

# **Overview of current practices of use and exchange of forest genetic resources for food and agriculture**

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Based on work by

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## **The use of forest genetic resources**

### **Types of uses**

*What are the main activities involving the use of forest genetic resources? To which degree does use of genetic resources and product development include genetic improvement*

- Reforestation, afforestation, management and establishment of agroforestry systems, for all those systems both genetically improved material and non genetically improved material collected from the wild are used.
- The genetically improved material is used for the establishment of industrial plantations. In the management of natural forests most of the regeneration is obtained by natural ways without the plantation of material made by artificial systems

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- However, there is some level of management and selection of the regeneration in some cases, but mostly mainly in tropical countries there is no much knowledge of the reproductive and pollination systems of the trees
- Forest tree breeders cannot rapidly produce new varieties, but the big genetic variation that many tree species have is an advantage to do the GI.

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- Collection of seeds from wild stands.
- Selected seed stands and (improved) seed orchards
- Breeding programmes.  
Existing conventional breeding and production programmes are limited by the long growth cycles of forest trees

## The use of forest genetic resources

### Types of uses

*What is the degree of development, industrial establishment and professionalization of the sector using forest genetic resources? Which ways and means are used to reward innovation and/or protect intellectual property, if at all?*

- The sector is still at an early stage of development and professionalization because it started quite recently and because of the long reproduction cycle which prevent to obtain rapid results from genetic improvement.
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### Types of uses

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- Systematic exploration and assessment began about 50 years ago. *Acacia spp.*, eucalypts *Eucalyptus spp.* and *Pinus spp.* The potential for hardwood species, *Tectona grandis*, *Swietenia macrophylla* and *Cedrela odorata*.
- Use of Intellectual property mechanisms for protection of improved material is currently absent from the sector.

## The use of forest genetic resources

### Types of uses

*Who are the main holders and users of forest genetic resources? Which roles do they play at the different stages of research and product development? Under which types of ownership are genetic resources held?*

- Private forest owners, local individual or community holders, NGOs, national seed banks and/or tree seed centers, universities and public or private research centers (e.g. research and trial programs, breeding programs), state-owned commercial companies or private companies (orchards and plantations).

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- In some cases, consortia between two or more of those different actors join their forces and develop collaborative programmes which encompass different stages of development (conservation, research trial, orchards, plantation, trade...). In the context of their collaboration, those consortia often establish a set of common rules for their exchange of material.



## B.Types of genetic diversity

*Are the GR used and exchanged mainly wild or improved? Which diversity is commonly used in product development, intra- or inter- specific?*

- The gene pools of many tree species, are still semi-wild,. Tested, selected is available for few tree species.
- Poor availability of high quality, source-identified genetic material (particularly seed) for trial and afforestation is a severe limitation to efficient and successful use of the genetic variability of some tree species.
- Seeds of tree species, the most common type of forest reproductive material, are obtained from a variety of sources, including wild stands, selected seed stands, seed orchards, research trials, plantations and even individual trees on farms, depending on tree species and countries.

## Types of genetic diversity

*What proportion of native vs exotic genetic material is used?*

- The proportion of exotic forest reproductive material used for plantation and afforestation is high. Fast-growing species are the most widely-spread as plantation species. But this is also true for tropical species such as Mahogany, Spanish cedar and Teak.
- Because movement of tree germplasm has a long history, some countries are currently self-sufficient. However, other countries still rely on imported seed. Often the demand is high for seed of introduced tree species, but in some cases countries are also importing seed of native tree species from neighboring countries.

## Types of genetic diversity

*What proportion of native vs exotic genetic material is used?*

- In the face of climate change, it is expected that the movement of forest reproductive material will become even more important as it provides opportunities to facilitate the adaptation of forests and to maintain productivity of forests and tree-based farming systems.
- Although the ongoing REDD discussion emphasizes “avoided deforestation”, the new climate agreement includes forest rehabilitation and restoration. In that case, it would create an additional demand for forest reproductive material.

## Types of genetic diversity

*Does genetic erosion occur in the sector? Is it perceived as a main problem/challenge for the sector by the users of genetic resources? Does the sector depend upon the effective conservation of genetic resources?*

- Information on the extent of losses of genetic diversity at the population level is limited by poor knowledge of the genetic structure of tree populations but see Lowe et al.2010 and SeedSource.net. There is indeed a lack of data on estimates of genetic erosion on both spatial and temporal aspects.
- Despite this lack of knowledge about genetic erosion, there seems to be a growing concern about the need to broaden the gene pools.
- Nevertheless, the testing and use of forest reproductive material have provided significant incentives for the conservation of forest genetic resources. Many international provenance trials highlighted the importance of conservation of specific natural populations,.

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## **2.The global exchange of forest genetic resources**

*What is the number and frequency of exchanges of germplasm? What is the importance of cross-border exchanges and the direction of flows of genetic*

- The establishment of research trials has promoted international collaboration on the collection and exchange of tree germplasm. The results of these provenance trials have had a large influence on the types of germplasm being transferred between countries and regions.

## 2.The global exchange of forest genetic resources

*What is the number and frequency of exchanges of germplasm? What is the importance of cross-border exchanges and the direction of flows of genetic*

- On the commercial side, the demand and supply of forest reproductive material varies considerably over time. In general, it seems that the supply of forest reproductive material is often insufficient to meet the demand, excluding most tree species in Europe and North America. Furthermore, in many African countries, the formal supply of tree germplasm satisfies only a low proportion of current demand.
- Aside from fast-growing tree species which have been (and continue to be) widely exchanged worldwide, flow of material mainly occur at regional.

## 2.The global exchange of forest genetic resources

*Under which modalities are genetic resources exchanged? Which terms and conditions for use and exchange do they normally imply? How important are Intellectual Property considerations in exchange and marketing practices?*

- Large amounts of seed are moved through the trade sector. There are for instance well-developed international seed markets of most acacias, eucalypts and pines. The international market for tropical hardwood seed is less developed but is constantly growing. Exchange of agroforestry tree species is run through informal practices by smallholder operators.



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- Material Transfer Agreements (MTAs) and Memorandums of Understanding (MoUs), but no standard MTA is used. For instance, the Australian Tree Seed Centre (ATSC) introduced in 1997, a memorandum of understanding (MoU) covering all seed dispatches with the intention of ensuring that the ATSC could access,
- Even if Intellectual Property Rights are not used in the FGR sector, some restriction for further use might still apply..

## **2.The global exchange of forest genetic resources**

*What issues (other than ABS) are to be taken into account when exchanging genetic resources?*

- Sanitary issues are a serious impediment to germplasm exchange.
- Documentation and certification schemes have been developed internationally for regulating international trade of forest reproductive material. The "OECD Forest Seed and Plant Scheme" is to date the most elaborated one:...