeand, Steve | Tolkamp, Wim |
| Codesido, Verónica | Hannerz, Mats | McRae, Tony | Waldmann, Patrik |
| Danusevicius, Darius | Hansen, Ole | Meland Edvardsen, Øyvind | Walfridsson, Erik |
| De Cuyper, Bart | Högberg, Karl-Anders | Moriguchi, Yoshinari | Vander Mijnsbrugge, Kristine |
| de Vries, Sven MG | Isik, Fikret | Nielsen, Ulrik Bräuner | Wang, Xiao-Ru |
| Douglas, Gerry | Jansons, Āris | Nikkanen, Teijo | Varghese, Mohan |
| Dutkowski, Greg | Jansson, Gunnar | Nilsson, Jan-Erik | Wei, Run-Peng |
| El-Kassaby, Yousry | Johnsen, Øystein | Normark, Erik | Wennström, Ulfstand |
| Ericsson, Tore | Johnskås, Ragnar | Novotný, Petr | Westin, Johan |
| Fjellström, Joakim | Kajba, Davorin | Parnuta, Gheorghe | Ylioja, Tiina |
| Foffova, Elena | Kang, Kyu-Suk | Persson, Torgny | |
| Fries, Anders | Karlman, Lars | Pliura, Alfas | |

Conference photo with most of the participants at 2007-09-27 (Dag Lindgren 65 Year Anniversary)

