



# **Agricultural Biotechnologies in Developing Countries**

**Guadalajara, Mexico, 1-4 March 2010**

## ***Current Status and Options for Forest Biotechnologies in Developing Countries***

**ABDC-10/4.1**



# **Forest Biotechnologies in Developing Countries**

## **1. Introduction**

### **A. Stock Tacking**

- 2. Overview of forest conventional technologies**
- 3. Current status of application of biotechnologies**
- 4. Analysis of success and failures**
- 5. Case studies**

### **B. Looking Forward**

- 6. Key issues where biotechnologies could be useful**
- 7. Options for developing countries**
- 8. Priorities for action for international community**

# Introduction

- **Forests: 4 billion Ha, 30% land area, economic/social/environmental functions**
- **Different management systems**
- **Planted forests: 5% area, 50% industrial wood**
- **Forest trees: undomesticated, wild, important natural diversity, outcrossing, heterozygous, long-lived perennial, long regeneration cycle, late sexual maturity**
- **Keystone species in dynamic ecosystems**



# Overview of conventional technologies

- **Forest tree improvement: *to improve the genetic value of the population while maintaining genetic diversity* [insurance against changes in needs and environment]**
- **Genetic gain carefully balanced against genetic diversity, even in most intensive planted forests**
- **Different path from crop and animal strategies and programs**



# **Status of application of biotechnologies**

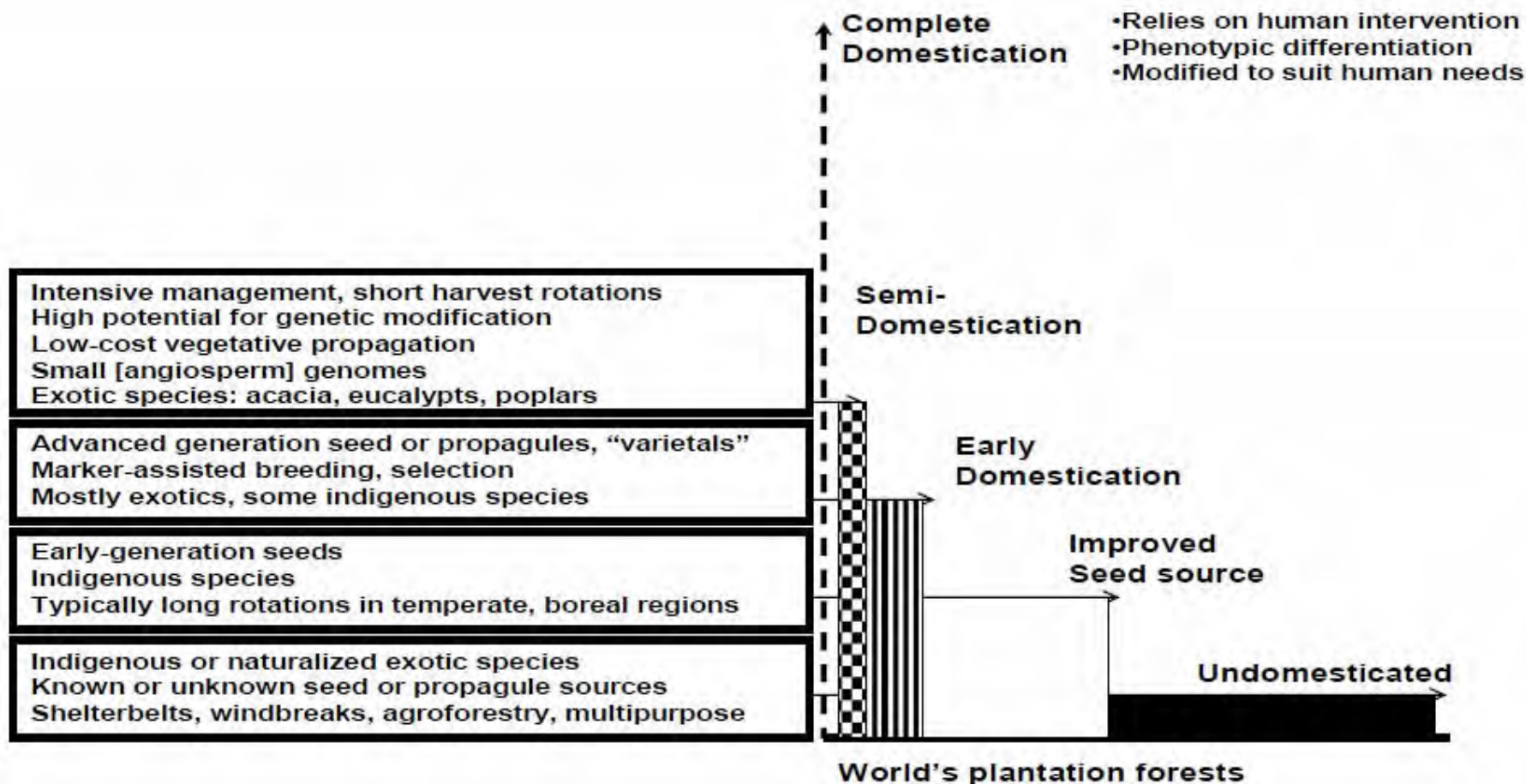
## **Naturally regenerated forests**

- **Molecular markers: genetic diversity studies, knowledge and information to define conservation strategies and programs, and guide integration of genetic conservation into forest management plans**
- **Genomics (phylogeny)**
- **Symbiotic associations**



# Status of application of biotechnologies

## Planted forests (types/degree of domestication)





# Status of application of biotechnologies

## Planted forests

- Vegetative propagation
- Biofertilizers
- Genetic finger printing (molecular markers)
- Quantitative Trait Loci and Marker-Assisted Selection
- Genome sequencing
- Functional genomics
- Genetic engineering



# **Analysis of success and failure**

## **Causes of failure**

- **Inadequate understanding (path separate from crop biotechnology, biased assessment of costs and benefits)**
- **Funding uncertainty**
- **Infrastructure and capacity constraints**





# **Analysis of success and failure**

## **Successful applications (case studies)**

- **Biotechnologies applied/integrated in advanced tree breeding programs**
- **Key role of the private sector**
- **Production of knowledge necessary to conservation and sustainable use of important tropical forest species (public research)**



# **Key issues that biotechnologies could address**

- **Adaptation to climate change**
  - **Modelling**
  - **Assisted migration**
- **Conservation and sustainable management of forest genetic resources**



# **Options for developing countries**

- **Integration of biotechnologies with conventional technologies**
- **Promote public-private partnership at national level**
- **Improve information and communication for biotechnologies**



# **Priorities for international community's action**

- **Improve access to scientific information in developing countries**
- **Build capacity for understanding forest biotechnology issues at all levels**
- **Review the status and potential of forest biotechnologies for developing countries**
- **Encourage North-South collaboration**

# THANK YOU