

IUFRO DIVISION 2 JOINT CONFERENCE

Low Input Breeding and Genetic Conservation of Forest Tree Species

9-13 October 2006, Antalya, Turkey

Summary Report

Professionals from 25 nations attended the conference representing a wide diversity of cultures and species of interest. To commemorate this meeting and its theme of genetic conservation, the conference began with the presentation to Mahir Küçük, Deputy Undersecretary of the Turkish Ministry of Environment and Forestry, of a sufficient number of seeds for *ex situ* plantings of 13,000 giant sequoias. The source of seed is the native Redwood Mountain Grove in California. These giant sequoias, the largest of Earth's secondary species, will be planted in the Taurus Mountains around the city of Antalya, in Turkey. The members of the panel acknowledge and warmly thank Fikret Isik (conference chair) and Kani Isik (local organizing coordinator) for organizing an excellent and effective conference.

Summaries of Presentations and Discussions

1. Minor species

The use of low input *in situ* and *ex situ* conservation strategies for apparently minor species was a repeated theme. Participants emphasized that so-called minor species, as differentiated from widespread secondary species, are at risk of extinction. Fikret Isik emphasized the relative definition of minor versus major species. A species considered as minor could have major importance in time and space. Even if relatively rare on the landscape, these at-risk minor species may be ecologically and economically important and should be protected.

2. Low-cost simple solutions

Bill Libby's keynote address emphasized the pressures of increasing demand for wood and wood products under three alternative scenarios of future global population sizes. Solutions will require a combination of "high input" and "low input" programs. Forest tree breeding, intensive management, and conservation efforts will be increasingly important, especially as lands continue to be withdrawn from production and allocated to wildlands, parks and reserves.

Fikret Isik, in his opening remarks provided the advice to make programs efficient, feasible, and sustainable. This theme recurred throughout the conference, particularly in Dag Lindgren's challenge to reduce our over-reliance on complicated statistical designs and analyses in favor of simple selection approaches such as phenotypic mass selection. This was not a call to abandon quantitative analyses, but rather to match tools to social and economic needs and limitations.

Other presenters emphasized simple low-cost methods that can often accomplish multiple and complex objectives. For example, *in situ* conservation is a low-cost approach that is highly efficient and provides opportunities for continuing adaptation to changing environments. Some emphasized that partnerships with farmers and forest owners are critical to program success. The methods should be readily usable by the people who work the land. The programs should match

local needs, especially where high-value timber species may be missing. In such cases, local tools should be used to protect the native species *in situ*.

David Spencer reminded participants that “low input” for users often requires “high input” from program managers. Long-term planning and strategic thinking on how to avoid pitfalls are essential in making the process of resource allocation simple and transparent.

3. Reducing total costs through high-tech inputs

It was remarkable that a conference with “low input” as a theme included many papers on tissue culture, somatic embryogenesis and the use of genetic markers for identifying population structure and capturing superior genotypes. This apparent disparity likely reflects the variety of definitions of “low input” and differences in the cost of labor around the world. For example, some presenters argued that “low input” is better understood as “low cost”. Use of advanced technology contributes to lowering costs by reducing time and effort for breeding and testing.

Vegetative propagation was highlighted as a tool that can help speed breeding and conservation efforts, but it is not a goal *per se*. For some species and situations, especially when/where infrastructure resources are scarce, seed collections may be a better alternative than vegetative propagation. Some programs may require the use of expensive technologies for establishing baseline information. For example, satellite imagery could provide information on the distribution and changes in the local forest, and molecular markers could be used to describe the genetic structure of the local forests, such that low-input conservation and/or breeding can be done effectively.

Yousry El-Kassaby described the use of genetic markers to reconstruct pedigrees in wind-pollinated seed collections. This technology simplifies program logistics by using open-pollinated seeds in breeding programs (instead of control crosses) while minimizing relatedness among selections. When sufficient markers are available to exclude unwanted male parents, costs to complete controlled crosses are severely reduced in both seed and breeding orchards. Furthermore, when this technology can be matched with quantitative trait loci, it has the potential to reduce the number of crosses required to test for desirable traits.

4. Keeping good records and making them and materials available

Lauren Fins emphasized the need for archiving genetic material, maintaining good records, making accurate maps and making the records and maps retrievable and easily accessible. Field plantings can serve as gene archives, thus elevating the importance of the records and maps. Future studies involving long-term performance and/or the use of new technologies will depend on the availability of good genetic materials and records. Concern was expressed that enforcement of intellectual property rights may impede the sharing of both known materials and their records.

5. Partnering with people and government agencies

Participants were concerned about the low level of government agency and public awareness of the importance of natural and planted forests to local and regional economies. Such forests could raise the living standards of peoples living in poverty; they have the potential to mitigate environmental problems such as soil erosion; they can augment landscape biodiversity, and provide important ecosystem services. Framing the discussion in “the language of the

government agency” about both potential and realized benefits would raise awareness of these programs.

6. Balancing breeding strategies and conservation goals

Participants discussed the need for ensuring the stability of ongoing conservation programs as well as how to balance conservation with intensive forestry and tree breeding without exhausting financial resources. The potential for agro-forestry practices to bridge the gap between forest genetics and biodiversity conservation was discussed.

Bill Dvorak emphasized the wisdom of including representatives of private industry in the conversation. Others suggested that representatives from the emerging nations of Africa and Latin America be included. Bruno Fady noted that most climate model scenarios predict increasing global temperatures and more frequent climatic extremes. Other presenters emphasized the need for program managers to balance competing strategies between conservation and intensive forestry. Intensive breeding, non-timber contributions of forest trees to ecosystem services, and overall biodiversity should be included. Bill Dvorak asked how we will measure success in conservation, a likely topic for another conference in the near future.

7. Using terminology ethically and correctly

Lokendra Purush Dhakal reminded us to be aware of the connotations of the words we use, and that “low input” may have negative overtones, implying a lack of importance. The forest tree breeding community, after more than 50 years, continues to use several technical terms incorrectly. Bill Libby noted that using technical terms incorrectly can result in miscommunications among breeders and other scientists, and between scientists and the public. This lack of precision erodes our ability to communicate clearly with each other and with the general public and will likely eventually erode public trust in our science.

(Signed) The Conference Panel: Lauren Fins (panel chair), Lokendra Purush Dhakal, William Dvorak, Yousry El-Kassaby, Bruno Fady and William J. Libby, Kani Isik (local organizing coordinator) and Fikret Isik (conference chair)

Conference sponsoring organizations

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1. International Union of Forest Research Organizations
2. Akdeniz University, Antalya, Turkey
3. North Carolina State University, Raleigh NC, USA
4. Turkey Ministry of Environment and Forestry
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7. Hellenic Scientific Society for Plant Genetics and Breeding, Greece
8. European Forest Genetic Resources Program
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