TREEBREEDEX: A working model network of tree improvement for competitive, multifunctional and sustainable European forestry

Home to rich and varied biodiversity and contrasting ecosystems, from boreal to Mediterranean, Atlantic to continental, Europe is both a major supplier and user of genetic forest resources in both research and wood product development. Forest managers have to grow trees as fast as they are chopped down. Tree breeders are making a big contribution to the sustainability of cultivated forests in Europe through new and better varieties. But their research work has become more and more complex over the years due to growing environmental concerns like climate change, pressures from urbanisation, multifunctionality, and new technologies (genetic engineering, genomics, micropropagation). Rare are the teams of breeders who can now compete alone and meet all the demands of modern research. So a pan-European approach is needed and the EU-funded TREEBREEDEX project is preparing the ground for a European tree breeders' network and even a European Virtual Tree Breeding Centre

FORESTRY RESEARCH COMES OUT OF THE WOODSA

After decades of genetic variability evaluation in field tests, modern biotechnology has given tree breeders a helping hand in gaining better insight into the genetic diversity of native populations of major economic forest species. Breeders have taken advantage of forest genetics and of the huge change in the genetic make-up of forests due to intensive use of plantations in the 20th century to develop, through recombination and selection, reforestation material better adapted to reforestation sites and better suited to human activities.

To meet the challenges of the 21st century like global warming and the threat to native species, forest geneticists and breeders rely heavily on past or present R&D as well as on the capacity of research teams to cooperate more closely. Many of them have already joined forces around international R&D projects on forest genetics, forest management, conservation and the wood chain, mainly funded by the EU, such as the European Forest Genetic Resources Programme (EUFORGEN) and work on sustainable forestry under the Fifth Research Framework Programme. The next step is to establish the roots of a European tree breeders' network.

The TREEBREEDEX project, which set up a central, virtual knowledge centre on tree breeding for Europe, aims to gather relevant information from across the EU into databases and best-practice manuals to provide a one-stop-shop for guidance on tree breeding resources and techniques. For instance, recent field trials in the UK found hybrid larch from the Netherlands and Douglas fir from France to be very successful in terms of adaptability and growth rate. The British Forestry Commission hopes to learn from France and Germany's extensive marker-aided selection knowledge, while offering access to its own clone-replicated field marker-aided selection trials. Information like this could be valuable to other European countries looking for new varieties and TREEBREEDEX is helping to spread the word.

There is plenty of scope for sharing tree-breeding knowledge as 28 forestry research institutions and private agencies from 18 different countries spanning very different ecosystems are involved in the project coordinated by France's National Institute for Agricultural Research INRA. All teams are expert in forest genetics and related sciences, and nearly all of them conduct breeding programmes on major forestry species. Their public funding and/or links with research institutions mean they can directly benefit from expertise in other fields such as in physiology, pathology and wood sciences.

Also, many of them work in close cooperation with their national or regional sectors of the forestry wood chain and are directly involved in national regulations concerning forest reproductive material. Forest geneticists and breeders have built up huge collections of trees for the most economic forest species and vast networks of well-documented experimental trials. In addition, they have continuously developed original methodology in genetics and in related sciences to recombine, test, evaluate, analyse, select and mass-produce tree species. All this, together with specific facilities and equipment, represents a unique set of infrastructures of benefit to the wider scientific community.

SIXTH FRAMEWORK PROGRAMME

EUROPEAN COMMISSION

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SEEING THE TREES THROUGH THE WOODS

The starting point for the TREEBREEDEX Coordination Action is to network the many but scattered infrastructures of the consortium partners, consisting mostly of biological collections and experimental facilities. The idea is to foster cooperation and complementarity among teams of tree breeders and geneticists, raise the R&D excellence level across Europe, gradually integrate tree improvement research into cooperative programmes, and to open research infrastructures to a wider scientific community in forestry and agriculture (ornamentals, fruit trees) and more broadly in biology including pharmacology and medicine. Access will be facilitated by clear access rules and intellectual property rights.

Networking activities under the project include setting up a website, discussion forums and databases, exchanging expertise and methodology through seminars, workshops, training sessions etc, and developing web-based coordination tools, common metadatabases (genetic material and field test networks), and protocols. The work focuses on the geographical structure of genetic diversity of species (delineation of adaptive environments and breeding zones at European level); joint management of breeding populations; and optimisation of breeding strategies and of improved variety mass-production and use in forests.

TREEBREEDEX is also preparing the scientific, technical and legal background for cooperative breeding programmes through case-studies on some pilot-species, and, more ambitiously, is looking into the feasibility of setting up a European Forest Tree Improvement Cooperative.

This infrastructure network will allow substantial economies of scale by optimising the use of tree-breeding research facilities including tree collections and by limiting duplication of research work. It will reinforce competitiveness through a better share of knowledge and methodology and through multidisciplinary joint research actions. All these activities will feed into the end goal of creating a European Virtual Tree Breeding Centre to serve as a unique link with the forestry wood chain, stakeholders, policy-makers and the public in all matters regarding forest genetics and selection and mass-production of improved forest tree varieties.

A WORKING MODEL NETWORK OF TREE IMPROVEMENT FOR COMPETITIVE, MULTIFUNCTIONAL AND SUSTAINABLE EUROPEAN FORESTRY IN SUMMARY

Project acronym: TREEBREEDEX
Funding scheme (FP6): Coordination Action (CA)
EU financial contribution: €2.8 million
EU project officer: Anna-Maria Johansson
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Start date: 1 June 2006
Completion date: 31 May 2010
Project website: http://treebreedex.eu/
Coordinator: Luc Pâques, Institut National de la Recherche Agronomique, paques@orleans.inra.fr
Partners: INRA (FR), Federal Research and Training Centre for Forests, Natural Hazards and Landscape (AT), Centre de Recherche de la Forêt et du Bois (BE), Instituut voor Natuur en Bosonderzoek (BE), Forestry and Game Management Research Institute (CZ), Bundesforschungs-anstalt für Forst- und Holzwirtschaft Institut für Forstgenetik und Forstpflanzenzüchtung (DE), Forest Research Institute of Lower Saxony (DE), Dept of Growth and Yield & Dept of Forest Genetic Resources Göttingen (DE), Staatsbetrieb Sachsenforst (DE), Royal Veterinary and Agricultural University (DK), Finnish Forest Research Institute (FI) , British Forestry Commission (UK), Consiglio per la Ricerca e Sperimentazione in Agricoltura (IT), The Irish Forestry Board (IE), Agriculture and Food Development Authority (IE), Lithuanian Forest Research Institute (LT), Alterra, Green World Research (NL), Norwegian Forest Research Institute (NO), Polish Academy of Sciences, Institute of Dendrology (PL), Forest Research Institute (PL), Forest Research and Management Institute (RO), Stiftelsen Skogsbrukets Forskningsinstitut (SE), Sveriges Lantbruksuniversitet (SE), Forest Research Institute (SK), Forest Research Centre (ES), Galician Research Center on Forest and Environmental Research (ES), Centro de Investigación y Tecnología Agroalimentaria de Aragón (ES), Technical University, Faculty of Forestry Zvolen (SK), Association Forêt Cellulose (FR)

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