Forestry Department

Food and Agriculture Organization of the United Nations

Forest Genetic Resources Working Papers

Glossary on forest genetic resources

(English version)

Based on the work of

Renate Prüller

IUFRO Secretariat, SilvaVoc

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The Forest Genetic Resources Working Papers report on issues addressed in the work programme of FAO. These working papers do not reflect any official position of FAO or IUFRO. Please refer to the FAO website (www.fao.org/forestry) for official information.

The purpose of these papers is to provide early information on on-going activities and programmes, and to stimulate discussion.

Comments and feedback are welcome.

For further information please contact:
Mr. Pierre Sigaud, Forestry Officer (Forest Genetic Resources)
Forest Resources Development Service
Forest Resources Division, Forestry Department
FAO
Viale delle Terme di Caracalla
I-00100 Rome, Italy
e-mail: pierre.sigaud@fao.org

The present paper is the result of a collaboration work between FAO's Forestry Department, IUFRO's Task Force on Forest Genetic Resources, and IUFRO's SilvaVoc Terminology project. This revised edition of the English version will be updated regularly and posted on line with the electronic glossary at http://iufro.boku.ac.at/silvavoc/glossary/. The glossary is available in English, French, German and Spanish.

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CONTENTS

USER'S GUIDE

Objectives

At its Tenth Session, held at the Food and Agriculture Organization of the United Nations (FAO) in Rome in September 1997, the Panel of Experts on Forest Gene Resources recommended *„that FAO and IUFRO, in collaboration with other relevant institutes, review and help revise and update existing terminology in the forest genetic resources field, concentrating initially on a core set of basic terms and concepts*".

The development of this document has been undertaken as a follow-up to the recommendation of the Panel. The Glossary has been produced in collaboration between the Forest Resources Development Service of FAO, the newly created IUFRO Task Force on Forest Genetic Resources and IUFRO's SilvaVoc terminology project.

Its main purpose is to provide an overview of the current variety of **definitions**[1] and of **terms**[2] applying to **concepts**[3] frequently used in the field of forest genetic resources. The objective of the glossary is not only to record established and widely accepted definitions of some common terms, but also to show the way and the sense some professions, organizations or countries use the terms. Instead of providing one single definition, the **terminology**[4] will aim at providing, for a given **key term**, various definitions and meaning developed by various groups for their specific scope and objectives. It should reflect the diversity of users and their complementary approaches, and incorporate their definitions or explanations, in addition to providing standard, universal definitions.

At the present stage this compilation is therefore circulated among scientists and organizations active in the field of forest genetic resources development to generate additional input of ‚in-house' definitions. It will then serve as a basis to further develop a final document on Forest Genetic Resources terminology.

General organisation

The concepts defined here were selected by FAO in agreement with the IUFRO Task Force on Forest Genetic Resources and SilvaVoc. The definitions were taken from printed and on-line documents available to the compilers. Sources are mentioned under References.

[1] **Definition**: Statement which describes a concept and permits its differentiation from other concepts within a system of concepts.

[2] **Term**: Designation of a defined concept in a special language by a linguistic expression. A term may consist of one or more words or even contain symbols.

[3] **Concept**: A unit of thought constituted through abstraction on the basis of properties common to a set of objects. Concepts are not bound to particular languages. They are, however, influenced by the social or cultural background.

[4] **Terminology**: Structured set of concepts and their representation in a specific subject field. (Source: ISO 1087:1990 International standard: Terminology-Vocabulary)

This document consists of 66 key terms arranged in mixed alphabetical/ systematic order. The systematic order reflects the generic concepts and sub-concepts. The generic concepts are listed in alphabetical order.

Key terms are English terms which were selected by the compilers to represent the concepts to be defined, e.g. „biological diversity“. Most key terms correspond to one or several entry terms in English, German, French and Spanish. In this document, entry terms are defined as alternative designations of concepts, for example „genetic marker“ or „marqueur génétique“ or designations of sub-concepts, for example „DNA marker“.

This implies that entry terms under a given key term are not necessarily exact synonyms, as key terms may refer to quite broad concepts. For example, the English entry terms „tree improvement“ and „tree breeding“ cannot always be used synonymously. Obviously, such discrepancies are even more pronounced *between* languages.

For the sake of simplicity for the user, entry terms such as „genetic marker“, „molecular marker“ and „DNA marker“ are all to be found under the key term „genetic marker“, rather than being listed separately.

Entry and key terms in English, French, German and Spanish are listed in a single alphabetical index.

Acknowledgment

An excellent source of inspiration for the production of this document was given in the working document on Indicators for Forest Biodiversity in Europe: Proposal for terms and definitions, prepared by M. Kaennel Dobbertin, WSL Switzerland.

Special thanks go to all those who have assisted with their comments, definitions and suggestions.

Call for participation

The selection of definitions presented here is of course non-exhaustive and arbitrary, as these definitions were collected only from printed and on-line documents available to the compilers.

Terms and/or definitions are currently given mainly in English, French, German and Spanish. It is planned to progressively cover all working languages of FAO and IUFRO (including Arabic and Chinese) with possible incorporation of equivalent terms in Russian. Contributions in languages mentioned above are encouraged and welcome and will be acknowledged. Please address your contributions to Mr. Pierre Sigaud, FAO (e- mail: pierre.sigaud@fao.org) or to Ms. Renate Prüller, IUFRO Secretariat, SilvaVoc (e-mail: prueller@iufro.org).

1 adaptation

Reference definition:

The process of change in structure and/or function that makes an organism or a population better suited to survive in an environment. Adaptation may be achieved by phenotypic tuning to prevailing environmental conditions, or through evolutionary changes of genetic structure at the population level.

Source: Koski, V. et al. 1997. EUFORGEN. IPBRI.

See also **adaptability**

French -> **adaptation**
Spanish -> **adaptación**
German -> **Anpassung**

Other definitions:

adaptation (L. *ad*, to + *aptare*, to fit)
Adjustment of a population to changed environment over generations, associated (at least in part) with genetic changes resulting from selection imposed by the changed environment. *Not* acclimatization.

Source: Zaid, A. et al. 1999. Glossary of biotechnology and genetic engineering. FAO Research and Technology Paper No. 7. http://www.fao.org/DOCREP/003/X3910E/X3910E00.htm

adaptation
A measure of the fitness of the genetic group – either individuals or parts of individuals, or as groups – to one or several conditions of its environments. Frequently used to mean the process of becoming suited in form or function to new or different environmental conditions. (Adaptation is the process of becoming adapted).

Source: A Glossary of Plant Genetic Resources Terms (English/Arabic). International Board for Plant Genetic Resources.

adaptation
A change on the part of the individual or the population which results in better survival or growth. The process of change. The changed structure or function.

Source: Genetics of Forest Tree Improvement. FAO

adaptation
(1) The process of evolutionary (genetic) adjustments fitting individuals or groups to their environment. Also the changed structure or function itself. (2) A tree's performance over a full rotation in a new environment. (see adapted, land race, evolution, mutation)

Source: Glossary of Terms Used in Forest Tree Improvement. Field Manual No. 6 (RAS/91/004) UNDP/FAO Regional Project, 1994.

1.1 adaptability

Reference Definition:

The potential or ability of a population to adapt to changes in the environmental conditions through changes of its genetic structure.

Source: Koski, V. et al. 1997. EUFORGEN. IPBRI.

see also **adaptation**

french -> **adaptabilité**
spanish -> **adaptabilidad**
german -> **Anpassungsfähigkeit**

Other definitions:

adaptability
(1) The process of evolutionary (genetic) adjustments fitting individuals or groups to their environment. Also the changed structure or function itself.
(2) A tree's performance over a full rotation in a new environment. (see adapted, land race, evolution, mutation, natural selection).

Source: Schmidt, L., 1997. Tree Improvement Glossary. Technical Note 46. Danida Forest Seed Centre

adaptability
Adaptability means that a population has genetic variation allowing it to adapt to future environmental conditions. These new environmental conditions may relate to climate, soils, new silvicultural techniques, or quality requirements.

Source: Savolainen, O. 1995 In: New Approaches to Breeding, IUFRO World Congress, Finland

adaptability
Refers to the degree to which adjustments are possible in practices, processes, or structures of systems to projected or actual changes of climate. Adaptation can be spontaneous or planned, and be carried out in response to or in anticipation of changes in conditions.

Source: Resources for the future. Glossary of Terms and Concepts. http://www.rff.org/glossary.htm

adaptability
The ability of a plant to adapt to different environmental conditions, by modifications in physiological responses.

Source: A Glossary of Plant Genetic Resurces Terms (English/Arabic). International Board for Plant Genetic Resources

1.2 adaptedness

Reference definition:

The state of being adapted that allows a population to survive, reproduce and permanently exist in certain conditions of the environment.

Source: Koski, V. et al. Euforgen. IPBRI

see also **adaptability**

*german -> **Angepaßtheit***

Other definitions:

adapted
Refers to how well trees are physiologically suited for high survival, good growth, and resistance to pests and adverse environments. For exotics it refers to how well the trees will perform in their new environment. (see adaptation, land type.)

Source: Glossary of Terms Used in Forest Tree Improvement. Field Manual No. 6 (RAS/91/004) UNDP/ FAO Regional Project on Improved Productivity of Man-Made Forests Through Application of Technological Advances in Tree Breeding and Propagation. FAO, 1994.

2 biological diversity

Reference Definition:

> **The variability among living organisms from all sources including, *inter alia*, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems.**

Source: The Convention on Biological Diversity. Article 2. UNEP 1992

syn **biodiversity**

french -> **diversité biologique**
spanish -> **diversidad biológica**
german -> **biologische Diversität**

Other definitions:

biological diversity or biodiversity
is the total variability within all the living organisms and the ecological complexes they inhabit. Biodiversity has three levels - ecosystem, species and genetic diversity - reflected in the number of different species, the different combination of species and the different combinations of genes within each species. 5-10 million species are estimated to exist, and many of them have millions of genetically distinct individuals. About 1.7 million species have been described worldwide with flowering plants constituting 14% of this total. Diversity within species is the main concern of genetic resources programmes and the key to the survival of species in nature in the long term. Drastic reductions in biodiversity are not a new phenomenon in nature. What is new is the scale on which the erosion of biodiversity is occuring. Reduction of diversity will have serious and irreversible consequences for human welfare.

Source: IPGRI. 1993. Diversity of Development. The Strategy of the International Plant Genetic Resources Institute.

biological diversity
= biodiversity
The variability among living organisms from all sources and the ecological complexes of which they are part; this includes: Ecosystem diversity: the variety and frequency of different ecosystems. Species diversity: the frequency and diversity of different species. Genetic diversity: the frequency and diversity of different genes and/or genomes. It includes the variation within a population and between populations.

Source: Schmidt, L., 1997. Tree Improvement Glossary. Technical Note 46. Danida Forest Seed Centre

biological diversity
The full range of genetic diversity (species, subspecies, and distinct biological populations of plants and animals) as well as the full variety of ecosystems in which the plants and animals occur.

Source: Koski, V.; Skroppa, T.; Paule, L.; Turok, J. 1997. Technical guidelines for genetic conservation of Norway spruce (*Picea abies* (L.) Karst.). EUFORGEN. IPGRI

biological diversity
The variety and complexity of species that are present and that interact in an ecosystem, plus the relative abundance of each.

Source: Temperate Forest Foundation. Glossary.USA. http://forestinfo.org/Glossary

biological diversity or "biodiversity"
is the totality of genes, species, and ecosystems in a region. The wealth of life on earth today is the product of hundreds of millions of years of evolutionary history. Over the course of time, human cultures have emerged and adapted to the local environment, discovering, using, and altering local biotic resources. Many areas that now seem „natural" bear the marks of millennia of human habitation, crop cultivation, and resource harvesting. The domestication and breeding of local varieties of crops and livestock have further shaped biodiversity.
Biodiversity can be divided into hierarchical categories – genes, species, ecosystems, and culture – that describe quite different aspects of living systems and that scientists measure in different ways.

Source: World Resources Institute (WRI). "What is Biological Diversity".
http://www.wri.org/biodiv/biodiv.html

biodiversity (biological diversity)
The variety, distribution, and abundance of different plants, animals and microorganisms, the ecological functions and processes they perform, and the genetic diversity they contain at local, regional or landscape levels of analysis. Biodiversity has five principal components: (1) genetic diversity (the genetic complement of all living things); (2) taxonomic diversity (the variety of organisms); (3) ecosystem diversity (the three dimensional structures on the earth's surface, including the organisms themselves); (4) functions or ecological services (what organisms and ecosystems do for each other, their immediate surroundings, and for the ecosphere as a whole (i.e. processes and connectedness through time and space); and (5) the abiotic matrix within which the above exists (the unity of the soil, water, air, and organisms, with each interdependent on the continued existence of the other).

Source: Dunster, J.&K. 1996. Dictionary of Natural Resource Management. CAB International

biodiversity
The wide diversity and interrelatedness of earth organisms based on genetic and environmental factors.

Source: Hagedorn, S. A. An Agricultural and Environmental Biotechnology Annotated Dictionary.
http://gophisb.biochem.vt.edu/resources/glossary.html

biodiversity
1. The variety and abundance of life forms, processes, functions, and structures of plants, animals, and other living organisms, including the relative complexity of species, comunities, gene pools, and ecosystems at spatial scales that range from local through regional to global – *syn*: biological diversity 2. An index of richness in a community, ecosystem, or landscape and the relative abundance of these species – note 1. There are commonly five levels of biodiversity: (a) genetic diversity, referring to the genetic variation within a species; (b) species diversity, referring to the variety of species in an area;

(c) community or ecosystem diversity, referring to the variety of communities or ecosystems in an area; (d) landscape diversity, referring to the variety of ecosystems across a landscape; and (e) regional diversity, referring to the variety of species, communities, ecosystems, or landscapes within a specific geographic region – note 2. Each level of biodiversity has three components: (a) compositional diversity or the number of parts or elements within a system, indicated by such measures as the number of species, genes, communities, or ecosystems; (b) structural diversity or the variety of patterns or organizations within a system, such as habitat structure, population structure, or species morphology; and (c) functional diversity or the number of ecological processes within a system, such as disturbance regimes, roles played by species within a community, and nutrient cycling within a forest.

Source: Helms, J. (ed.). 1998. The Dictionary of Forestry. Society of American Foresters. USA

biodiversity
The variety of life on Earth and the natural patterns it forms, including all species of life and the genes that each individual contains, as the critical inter-relationships or „eco-systems“ which those species form.

Source: BIOTECanada. What is Biotechnology? Glossary. http://www.biotech.ca/EN/what_glossary.html

biodiversity
Biodiversity is the property of living systems of being distinct, that is, different, unlike. The word is a contraction of Biological Diversity, i.e. the diversity of living beings. Life comes in an almost infinite variety of fascinating and enchanting forms, from microsopically small unicellular species to giant whales and elephants. In turn, species are formed by different kinds of populations, these by different kinds of individuals, and these by different types of organs, tissues, cells, and genes. Diversity surround us, engulfs us, and not only in the living world. The inanimate world is also highly diverse. The rare, the peculiar, is to encounter living beings that are identical.

Source: Solbrig, O.T. et al. 1992: Biodiversity and Global Change. International Union of Biological Sciences (IUBS)

biodiversity (biological diversity)
The variety and variability (both in numbers and frequency) of the organisms and the genetic variability within each species. The term can be used to describe a particular site, a general habitat type, a small or large geographic region, or (less correctly) the genetic diversity of a particular species or population.

Source: Maynard, C., 1996: Forest Genetics Glossary. SUNY College. http://www.esf.edu/course/cmaynard/GENE_GLOSSERY.html

biodiversity
Biodiversity is the totality of genes, species, and ecosystems in a region. (…) Biodiversity can be divided into three hierarchical categories – genes, species, and ecosystems – that describe quite different aspects of living systems and that scientists measure in different ways: genetic diversity (…), species diversity (…), ecosystem diversity (…).
Besides ecosystem diversity, many other expressions of biodiversity can be important. These include the relative abundance of species, the age structure of populations, the pattern of communities in a region, changes in community composition and structure over

time, and even such ecological processes as predation, parasitism, and mutualism. More generally, to meet specific management or policy goals, it is often important to examine not only compositional diversity – genes, species, and ecosystems – but also diversity in ecosystem structure and function.

Source: WRI, IUCN, UNEP, 1992. Global biodiversity strategy: guidelines for action to save, study, and use earth‘s biotic wealth sustainably and equitably.

biodiversity
Diversity of the biotic components of ecosystems at the levels of organization, such as genes, species, populations, communities (e.g. tree community or forest ecosystem) and regions (landscape ecosystems, biogeographic units) … Biodiversity is more than, but includes, species richness. It denotes the entirety of the life-forms in a system at any level. At a-level in forestry it denotes, as dominance diversity, the pattern of mixture of species within a community (evenness or unevenness of mixture) in terms of their contribution to the number of individuals or biomass of the community: at b-level it denotes the patterns of between-community diversity within a geographic unit at the scale of landscapes; at d-level it denotes differences at larger regional scale. Biodiversity at a-level and b-levels are crucially important elements of sustainable forest conservation and management. Biodiversity determines structural diversity and organizational complexity, and is the key to ecological and economic self-sustainability and sustainability of forest management.

Source: Bruenig, E.F. Conservation and Management of Tropical Rainforests. An Integrated Approach to Sustainability. Glossary. CAB International.

biodiversity (biological diversity)
The diversity of plants, animals, and other living organisms in all their forms and levels of organization, including genes, species, ecosystems, and the evolutionary and functional processes that link them.

Source: Forest Service British Columbia. 1997. Glossary of Forestry Terms. Canada
http://www.for.gov.bc.ca/pab/publctns/glossary/glossary.htm

biodiversity
1. Biological diversity: all the varied forms of plants, animals and micro-organisms (Cooper, 1992). 2. The measure of the variation in genes, species and ecosystems diversity, species diversity and ecosystem diversity (McNeeley, 1993). 3. Made up of all species of plants and animals, their genetic material and the ecosystems of which they are a part (Harvesting Nature‘s Diversity). … 5. The variety and variability of living organisms and the ecological complexes in which they occur; the variety of the world‘s species, including their genetic diversity and assemblages they form (W.V. Reid and K.R. Miller, 1989). 6. Refers to the variety of life-forms and in a specific ecosystem (R. E. Segovia, 1995).

Source: SRDP. 1996. Glossary of Terms. Ottawa, Canada.

biological diversity
denotes the variety of life forms, the ecological roles they perform and the genetic diversity they contain (Wilcox, 1984).

Source: FAO. 1993. Conservation of genetic resources in tropical forest management. Principles and concepts. FAO Forestry Paper 107

2.1 agricultural biodiversity

Reference Definition:

syn **agricultural biological diversity**
agrobiodiversity

> **Agricultural biodiversity, sometimes called 'agrobiodiversity' encompasses the variety and variability of animals, plants and micro-organisms which are necessary to sustain key functions of the agro-ecosystem, its structure and processes for, and in support of, food production and food security.**

Source: FAO/CBD. Workshop 1998

french -> **agrobiodiversité**
spanish -> **agrobiodiversidad**
german -> **Agrobiodiversität**

Other definitions:

agrobiodiversity
The variety and variability of animal, plant and microbial organisms on earth that are important to food and agriculture. It is an important sub-set of biodiversity as it is the basis of food security. It includes all the species used directly or indirectly for food and agriculture: human nutrition, feed for domestic animals, and the provision of essential raw materials and services such as fibre, fertiliser, fuel and pharmaceuticals. It covers, *inter alia*, crop varieties, including forage and fodder plants and trees, animal breeds, including fish, molluscs, bird species and insects, as well as fungi, yeasts and micro-organisms such as algae and diverse bacteria.
Agricultural biodiversity has been further described as including:
- harvested crop varieties, livestock breeds, fish species and non-domesticated (‚wild') resources within field, forest, rangeland and aquatic ecosystems;
- non-harvested species within production ecosystems that support food provision, including soil micro-organisms, pollinators, green manures, biocontrol organisms and so forth; and
- non-harvested species in the wider environment that support food production ecosystems, (agricultural, pastoral, forest and aquatic) including landraces, ‚wild' relatives of crops and livestock, environmental plants such as windbreaks for soil erosion control, etc.

Source: FAO, 1999

agrobiodiversity
Agrobiodiversity is a fundamental feature of farming systems around the world. It encompasses many types of biological resources tied to agriculture (see conceptual view of agrobiodiversity), including:
- genetic resources – the essential living materials of plants and animals;
- edible plants and crops, including traditional varieties, cultivars, hybrids, and other genetic material developed by breeders; and
- livestock (small and large, lineal breeds or thoroughbreds) and freshwater fish;

- soil organisms vital to soil fertility, structure, quality, and soil health;
- naturally occurring insects, bacteria, and fungi that control insect pests and diseases of domesticated plants and animals;
- agroecosystem components and types (polycultural/monocultural, small/large scale, rainfed/irrigated, etc.) indispensable for nutrient cycling, stability, and productivity; and
- „wild" resources (species and elements) of natural habitats and landscapes that can provide services (for example, pest control and ecosystem stability) to agriculture.

Agrobiodiversity therefore includes not only a wide variety of species, but also the many ways in which farmers can exploit biological diversity to produce and manage crops, land, water, insects, and biota.
The concept also includes habitats and species outside of farming systems that benefit agriculture and enhance ecosystem functions. One example is a source of host plants for natural enemies and predators of agricultural pests.

Source: WRI, 1997. Agrobiodiversity as a Basis for Production and Survival. http://www.wri.org/sustag/lba-01b.html

agrobiodiversity
In the context of mountain areas, agrobiodiversity is the fundamental basis of agriculture and the overall economic system. It is the source of the resiliency and regeneration necessary for the sustainability of agricultural systems. The self-sufficiency of local mountain farming communities depends on agrobiodiversity. Considering the proportion of the earth occupied by farming systems, agrobiodiversity is a global asset.

Source: ICIMOD. http://www.icimod.org.sg/Publications/newsletter/manag.html

agricultural biodiversity
Although the term „agricultural biodiversity" is relatively new – it has come into wide use in recent years as evidenced by bibliographic references – the concept itself is quite old. It is the result of the careful selection and inventive developments of farmers, herders and fishers over millenia. Agricultural biodiversity is a sub-set of biodiversity. It is a creation of humankind whose food and livelihood security depend on the sustained management of those diverse biological resources that are important for food and agriculture. Agricultural biodiversity, also known as agrobiodiversity or the genetic resources for food and agriculture, includes:

- Harvested crop varieties, livestock breeds, fish species and non-domesticated (‚wild') resources within field, forest, rangeland and in aquatic ecosystems;
- Non-harvested species within production ecosystems that support food provision, including soil micro-biota, pollinators and so on; and
- Non-harvested species in the wider environment that support food production ecosystems (agricultural, pastoral, forest and aquatic ecosystems).

Agricultural biodiversity results from the interaction between the environment, genetic resources and the management systems and practices used by culturally diverse peoples resulting in the different ways land and water resources are used for production. It thus encompasses the variety and variability of animals, plants and micro-organisms which are necessary to sustain key functions of the agro-ecosystem, its structure and processes for, and in support of, food production and food security (FAO, 1999).

Source: UKabc. Sustaining Agricultural Biodiversity. UK Food Group. http://www.ukabc.org/ukabc3.htm

agricultural biodiversity
The variety and variability of animals, plants and micro-organisms used directly or indirectly for food and agriculture (including, in the FAO definition, crops, livestock, forestry and fisheries). It comprises the diversity of genetic resources (varieties, breeds, etc.) and species used for food, fodder, fibre, fuel and pharmaceuticals. It also includes the diversity of non-harvested species that support production (e.g. soil micro-organisms, predators, pollinators and so on) and those in the wider environment that support agro-ecosystems (agricultural, pastoral, forest and aquatic), as well as the diversity of the agro-ecosystems themselves.
It has also been defined as:
Agricultural biodiversity encompasses the variety and variability of animals, plants and micro-organisms which are necessary to sustain key functions of the agro-ecosystem, its structure and processes for, and in support of, food production and food security. (FAO, 1999)

Source: UKabc. Sustaining Agricultural Biodiversity. UK Food Group. http://www.ukabc.org/ukabc3.htm

agricultural biodiversity or agrobiodiversity
Agricultural biodiversity refers to the variety and variability of animals, plants, and micro-organisms on earth that are important to food and agriculture which result from the interaction between the environment, genetic resources and the management systems and practices used by people. It takes into account not only genetic, species and agro-ecosystem diversity and the different ways land and water resources are used for production, but also cultural diversity, which influences human interactions at all levels. It has spatial, temporal and scale dimensions. It comprises the diversity of genetic resources (varieties, breeds, etc.) and species used directly or indirectly for food and agriculture (including, in the FAO definition, crops, livestock, forestry and fisheries) for the production of food, fodder, fibre, fuel and pharmaceuticals, etc.) and those in the wider environment that support agro-ecosystems (agricultural, pastoral, forest and aquatic), as well as the diversity of the agro-ecosystems themselves.

Source: International Technical Workshop organised jointly by the FAO and the Secretariat of the Convention on Biological Diversity (SCBC), with the support of the Government of the Netherlands www.fao.org/sd/epdirect/Epre0063.htm

agricultural biodiversity
Agricultural biodiversity encompasses the variety and variability of plants, animals and micro-organisms at genetic, species and ecosystem level which are necessary to sustain key functions in the agro-ecosystem, its structures and processes for, and in support of, food production and food security. Many people say that local knowledge and culture are also integral parts of agricultural biodiversity, because it is the human activity of agriculture which conserves this biodiversity through sustainable use.

Source: Cromwell, E. Cooper, D.; Mulvany, P. 1999. Agricultural Biodiversity and Livelihoods: issues and entry points: Paper for DFID Linking policy and Practice in Biodiversity project (LPPB), ODI, FAO, ITDG

agrobiodiversity
Agrobiodiversity consists of a rich basket of resources – ranging from varieties of crops and livestock, to beneficial insects, microscopic organisms, and genetic materials – that make up healthy soils and enable production of nutritious food.

Source: Thrupp, L.A. 1998. Cultivating Diversity: Agrobiodiversity and Food Security. WRI. http://www.wri.org/press/agrobiod.html

2.2 forest biological diversity

Reference Definition

The variability among living organisms and the ecological processes of which they are part; this includes diversity of living in forests within species, between species, and of ecosystems.

Source: Ad Hoc Technical Expert Group on Forest Biological Diversity, 2001

french -> **biodiversité forestière**
spanish -> **biodiversidad forestal**
german -> **forstbiologische Diversität**

3 biotechnology

Reference Definition:

Any technological application that uses biological systems, living organisms, or derivatives thereof, to make or modify products or processes for specific use.

Source: The Convention on Biological Diversity. Article 2. UNEP 1992

french -> **biotechnologie**
spanish -> **biotecnología**
german -> **Biotechnologie**

Other definitions:

biotechnology
The application of scientific and engineering principles to the processing of materials by biological agents to provide goods and services. Biotechnology comprises any technique that uses living organisms to make or modify a product, to improve plants or animals or to develop microorganisms for specific purposes.

Source: Schmidt, L., 1997. Tree Improvement Glossary. Technical Note Nr. 46. Danida

biotechnology
Any technique that uses living organisms (or part of organisms) to make or modify products, to improve plants or animals, or to develop micro-organisms for specific uses. It refers to the technological application of biological processes, including a number of

individual techniques such as recombinant DNA-molecule manipulation, protein engineering, cell fusion, nucleotide synthesis, monoclonal antibody use and production, product recovery, and unique fermentation techniques, e.g. biocatalysis using immobilized enzymes.

Source: IBPGR (comp.), 1991. Elsevier's Dictionary of Plant Genetic Resources. Italy.

biotechnology
The collection of industrial processes that involve the use of biological systems. For some industries, these processes involve the use of genetically engineered micro-organisms.

Source: King, R.C.; Stansfield, W.D.; 1997. A Dictionary of Genetics. Oxford University Press

biotechnology
The application of science and engineering in the direct or indirect use of living organisms, or parts of organisms, in their natural or modified forms.

Source: Canadian Forest Service. Science Branch. 1998. Ontario KIA 0E4. Biotech@nrcan.gc.ca

biotechnology
The scientific manipulation of living organisms, especially at the molecular genetic level, to produce useful products. Gene splicing and use of recombinant DNA (rDNA) are major techniques used.

Source: Hagedorn, S. A. An Agricultural and Environmental Biotechnology Annotated Dictionary. http://gophisb.biochem.vt.edu/resources/glossary.htm

biotechnology
The industrial use of living organisms or biological techniques developed through basic research. Biotechnology products include antibiotics, insulin, interferon, recombinant DNA, and techniques such as waste recycling. Much older forms of biotechnology include breadmaking, cheesemaking and brewing wine and beer.

Source: BioTech Resources. Indiana University. Life Science Dictionary.
http://biotech.chem.indiana.edu/Search/dict-search.html

biotechnology
1. Any technique that uses living organisms, or parts of organisms, to make or modify products, to improve plants or animals or to develop microorganisms for specific uses (OTA-U.S. Congress, 1988). 2. Dubbed as the technology of life by altering the genetic make-up of living organisms through tissue culture, cloning existing cells, DNA changing and genetic engineering (Pecs, K. 1993) 3. The application of scientific and engineering principles to the processing of materials by biological agents to provide goods and services (Reinjtjes et al., 1993). 4. Assists the conservation of plant and animal genetic resources through: new methods for collecting and storing genes (as seed and tissue culture), detection and elimination of diseases in genebank collections; identification of useful genes; improvement techniques for long-term storage; and safer and more efficient distribution of germplasms to users (Harvesting Nature's Diversity). 5. The use of advance genetic techniques to construct novel microbial and plant strains and obtain site-directed mutants ot improve the quantity and quality of products (Mc Graw-Hill Dictionary of Scientific and Technical Terms).

Source: SRD Project. 1996. Glossary of Terms. Ottawa, Canada

biotechnology
… can be broadly defined as „using living organisms or their products for commercial purposes.“ As such, biotechnology has been practiced by human society since the beginning of recorded history in such activities as baking bread, brewing alcoholic beverages, or breeding food crops or domestic animals.
A narrower and more specific definition of biotechnology is „the commercial application of living organisms or their products, which involves the deliberate manipulation of their DNA molecules“ …. This definition implies a set of laboratory techniques developed within the last 20 years that have been responsible for the tremendous scientific and commercial interest in biotechnology, the founding of many new companies, and the redirection of research efforts and financial resources among established companies and universities. These laboratory techniques provide scientists with a spectacular vision of the design and function of living organisms, and provide technologists in many fields with the tools to implement exciting commercial applications.

Source: Iowas State University. Principles of Biotechnology. (Bio-1).
http://www.nal.usda.gov/Bic/Education_res/iastate.info/bio1.html

biotechnology
The use of current technologies such as DNA technologies for the modification and improvement of biological systems.

Source: BIOTECanada. What is Biotechnology? Glossary. http://www.biotechCa/EN/hat_glossary.html.

biotechnology
Development of products by a biological process. Production may be carried out by using intact organisms (e.g., yeasts and bacteria) or by using natural substances (e.g., enzymes) from organisms.

Source: Côté, M. (ed.) 2000. Dictionary of Forestry. Ordre des ingénieurs forestiers du Québec

3.1 genetic engineering

Reference Definition:

All modern molecular biology techniques used to isolate, manipulate and transfer genes from one organism to another.

One such method is using recombinant DNA.

french -> **génie génétique**
spanish -> **ingeniería genética**
german -> **Gentechnik**

Other definitions:

genetic engineering
Genetic manipulations, by which an individual, having a new combination of inherited properties, is established.

Source: Ayad, W.G. 1980. A Glossary of Plant Genetic Resources Terms. AGP: IBPGR/80/11. Rome

genetic engineering
The directed genetic modification of an individual organism to have a new heritable trait by splicing a specific gene into the individual‘s geonomic DNA sequence.

Source: Helms, J. (ed). 1998. The Dictionary of Forestry. Society of American Foresters

genetic engineering
An all-inclusive term to cover all laboratory or industrial techniques used to alter the genetic machinery of organisms so that they can subsequently synthesize increased yields of compounds already in their repertoire, or form entirely new compounds, adapt to drastically changed environments, etc. Often, the techniques involve manipulating genes in ways that bypass normal sexual or asexual transmission.

Source: King, R.C.; Stansfield, W.D. 1997. A Dictionary of Genetics. Oxford University Press

genetic engineering
The manipulation of an organism‘s genetic endowment by introducing or eliminating specific genes through modern molecular biology techniques. A broad definition of genetic engineering also includes selective breeding and other means of artifical selection.

Source: Hagedorn, S. A. An Agricultural and Environmental Biotechnology Annotated Dictionary. http://gophisb.biochem.vt.edu/resources/glossary.html

genetic engineering
The use of in vitro techniques to manipulate the genes of an organism or their expression, i.e. to produce DNA containing new combinations of genes or gene sequences. The Ti plasmid of Agrobacterium tumefaciens is often used as a vector for transferring genetic information from a donor organism to a recipient cell devoid of such material.

Source: IBPGR (comp.) 1991. Elsevier’s Dictionary of Plant Genetic Resources. Rome

genetic engineering
The process of changing the genetic makeup of one organism by transferring DNA from another organism. Also known as Recombinant DNA technology. This could also include modification of genes.

Source: BIOTECanada. What is biotechnology? Glossary. http://www.biotech.Ca/EN/what_glossary.htm

genetic engineering(recombinant DNA technology)
The isolation of useful genes from a donor organism or tissue and their incorporation into an organism that does not normally possess them.

Source: Schmidt, L., 1997. Tree Improvement Glossary. Technical Note 46. Danida Forest Seed Centre

genetic engineering
1. The manipulation of the information flow of a biological system that is performed by the genetic structure of an organism. This manipulation is accomplished by regulating or altering the genes (Training on planning and implementing ecological programmes for production and rural development). 2. The international production of new genes and alteration of genomes by the substitution or addition of new genetic material (Mc Graw-Hill Dictionary of scientific and technical terms). 3. Techniques used by scientists to transfer genes from one organism to another. One such method is using recombinant DNA (D.A. Posey and G. Dutfield).

Source: SRD Project. 1996. Glossary of Terms relevant to: Sustainable Agriculture, Seed Production and Handling Technology, Genetic Conservation, Agroforestry, Indigenous Knowledge Systems Development and Related Fields and Issues. Ottawa, Canada

genetic engineering
Techniques used to isolate, manipulate and transfer genes.

Source: FAO. Biotechnology in forest tree improvement. FAO 118

genetic engineering
Artificial selection of cultigens to increase species efficiency for food production.

Source: •umer-Linder, 1979. M. Swedish University of Agricultural Sciences, Ecological studies 3, Uppsala

3.2 genetic marker

Reference Definition:

syn **gene marker**

> **A gene or group of genes used to identify an individual or a cell that carries it, or as a probe to mark a nucleus, chromosome, or locus.**
>
> **Genetic markers can be classified as biochemical markers (e.g. isozymes) and molecular markers (e.g. DNA markers).**

french -> **marqueur génétique**
spanish -> **marcador genético**
german -> **Genmarker**

Other definitions:

genetic marker
Any allele used as an experimental probe to mark a nucleus, chromosome or a gene. Genetic markers can be classified as Biochemical markers (e.g. isozymes) and Molecular markers (e.g. DNA markers).

Source: Schmidt, L. 1997. Tree Improvement Glossary. Technical Note 46. Danida Forest Seed Centre

genetic marker
A mutation in a gene of known location and effect, which facilitates the analysis of its inheritance or that of a linked gene.

Source: IBPGR (comp.) 1991. Elsevier's Dictionary of Plant Genetic Resources. Rome

genetic marker
An inheritable character easily discerned and used for identification of an individual and for genetic mapping.

Source: Côté, M. (ed.) 2000. Dictionary of Forestry. Ordre des Ingénieurs forestiers du Québec. Les Presses de l'Université Laval. Canada.

genetic marker
A gene or group of genes used to „mark" or track the action of microbes.

Source: Hagedorn, S. A. An Annotated Dictionary. http://gophisb.biochem.vt.edu/resources/lossary.html

genetic marker
A gene, whose phenotypic expression is usually easily discerned, used to identify an individual or a cell that carries it, or as a probe to mark a nucleus, chromosome, or locus.

Source: King, R.C.; Stansfield, W.D. 1997. A Dictionary of Genetics. Fifth edition. Oxford University Press

genetic marker
A genetic factor that can be identified and thus acts to determine the presence of genes or traits linked with but not easily identified.

Source: BIOTECanada. What is Biotechnology? Glossary. http://www.biotech.ca/EN/hat_glossary.html

genetic marker
A segment of DNA with an identifiable physical location on a chromosome and whose inheritance can be followed. A marker can be a gene, or it can be some section of DNA with no known function. Because DNA segments that lie near each other on a chromosome tend to be inherited together, markers are often used as indirect ways of tracking the inheritance pattern of a gene that has not yet been identified, but whose approximate location is known.

Source: Nussbaum, R. Glossary. National Human Genome Research Institute's Laboratory of Genetic Disease Research. http://wwww.nhgri.nih.gov/DIR/VIP/Glossary/pub_glossary.cgi/

genetic marker (gene marker)
Any genetically controlled phenotypic difference used in genetic analysis, particularly in the detection of genetic recombination events.

Source: Archaeology.Info. Glossary. http://www.archaeologyinfo.com/glossaryg.htm

genetic marker
Any region used as an experimental probe to mark a nucleus, chromosome, gene, or DNA region.

Source: Klopfenstein, N. B. et al. 1997. USDA Forest Service General Technical Report RM-GTR-97.

genetic marker
Any genetically controlled phenotypic difference used in genetic analysis, or, more specifically, any gene difference used in the detection of recombination events (genetic recombination) in order to facilitate recognition of a novel (recombinant) genotype by its particular phenotypic expression.

Source: Boudreault-Lapointe. 1988. Plant Biotechnology Vocabulary. Terminology Bulletin 180. Canada

biomarker
The variation, induced by a substance foreign to the body, in cellular or biochemical components or processes, structures, or functions that is measurable in a biological system or sample.

Source: Dunster, J.& K. 1996. Dictionary of Natural Resource Management. CAB International

DNA marker
A distinctive segment of DNA.

Source: Schmidt, L., 1997. Tree Improvement Glossary. Technical Note 46. Danida

4 (genetic) conservation

Reference Definition:

syn **gene conservation**
genetic resource conservation
gene pool conservation

The collection, maintenance, storage and sustainable management of genetic resources aimed at ensuring their continued existence, evolution and availability for future generations.

french -> **conservation (génétique)**
spanish -> **conservación (genética)**
german -> **(genetische) Erhaltung**

Other definitions:

genetic conservation
The collection, maintenance and preservation of intra- and inter specific variation, e.g. a representative sample of the genetic variation of a particular species.

Source: IBPGR. 1991. Elsevier's Dictionary of Plant Genetic Resources. Rome

genetic conservation
1. The wise and sustainable management of natural resources with objectives being human survival and development (J. Burley, Abstracts). 2. The management of human use of genetic resources so that they may yield the greatest sustainable benefit to the present generation, while maintaining their potential to meet the needs and aspirations of future generations (Conservation of genetic resources in tropical forest management: Principles and Concepts). 3. Collection, maintenance, and preservation of all segments of germplasm in a crop species and its wild relatives (T.T. Chang, 1976).

Source: SRD Project. 1996. Glossary of Terms relevant to: Ottawa

gene(tic) conservation
All activities including, e.g. collecting, maintenance, storage, management, protection and regeneration, aimed at ensuring the continued existence, evolution and availability of genetic resources; in situ and ex situ.

Source: Koski, V. et al. 1997. Technical guidelines for genetic conservation of Norway spruce (*Picea abies* (L.) Karst.). EUFORGEN. IPGRI

gene conservation
Protecting and maintaining the genetic variation of a species in order to keep a genetic resource for future research and improvement.

Source: Schmidt, L. 1997. Tree Improvement Glossary. Technical Note 46. Danida Forest Seed Centre

gene conservation
A sound gene conservation means that the methods selected ensure that the objectives are fulfilled while taking the genetic knowledge into account.

Source: Mátyás, C. (ed.) 1997. IUFRO World Series Vol. 6.

gene conservation
Any action to maintain an individual gene (phenotpye) in a population. A term to be avoided in favor of the term *gene pool* (or *genetic resource) conservation* (Nienstaedt, 1980).

Source: USDA Forest Service. 1980. A Glossary of Terms for Forest Tree Improvement Workshop. Sacramento, California

gene pool conservation (genetic resource conservation)
Any action that insures the maintenance and wise use of the evolutionary potential of the population (Nienstaedt, 1980).

Source: USDA Forest Service. 1980. A Glossary of Terms for Forest Tree Improvement Workshop. Sacramento, California

conservation
The management of human use of the biosphere so that it may yield the greatest sustainable benefit to present generations while maintaining its potential to meet the needs and aspirations of future generations: Thus conservation is positive, embracing preservation, maintenance, sustainable utilization, restoration, and enhancement of the natural environment

Source: IUCN/WWF/UNEP. 1981. Conservation Strategy

conservation
of a resource is best defined as the actions and policies that assure its continued availability and existence.

Source: FAO. 1989. Plant Genetic Resources. Conceptual framework. FAO. Rome

conservation
1. Protection of plant and animal habitat 2. The management of a renewable natural resource with the objective of sustaining its productivity in perpetuity while providing for human use compatible with sustainability of the resource – *note* for a forest this may include managed, periodic cutting and removal of trees followed by regeneration conservation 3. The process or means of achieving recovery of viable populations.

Source: Helms, J. (ed.) 1998. The Dictionary of Forestry. Society of American Foresters

conservation
1. The management or control of human use of resources (biotic and abiotic) and activities on the planet, in an attempt to restore, enhance, protect, and sustain the quality and quantity of a desired mix of species and ecosystem conditions and processes for present and future generations. 2. The process or means of achieving and maintaining conservation objectives. Conservation is explicitly concerned with the temporal distribution of use;

that is, carefully considered use now so that some (more, less, or the same amount) will still exist for use later on. The use in question could be *consumptive* (harvesting of a resource) or *non-consumptive* (retention of ecological reserves). There are many varied definitions of conservation in different fields. Most encompass the notion of judicious use by humans over time, which in some instances may mean no use at all or use that serves to enhance, rather than deplete, resources.

Source: Dunster, J.& K. 1996. Dictionary of Natural Resource Management. CAB International

conservation
In forestry, the wise use of natural renewable resources. A key idea for understanding "conservation" is "use" by people.

Source: Fletcher, R. et al. 1994. Glossary of Woodland Words. Oregon State University

conservation
The human use of the biosphere so that it may yield the greatest sustainable benefit to present generations while maintaining its potential to meet the needs and aspirations of future generations, and includes the preservation, maintenance, sustainable utilisation, restoration and enhancement of the environment. Modern conservation theory incorporates the notion that what is to be conserved is not so much the physical state of an ecological system as the ecological processes by which that state is created and maintained (Australia, Resource Assessment Commission 1991). Conservation applies both to forests designated for harvesting and to forests designated as ecological reserves, although the management goals are different (Maini and Carlisle 1974).

Source: Aird, P. L. Conservation of the Sustainable Development of Forests worldwide: A Compendium of Concepts and Terms. The Forestry Chronicle Vol. 70, No. 6, 1994.

conservation
…. is seen as the antithesis of use and in this kind of conflict often *conservation* and *breeding* are seen as mutually exclusive. As long as forests and their genes are assumed as fixed resources, both genetic and management issues will be solved along a one-dimensional axis of production versus conservation. On the other hand, if we view resources as multidimensional with many options for productivity and conservation, a more rational solution may be possible.

Source: Mátyás, C. (ed.) 1997. IUFRO World Series Vol. 6

conservation
The management of human use of organisms or ecosystems to ensure such use is sustainable. Besides Sustainable Use, conservation includes Protection, Maintenance, Rehabilitation, Restoration, and Enhancement of populations and ecosystems.

Source: IUCN, UNEP, WWF, 1991: Caring for the Earth. A Strategy for Sustainable Living.

conservation
Judicious case and management of nature and natural resources for the benefit of human society and for ethical reasons.

Source: UNEP. 1995. Global Biodiversity Assessment. Annex 6, Glossary

4.1 in situ conservation

Reference Definition:

syn **in-situ conservation**

> **The conservation of ecosystems and natural habitats and the maintenance and recovery of viable populations of species in their natural surroundings and, in the case of domesticated or cultivated species, in the surroundings where they have developed their distinctive properties.**

Source: The Convention on Biological Diversity. Article 2. UNEP 1992

french -> **conservation in situ**
spanish -> **conservación in situ**
german -> **in-situ-Erhaltung**

Other definitions:

in situ conservation
Retention, conservation, and propagation of germ plasm resources on the site as a means of continuing the organism or ecosystem in its original habitat or location.

Source: Dunster, J. & K. 1996. Dictionary of Natural Resource Management. CAB International

in situ conservation
Conservation of genetic resources ‚on site', in the natural and original population, on the site formerly occupied by that population, or on the site where genetic resources of a particular population developed their distinctive properties. Although usually applied to stands regenerated naturally, the *in situ* conservation may include artificial regeneration whenever planting or sowing is done without conscious selection and in the same area where the reproductive material was collected.

Source: Koski, V. et al. 1997. Technical guidelines for genetic conservation. EUFORGEN. IPGRI

in situ conservation
Conservation in natural stands.

Source: FAO. Biotechnology in forest tree improvement. FAO 118

in-situ conservation
1. Literally ‚on site'. Until recently, it was narrowly used to describe conservation of genetic resources in their natural surroundings, normally protected from human interference. However, it is increasingly used to designate conservation on the farm, where genetic resources are developed, bred and maintained (Cooper et al., 1992). 2. The conservation of ecosystems and natural habitats and the maintenance and recovery of viable populations of species in their natural surroundings. In the case of domesticated or cultivated species, such as crops, conservation in the surroundings where those populations have developed their distinctive properties (De Boef, et al., 1993). 3. Maintains plants and animals in their

original habitats or in traditional farming systems. Allows evolutionary processes to continue so that plant populations can adapt to changing environmental and human needs (IBPGRI calendar). 4. Conservation of genetic resources of target species ‚on-site', within the natural original ecosystem in which they occur, or on the site formerly occupied by that ecosystem. Although most frequently applied to populations regenerated naturally, in-situ conservation may include artificial regeneration whenever planting or sowing is done without conscious selection and in the same area where the seed or other reproductive materials were collected (Conservation of genetic resources in tropical forest: Principles and Concepts). 5. Maintains plants and animals in their original habitats. It is appropriate for many wild species, including relatives of crops and particularly trees, for which no adequate ex situ methods are available. It also preserves evolutionary processes and has low direct costs (Diversity for Development: The Strategy of the IPGRI). 6. A conservation method that attempts to preserve the genetic integrity of gene resources by conserving them within the evolutionary dynamic ecosystems of their original habitat or natural environment (W.V. Reid and K.R. Miller, 1989).

Source: SRD Project. 1996. Glossary of Terms. Ottawa, Canada.

in situ gene conservation
Protection of the genetic variation of a species at its native sites, e.g. by establishing forest reserves.

Source: Schmidt, L., 1997. Tree Improvement Glossary. Technical Note 46. Danida

in situ
On site; within the natural habitat

Source: Helms, J.A. (ed.) 1998. The Dictionary of Forestry. Society of American Foresters

in-situ
At its native place. Ant. *Ex-situ*.

Source: Schmidt, L., 1997. Tree Improvement Glossary. Technical Note 46. Danida

in situ
Refers to performing assays or manipulations with intact tissues.

Source: Hagedorn, S. A. An Agricultural and Environmental Biotechnology Annotated Dictionary.

4.2 ex situ conservation

Reference Definition:

syn **ex-situ conservation**
ex situ gene conservation

> **The conservation of components of biological diversity outside their natural habitats.**
>
> Source: The Convention on Biological Diversity. Article 2. UNEP 1992

french -> **ex situ conservation**
spanish -> **conservación ex situ**
german -> **ex-situ-Erhaltung**

Other definitions:

ex situ conservation
Transfer of organisms (plant or animal) from one site (e.g., in the wild) to another site (e.g. seed banks, zoos), for the purpose of maintenance or breeding as a means of conserving the organisms.

Source: Dunster, J.& K 1996. Dictionary of Natural Resource Management. CAB International

ex situ conservation
Any conservation method that entails removal of individual plants or propagating material (seed, pollen, tissue) from its site of natural occurrence, i.e. conservation „off-site“ in gene banks as seed, tissue or pollen; in plantations; or in other live collections, such as ex situ conservation stands.

Source: FAO. 1993. FAO Forestry Paper 107. Rome

ex situ conservation
Conservation of genetic resources that entails removal of individuals or reproductive material from its site of natural (original) occurrence, i.e. conservation ‚off site‘.

Source: Koski, V. et al. 1997. EUFORGEN. IPGRI

ex-situ conservation
The conservation of components of biological diversity outside their natural habitats; in the case of genetic plant resources, this may be in genebanks, or in other live collections. It is used to indicate conservation in genebanks (De Boef, et al., 1993). …5. A conservation method that entails the removal of germplasms resources (seed, pollen, sperm, individual organisms) from their original habitat or natural environment (W.V. Reid and K.R. Miller).

Source: SRD Project. 1996. Glossary of Terms. Ottawa, Canada.

ex situ gene conservation
Protection of the genetic variation of a species outside its native site e.g. established plantations.

Source: Schmidt, L. 1997. Tree Improvement Glossary. Technical Note 46. Danida Forest Seed Centre

5 evolution

Reference Definition:

syn **evolutionary processes**

> **The changes in genetic constitution of a population or group of populations in successive generations. Particularly long-term changes accompanying ecotype, race, subspecies, genus, and family formation. The causative processes include mutation, recombination, drift, isolation, and natural selection. Evolution has no determined endpoint.**

french -> **évolution**
spanish -> **evolución**
german -> **Evolution**

Other definitions:

evolution
The stepwise development (or extinction) of biological groups, as a result of natural selection and increase of hereditary variants in the population. A small proportion of individuals with a particular non-favourable genetic mark up may survive in a large population. Through sucessive generations, change in the environment or a new environment to which the organisms have migrated may favour the survival and reproduction of the aberrant individuals with a consequent increase of their genes in the population. The causative processes include mutation, recombination, drift, isolation, and natural selection.

Source: Schmidt, L. 1997. Tree Improvement Glossary. Technical Note 46. Danida

evolution
A cumulative genetic change in a population of organisms related by descent, over time. It is typically the result of natural selection but can also be due to random genetic drift. Evolution has no determined endpoint.

Source: Dunster, J.& K 1996. Dictionary of Natural Resource Management. CAB International

evolution
Long-time changes in gene frequency and phenotypic characteristics of a population or group of populations.

Source: Wright, J.W. 1976. Introduction to Forest Genetics. Michigan State University. New York

evolution
The changes in genetic constitution of a group in successive generations. Particularly long-time changes accompanying ecotype, race, subspecies, species, genus, and family formation.

Source: FAO. Genetics of Forest Tree Improvement

evolution
The process of cumulative change in response to changing environmental conditions. The theory that species have changed in response to natural selection.

Source: •umer-Linder, M. 1979. Environmental World-List; Swedish University of Agricultural Sciences. Uppsala

evolution
1) The change in life over time by adaptation, variation, over-reproduction, and differential survival/reproduction, a process referred to by Charles Darwin and Alfred Wallace as natural selection. 2) Descent with modification.

Source: On-Line Biology Book: Glossary

5.1 genetic drift

Reference Definition:

syn **random drift**

Random change in allele frequencies in a population from one generation to the next because of small population size.

Source: Schmidt, L. 1997 Tree Improvement Glossary. Danida

french -> **dérive génétique**
spanish -> **deriva genética**
german -> **genetische Drift**

Other definitions:

genetic drift
Change in allele frequency from one generation to another within a population, due to the sampling of finite numbers of genes that is inevitable in all finite-sized populations. The smaller the population, the greater the genetic drift, with the result that some alleles are lost, and genetic diversity is reduced. Thus minimization of genetic drift is an important consideration for conservation of genetic resources.

Source: Zaid, A. et al. 1999. Glossary of biotechnology and genetic engineering. FAO Research and Technology Paper No. 7. http://www.fao.org/DOCREP/003/X3910E/X3910E00.htm

genetic drift
The random change of the occurance of a particular gene in a population; genetic drift is thought to be one cause of speciation when a group of organisms is separated from its parent population.

Source: Schlindwein, B. Hypermedia Glossary of Genetic Terms. http://www.weihenstephan.de/~schlind/

6 gene flow

Reference Definition:

syn **geneflow**
migration [~]

The movement of genes by pollen (dispersal of gametes), seeds (through zygotes) and plants from one population to another.

french -> **flux de gènes**
spanish -> **flujo de genes**
german -> **Genfluß**

Other definitions:

gene flow
Passage of genes from one population to another (also called gene migration).

Source: Schmidt, L. 1997. Tree Improvement Glossary. Technical Note 46. Danida

gene flow
The exchange of genetic traits between populations by movement of individuals, gametes, or spores.

Source: Dunster, J.& K 1996. Dictionary of Natural Resource Management. CAB International

geneflow
The exchange of genetic material between populations due to the dispersal of gametes (through pollen) and zygotes (through seeds).

Source: Koski, V.; Skroppa, T.; Paule, L. Wolf, H.; Turok, J.; 1997 Technical guidelines for genetic conservation of Norway spruce (*Picea abies* (L.) Karst.). Euforgen. IPGRI.

gene flow
The spread of genes through crossing.

Source: Wright, J. W. 1976. Introduction to Forest Genetics. Michigan State University. N.Y, 1976

gene flow
The exchange of genes (in one or both directions) at a low rate between two populations, due to the dispersal of gamentes or of individuals from one population to another, also called migration.

Source: Ayala, F.J.; Kiger, J. A. Modern Genetics: University of California, Davis

gene flow
The consequence of crossfertilization between members of a species that results in the spread of alleles across and between populations.

Source: Helms, J. (ed.) 1998. The Dictionary of Forestry. Society of American Foresters

migration
Movement of genes by pollen, seeds or plants from one population (*emigration*) into another population (*immigration*) of the same species. Migration contribute to altering the gene frequencies of the offspring compared to the parent generation.

Source: Schmidt, L. 1997. Tree Improvement Glossary. Technical Note 46. Danida Forest Seed Centre

5.3 selection

Reference definition:

Any process, natural or artificial, which permits a change in the genetic structure of populations in succeeding generations.

french -> **sélection**
spanish -> **selección**
german -> **Selektion**

Other definitions:

selection
Often synonymous with artificial selection, which is the choice by the breeder of individuals for propagation from a larger population. Artificial selection may be for one or more desired characters or properties. It may be based on the tree itself (phenotypic), or on the progeny of the tree or its other relatives (genotypic).

Source: Schmidt, L. 1997. Tree Improvement Glossary. Technical Note 46. Danida

selection
Choosing individual trees or populations with desirable characters to obtain genetic improvement.

Source: Maynard, C. 1996. Forest Genetics Glossary.
http://www.esf.edu/course/cmaynard/GENE_GLOSSERY.html

selection
There are two forms of selection. Natural selection is the differential reproduction and survival of individuals, such that poorly adapted offspring do not continue in the population. Artificial selection occurs when human manipulations yield specific traits deemed desirable, such as hunting, prevent or eliminate individuals from reproducing, thus suppressing or eradicating a particular trait.

Source: Dunster, J. & K. 1996. Dictionary of Natural Resource Management. CAB International.

selection
Placing organisms under conditions where the growth of those with a particular genotype will be favored.

Source: BioTech Life Science Dictionary. BioTechResources and Indiana University

selection
Choosing individuals with desired qualities to serve as parents for the next generation.

Source: Côté, M. 2000. Dictionary of Forestry. Ordre des ingénieurs forestiers du Québec. Univ. Laval.

selection
The choosing of individuals or populations with specified desirable characters to improve or alter the average genotype of the population or populations.

Source: FAO. Genetics of forest tree improvement

6 genetic pollution

Reference Definition:

french -> **pollution génétique**
spanish -> **polución genética**
german -> **genetische Verunreinigung**

Other definitions:

genetic pollution
Uncontrolled spread of genetic information (frequently referring to transgenes) into the genomes of organisms in which such genes are not present in nature.

Source: Zaid, A. et al. 1999. Glossary of biotechnology and genetic engineering. FAO Research and Technology Paper No. 7. http://www.fao.org/DOCREP/003/X3910E/X3910E00.htm

genetic pollution
Uncontrolled escape of genetic information (frequently refering to products of genetic engineering) into the genomes of organisms in the environment where those genes never existed before.

Source: Searchable Biotechnology Dictionary. University of Minnesota. http://www.plpa.agri.umn.edu/scag1500/definitions.html

7 genetic diversity

Reference Definition:

The genetic variability within a population or a species.

Is one aspect of -> biological diversity. Genetic diversity can be assessed at three levels: (a) diversity within breeding populations, (b) diversity between breeding populations; and (c) diversity within the species.

french -> **diversité génétique**
spanish -> **diversidad genética**
german -> **genetische Diversität**

Other definitions:

genetic diversity
The genetic variability within a population or a species, usually assessed at three levels: (a) within breeding populations, (b) between breeding populations, and (c) within species.

Source: Helms, J. (ed.) 1998. The Dictionary of Forestry. Society of American Foresters

genetic diversity
The genetic variability within a population or a species. The number and relative abundance of alleles. This is the foundation of all diversity, and loss of genetic diversity within species is increasingly recognized as an important and largely undocumented problem, at least as serious as loss of entire species. Genetic diversity can be assessed at three levels: (1) diversity within breeding populations; (2) diversity between breeding populations within any one geographic area; and (3) diversity within the species.

Source: Dunster, J.& K. 1996. Dictionary of Natural Resource Management. CAB International

genetic diversity
The condition of being genetically different and variable.

Source: Ayad, W.G. 1980. A Glossary of Plant Genetic Resources Terms. AGP: IBPGR/80/11.

genetic diversity
… 3. Refers to the range of variability (for specific characters) among representative plants or seeds of a genetically pure seedlot. It describes the homogeneity or heterogeneity of seeds and ultimate plants composing a variety. On a broader scale, the term may also be used to describe the diversity of varieties growing in a given area .. 5. Variation or differences within the genes of an offspring; variations can be visible, such as color, height or shape, or invisible like taste, resistance to pests and diseases. Makes it possible to produce new breeds of crops or animals and allow them to adapt to changing conditions (soils, climate, different management practices or agricultural uses) .. 7. Existing condition of being genetically different. 8. The total range of genetic differences displayed by plants of the same species.

Source: SRD Project. 1996. Glossary of Terms. Ottawa. Canada

genetic diversity
… refers to the variation of genes within species. This covers distinct populations of the same species (such as the thousand of traditional rice varieties in India) or genetic variation within a population (which is very high among Indian rhinos, for example, and very low among cheetahs). Until recently, measurements of genetic diversity were applied mainly to domesticated species and populations held in zoos or botanic gardens, but increasingly the techniques are being applied to wild species.

Source: WRI. "What is Biological Diversity". http://www.wri.org/biodiv.html

genetic diversity
General concept: the amount of genotypic variability in a population. Quantitative definition: the number of different alleles per loci and the proportion of loci with more than one allele in a species or population.

Source: Maynard, C., 1996: Forest Genetics Glossary. SUNY College.

genetic diversity
is one aspect of biological diversity. … Genetic diversity occurs at gene level (the molecular level), the individual level, the population level, the species level, and the ecosystem level.

Source: FAO. 1989. Plant Genetic Resources. Conceptual framework

genetic diversity
The variety and frequency of different genes and/or genetic stocks.

Source: IUCN, UNEP, WWF; 1991: Caring for the Earth. A Strategy for Sustainable Living.

genetic diversity
In ecology, the number of species or other taxa in a particular ecological unit.

Source: King, R.C.; Stansfield, W.D.; 1997. A Dictionary of Genetics. Oxford University Press

genetic diversity
The range of a genepool; the amount of genetic variation present in a population or species as a consequence of its evolutionary pathways.

Source: IBPGR (comp.). 1991. Elsevier's Dictionary of Plant Genetic Resources. Rome

genetic diversity
The measure of genetic variation present in a population as a consequence of its evolution.

Source: Koski, V. et al. 1997. EUFORGEN. IPGRI

genetic diversity (genetic variability)
The formation of individuals differing in genotype, or the presence of genotypically different individuals, in contrast to environmentally induced differences which, as a rule, cause only temporary, nonheritable changes to the phenotype (Rieger et al., 1968)
These terms are also used to imply the maintenance of the gene pool.

Source: USDA Forest Service. 1980. A Glossary of Terms for Forest Tree Improvement Workshop.

8 genetic variation

Reference Definition:

The occurrence of differences among individuals of the same species. Genetic variation is brought about by a change in genes, as distinct from differences due to environmental factors.

french -> **variation génétique**
spanish -> **variación genética**
german -> **genetische Variation**

Other definitions:

genetic variation
The occurrence of genetic variants (alleles, genes or genotypes). Genetic variation is brought about by a change in genes, as distinct from differences due to environmental factors.

Source: Koski, V. et al. 1997. Technical guidelines for genetic conservation of Norway spruce (*Picea abies* (L.) Karst.). EUFORGEN. IPGRI

genetic variation
Genetic diversity or variation is not explicitly defined in the Convention. Genetic variation includes genetic differences between species and within species. The genetic diversity of a species can be divided into inter-population diversity and intra-population diversity, and further into the diversity within an individual expressed by differences between alleles in the two chromosomes of diploid organisms (degree of individual heterozygosity).

Source: Graudal, L. et al. 1997. Technical Note 48. Danida Forest Seed Centre

genetic variation
Variation due to the contribution of segregating genes and gene interactions.

Source: Ayad, W.G. 1980. Glossary of Plant Genetic Resources IBPGR Secretariat. AGP: IBPGR/80/11

variation
The occurrence of differences among individuals of the same species attributable to differences in their genetic composition or the environment in which they were raised – *note* quantitative differences in a given trait are assessed by their variance.

Source: Helms, J. (ed.) 1998. The Dictionary of Forestry. Society of American Foresters (SAF)

variation
Differences in form or function between individuals or populations or species. Variations may or may not be heritable and are caused by both genetic and environmental factors. Natural variation is that which occurs spontaneously.

Source: IBPGR (comp.) 1991. Elsevier's Dictionary of Plant Genetic Resources. Rome

variation
Differences in the frequency of genes and traits among individual organisms within a population.

Source: Hagedorn, S. A. An Annotated Dictionary. http://gophisb.biochem.vt.edu/resources/glossary.htm

variation
Difference in performance and characters of individuals due to internal and external factors. In a natural population the phenotypic variation is the product of developmental, environmental and genetic variation. In trials, sampling variation and experimental error make up the residual variation.

Source: Schmidt, L. 1997. Tree Improvement Glossary. Technical Note 46. Danida

geographic variation
The phenotypic differences among native trees growing in different portions of a species' range. If the differences are largely genetic rather than environmental, the variation is usually specified as racial, ecotypical, or clinal.

Source: Schmidt, L. Glossary of Terms Used in Forest Tree Improvement. UNDP/FAO (RAS/91/004).

phenotypic variation
The total biological variation of a given character.

Source: Ayad, W.G. 1980. Glossary of Plant Genetic Resources Terms. IBPGR. AGP:IBPGR/80/11

9 genetic resources

Reference Definition:

syn **gene resources**

Genetic material of actual of potential value.

Source: The Convention on Biological Diversity. Article 2. UNEP 1992

french -> **ressources génétiques**
spanish -> **recursos genéticos**
german -> **genetische Ressourcen**

Other definitions:

genetic resource
Genetic resources are the heritable characteristics of a plant or animal of real or potential benefit to people. The term includes modern cultivars and breeds; traditional cultivars and

breeds; special genetic stocks (breeding lines, mutants, etc); wild relatives of domesticated species; and genetic variants of wild resource species. A ‚wild genetic resource' is the wild relative of a plant or animal that is already known to be of economic importance. The reasons for conserving such a resource include the provision of direct and indirect economic benefits. However, the conserved genetic material must be made available to the people who require it to improve the productivity, quality, or pest resistance of utilized plants or animals.

Source: Dunster, J. & K. 1996. Dictionary of Natural Resource Management. CAB International

genetic resources
Genetic resources are the genes, stored as germplasm (seeds, tubers or other reproductive parts of plants), that can be used to develop new crops and crop varieties or to protect existing crops from pests, diseases or environmental stresses.

Source: American Genetic Resources Alliance, 1998. What are Genetic Resources? http://www.amgra.org/grbkgrd.htm

genetic resources
1. In a strict sense, the physical germplasm (hereditary materials) which carries the genetic characteristics of life forms. In a broad sense, technologies and social and environmental systems through which germplasm is a cash-economic resources (Cooper et al., 1992) 2. Plant and animal stock with distinct inheritable characteristics of (potential) use within an agroecosystem (Reinjtjes et al., 1993). … 4. Germplasm that includes the entire array of cultivars in the crop species, related wild species in the genus, and hybrids between the wild and cultivated species (T.T. Chang, 1976).

Source: SRD Project. 1996. Glossary of Terms. Ottawa. Canada

genetic resources
Germplasm of plants, animals, or other organisms, containing useful characters of actual or potential value. In a domesticated species, it is the sum of all the genetic combinations produced in the process of evolution.

Source: IBPGR (comp.). 1991. Elsevier's Dictionary of Plant Genetic Resources. Rome

genetic resources
The economic, scientific or social value of the heritable materials contained within and between species.

Source: Kemp, R.H. 1993. Principles and concepts. FAO Forestry Paper 107

genetic resources
In the same way that the term *forest resources* refers to te usefulness of the forests for the production of timber or other products for human benefit, the term *genetic resouces* implies that elements of the genetic variability of the trees and other plants and animals will be used to meet human needs and objectives. … The other important aspect of the *genetic resources* of natural forests, especially the tropical forests, is their great diversity, and this range of variation provides the basis for selection and improvement of the products and other benefits to meet future needs, so far as they can be foreseen.

Source: Kemp, R.H. Principles and concepts. FAO Forestry Paper 107

genetic resource
When genetic diversity can be used for plant domestication and improvement, diversity found in the original plant material is considered a genetic resource. *Plant genetic resources* thus refers to the economic, scientific or societal value of the heritable materials contained *within and among species.*

Source: FAO. 1989. Conceptual framework

gene resource (genetic resource)
The total genetic information encoded in the sum total of the genes in all the populations of a species. Thus it is the sum of the genetic information in the gene pools of the species. Where interbreeding species overlap the species complex may represent the gene resource (Nienstaedt, 1980).

Source: USDA Forest Service. 1980. A Glossary of Terms for Forest Tree Improvement Workshop. Sacramento, California

9.1 value of genetic ressources

Reference Definition:

> **The recent focus on genetic resources has been directed toward the direct economic value of the resource, and this one focus has been echoed in the access and benefit-sharing provisions of the Convention on Biological Diversity. However, the scope of the benefits of maintaining genetic resources is much wider and includes the value of biological diversity to native peoples in social and cultural contexts, and to ecosystem functioning.**
>
> *Source*: CIFOR, 2000. Why Genetic Resources Management Matters.

french -> **valeur de ressources génétiques**
spanish -> **valor de recursos genéticos**
german -> **Wert von Genessourcen**

Other definitions:

values of genetic resources
The values we derive from plant genetic resources are generally associated with the different levels of organization and diversity that exist in nature, from ecosystems to species, populations, individuals and genes. In considering the conservation of plant genetic resources it is necessary to clearly specify objectives aimed at. This is of utmost importance, as it is possible to conserve an ecosystem and still lose specific species; and to conserve a species and lose genetically distinct populations, or genes which may be of value in adaptation and future improvement of the species (Wilcox, 1982).

Source: Plant Genetic Resources. Conceptual framework. Food and Agricultural Organization of the United Nations. Rome, 1989. p. 19

value of genetic resources
One strand of literature argues that genetic resources are priceless in an economic sense and supports the conservation of biodiversity as a moral and ethical issue and as a matter of long-term sustainability of human life. A second theme emerges from a more utilitarian claim: biodiversity should be preserved, it is argued, because it can confer benefits to humans. This can be characterized as the utilitarian view of genetic resources.

Source: Ex situ collections of plant genetic resources: conceptual framework and empirical approaches. http://www.bdt.fat.org.br/publicacoes/padct/bio/cap6/doucon.html

value of genetic variation
The value of genetic variation can be expressed as an ecological, economical or ethical value. In practice, however, it is difficult to determine whether a specific genetic variant of a species will be of future value. Hence, within species it is difficult to separate the "re-source" from the rest of the variation and in reality it is impossible to distinguish between genetic resources and genetic variation.

Source: Graudal, L.; Kjaer, E.; Thomsen, A. and Larsen, A.B. Planning national programmes for conservation of forest genetic resources. Technical Note 48. December 1997. Danida Forest Seed Centre

use values and option values
Economists recognise two main types of value: *use values* and *non-use (existence) values*. *Use values* may be further sub-divided into those available for known and immediate uses and those which might become available in the future (*option values*). While the direct use value of the genetic diversity in the forests can best be measured in respect of the few most marketable species the option value of species not currently in demand may be quite high.

Source: Conservation of genetic resources in tropical forest management. Principles and concepts. FAO Forestry Paper 107. FAO. Rome, 1993.

value of genetic resources
Biological scientists argue that almost all genetic resources are potentially valuable and hence should be conserved (e.g. Wilson, 1988). It is assumed that all genetic material has potential value, because the future technologies and environmental conditions are not known (Mc Neely et al., 1990). Consequently, the future value of existing genetic resources cannot be determined at present. Additionally, there are arguments defining the value of genetic resources purely from an environmental-ethical point of view (e.g. Busch et al., 1989; Oldfield, 1989; Shiva, 1991). On the other hand, based on anthropocentric aims, genetic resources are only considered to be valued to the extent that they serve (or may in future serve) the human race.

Source: Virchov, D. Economic Value of Genetic Resources: An Agenda for Research. ZEF Bonn. In: AgBiotechNet 1999, Vol. 1

value of genetic resources
While non economists tend to attribute "existence" value to genetic resources, economists tend to emphasise their "use" value, i.e. their capacity to perform a given task and therefore produce utility. From this it follows that the value of a specific genetic resource depends, also, upon the existence of other genetic resources able to perform the same or similar task, or from the existence of the same resource in an other species or varitety.

Source: Evenson, R.; Santaniello, V.: The Economic Value of Plant Genetic Resources for Agriculture. ISHS Acta Horticulturae 495. http://www.actahort.org/books/495/495_48.htm

10 management of genetic resources

Reference Definition:

french -> **aménagement des ressources génétiques**
spanish -> **gestión de los recursos genéticos**
german -> **Genressourcen-Management**

Other definitions:

management of genetic resources
The management of forest genetic resources to ensure at the same time their conservation, improvement and sustainable use is a complex challenge. Fortunately, when simple basic principles are applied, the production of goods and services is generally com-patible with the genetic conservation and development of a given forest tree species.

Source: FAO Forestry. Conseration and Management of Forest Genetic Resoures. http://www.fao.org/FORESTRY/FOR/FORM/FOGENRES/homepage/Insitu-e.stm

genetic resource management
Higher plant, microbial and insect germplasm should be acquired and safeguarded through the expansion of genebanks or in situ preserves for long-term accessibility. The genetic content of acquired germplasm should be characterized to insure broad-spectrum genetic variability while minimizing genetic redundancy. The agricultural potential of unimproved germplasm must be assessed.

Source: USDA Agricultural Research Service. Plant, Microbial, and Insect Genetic Resources, Genomics and Genetic Improvement. Program Component Definitions. http://www.nps.ars.usda.gov/programs/programs.htm?npnumber=301&docid=791

sustainable forest management
….. The term can only be precisely defined in terms of the management objectives of a particular forest, however, it should always incorporate the principles of sustainable development, to meet the needs of the present without compromising the ability of future generations to meet their own needs. It there-fore has essential objectives in common with the *conservation of genetic resources*.

Source: FAO. Conservation of genetic resources in tropical forest management. Principles and concepts. FAO Forestry Paper 107. Rome, 1993.

genetic resources management
Effective conservation and management of genetic resources in agriculture are key factors in achieving long term and sustainable food security. They are highly important for poverty reduction, since an estimated 85 - 90 % of the worlds poor rely on biological products to meet their basic needs, i.e. food, fuel , medicine, shelter and transportation. Additionally, in the wake of globalisation and increased privatisation, agricultural genetic resources have become a highly political issue and in some cases this poses a serious threat to their continued use for the improved well being of poor people.

Source: http://ecart.iao.florence.it/capstat/grmfr.htm

11 genome

Reference Definition:

All the genetic material in the chromosomes of a particular organism.

The genetic material inherited from either parent.

french -> **génome**
spanish -> **genoma**
german -> **Genom**

Other definitions:

genome
All the genes of a living organism. Its complete set of chromosomes (DNA), with their associated genes.

Source: Forest Genetics Council. BC, Canada. http://www.fgcouncil.bc.ca/framdocs.htm

genome
1 the genetic complement of an individual. 2 all of the DNA sequences in a single (haploid) set of chromosomes. The genetic material inherited from either parent.

Source: Dunster, J.& K. 1996. Dictionary of Natural Resource Management. CAB International

genome
1. The set of genes carried by an individual. 2. The set of genes shared by members of a reproductive unit such as a population or species.

Source: On-Line Biology Book: Glossary

genome
The total complement of genes contained in a cell or virus; commonly used to refer to all genes present in 1 complete set of chromosomes in eukaryotes.

Source: Klopfenstein, N. et al. 1997. USDA Forest Service General Technical Report RM-GTR-297

genome
A complete haploid set of chromosomes as found in a gamete.

Source: Helms, J. (ed.) 1997. The Dictionary of Forestry. Society of American Foresters

genome
The genetic content of a cell or virus; in eukaryotes, it sometimes refers to only one complete (haploid) chromosome set.

Source: Ayala, F.J./Kiger, J. A.; Modern Genetics, University of California, Davis

genetic makeup
Total genetic content of an individual or species (also called genome).

Source: Schmidt, L. 1997. Tree Improvement Glossary. Technical Note 46. Danida

11.1 gene

Reference Definition:

The basic unit of heredity transmitted from generation to generation during sexual or asexual reproduction.

see also **trait**

french -> **gène**
spanisch -> **gen**
german -> **Gen**

Other definitions:

gene
The unit of heredity transmitted from generation to generation during sexual or asexual reproduction. More generally, the term is used in relation to the transmission and inheritance of particular identifiable traits. The simplest gene consists of a segment of nucleic acid that encodes an individual protein or RNA.

Source: Zaid, A. et al. 1999. Glossary of biotechnology and genetic engineering. FAO Research and Technology Paper No. 7 http://www.fao.org/DOCREP/003/X3910E/X3910E00.htm

gene
The smallest transmissible unit of genetic material (basic unit of heredity) consistently associated with a single primary genetic effect – *Note* Genes are ultramicroscopic and act as if linearly arranged at field places (loci) on a chromosome transmitted in the gametes from parent to offspring, governing the transmission and development of a hereditary character.

Source: Helms, J. (1998) The Dictionary of Forestry. Society of American Foresters (SAF).

gene
The basic unit of inheritance.

Source: McGraw-Hill. Dictionary of Scientific and Technical Terms. Fifth Edition.

11.2 allele

Reference Definition:

syn **allelomorph**

> **One of several alternative forms of a gene occupying the same locus on a particular chromosome.**
>
> *Source:* Maynard, C. 1996. Forest Genetics Glossary.

french -> **allèle**
spanish -> **alelo**
german -> **Allel**

Other definitions:

allele
One of an alternate form of a gene, located in a certain position (locus) on a particular chromosome or linkage group. When the alternates exceed two, the alleles form a multiple allelic series.

Source: A Glossary of Plant Genetic Resources Terms (English/Arabic). IBPGR.

allele
One of an array of genes possible at a certain position (locus) on a given chromosome. Alternative (Mendelian) effects on the same character are produced by different alleles, e.g., as met in green or albino seedlings. If the array contains more than two genes, the genes are called multiple alleles. Multiple alleles arise by repeated mutations of a gene, each with different effects. No more than two alleles can be present in a given diploid organism.

Source: Glossary of Terms Used in Forest Tree Improvement. Field Manual No. 6 (RAS/91/004) UNDP/FAO Regional Project 1994.

allele, allelomorph
One of a pair or series of genes located at the same locus in homologous chromosomes and controlling the same character, or one of a pair of characters which are governed by allelomorphic genes and are alternative to each other in inheritance. Many allelomorphic genes can be present simultaneously in a population but only two allelomorphic genes of the same series can be present simultaneously in a diploid organism.

Source: Genetics of Forest Tree Improvement. FAO

allele (s.c.) (cytogenetics)
= allelomorph
Either of a pair or series (-> multiple alleles) of alternative, contrasting Mendelian characters (as met e.g. in green or albino seedlings) that are controlled by genes occurring at the same locus in homologous chromosomes. Note: Where such characters exhibit the dominant-recessive relationship, the dominant gene controls the character when both of the pair are present (see dominant character, recessive character).

Source: Ford-Robertson, F.C. Terminology of Forest Science, Technology Practice and Products. Society of American Foresters, FAO/IUFRO Committee on Forestry Bibliography and Terminology. 1971.

12 genotype

Reference Definition:

The genetic constitution of an organism as distinguished from its appearance or phentoype.

Also the gene classification of this constitution expressed in a formula.

french -> **génotype**
spanish -> **genotipo**
german -> **Genotyp**

Other definitions:

genotype
(1) An individual's hereditary constitution, with or without phenotypic expression of the one or more charcaters it underlies. Also the gene classification of this constitution expressed in a formula. The genotype is determined chiefly from performance of progeny and other relatives. It interacts with the environment to produce the phenotype. (2) Individual(s) characterized by a certain genetic constitution.

Source: Schmidt, L. 1997. Tree Improvement Glossary. Technical Note 46. Danida Forest Seed Centre

genotype
The genetic make up of an organism, this being the sum total of all the genetic information in the organism. In analysis of the genetic constitution of a few gene loci, the genotype is all the characteristics on the chromosome, even if they are not expressed in the phenotype.

Source: Dunster, J. & K. 1996. Dictionary of Natural Resource Management. CAB International

genotype
Genetic constitution of an individual tree possessing a particular set of alleles (i.e. different forms of genes which may occupy the same position on a chromosome).

Source: Koski, V. et al. Technical Guidelines for genetic conservation. Euforgen. IPGRI

genotype
(1) The entire genetic constitution, expressed or latent, of an organism. (2) The genetic constitution of an individual with respect to a few genes under consideration. (3) A group of organisms having similar genetic constitution.

Source: Wright, J. W. 1976. Introduction to Forest Genetics. Michigan State University. New York

genotype
The genetic (alleleic) makeup of an organism with regard to an observed trait.

Source: On-Line Biology Book: Glossary

genotype
Genetic constitution as contrasted with the characteristics manifested by the organism (phenotype).

Source: MacMillan, S. (comp.) 1980. Penguin Dictionary of Biology.

genotype
1) An individual's hereditary constitution, with or without penotypic expression of the one or more characters it underlies. The genotype is determined chiefly from performance of progeny and other relatives. It interacts with the environment to produce the phenotype.
2) Individuals characterised by a certain genic constitution.

Source: FAO. A guide to forest seed handling. Forestry 20/2

genotypes
The genetical potential of the tree when environmental factors are excluded, i.e. only determined by the genes of the tree.

Source: ITTO. Regional Centre for Forest Management Malaysia

genotype
An individuals entire genetic or hereditary constitution, with or without phenotypic expression. The genotype interacts with the environment to produce the phenotype.

Source: ODA. Silvicultural Manual for the Solomon Islands, Solomon Island Forest Record N°6, ODA Forestry Series N°1

genotype
The specific set of genes possessed by an individual, both expressed and recessive.

Source: Maynard, C. 1996. Forest Genetics Glossary

genotype
This term may be used in a limited sense to describe the genetic constitution of an individual in terms of a few specific genes, or in a general sense to include the entire genetic constitution (expressed or latent) of an individual.

Source: FAO. Genetics of Forest Tree Improvement

genotype
The genetic constitution of an organism or virus as distinguished from its appearance or phenotype; the allelic composition of 1 or more genes of interest.

Source: Klopfenstein, N.B. et al. 1997. USDA Forest Service General Technical Report RM-GTR-297

13 genpool

Reference definition:

syn **genepool**

> **The total genetic information present in a breeding population or species at one time.**
>
> **More often applied as a common term for all genes present in plant or animal populations from specific regions, e.g. Amazonian forests.**

french -> **réservoir de gènes**
spanish -> **fondo de genes**
german -> **Genpool**

Other definitions:

gene pool
The total genetic information possessed by the reproductive members of a population of sexually reproducing organisms.

Source: FAO/UNEP. The methodology of conservation of forest genetic resources. Report pilot study.

gene pool
The total sum of all the genes and their alleles present in a breeding population or species at one time.

Source: Schmidt, L. 1997. Tree Improvement Glossary. Technical Note 46. Danida

gene pool
The total of all the genes of all breeding individuals available within a population at any one time.

Source: Dunster, J. & K. 1996. Dictionary of Natural Resource Management. CAB International

gene pool
All of the genes in a species, subspecies or interbreeding group of organisms.

Source: Côté, M. (éd.) 2000. Dictionary of Forestry. Ordre des Ingénieurs forestiers du Québec.

gene pool
Total number of genes/gene complexes in an organism's population.

Source: MacMillan, S. 1980. Penguin Dictionary of Biology

gene pool
The total of all the genes of a species. More often applied as a common term for all genes present in plant or animal populations from specific regions, e.g. Amazonian forests.

Source: •umer-Linder, M. 1979. Ecological studies 3. Swedish University of Agricultural Sciences.

14 germplasm

Reference definition:

syn **germ plasm**

> **The genetic material which forms the physical basis of heredity and which is transmitted from one generation to the next by means of the germ cells.**
>
> **Often synonymous with genetic material, when applied to plants it is the name given to seed or other material from which plants are propagated.**

french -> **matériel génétique**
spanish -> **plasma germinal**
german -> **Keimplasma**

Other definitions:

germplasm
Within an individual or group, the collective hereditary material that is the physical basis for inheritance; i.e. the genotype, with particular reference to its transmission to the next generation.

Source: Schmidt, L., 1997. Tree Improvement Glossary. Technical Note 46. Danida

germplasm
1. Within an individual or group, the collective hereditary materials that are the physical basis for inheritance; the hereditary stream 2. The genotype, with particular reference to its transmission to the next generation.

Source: Helms, J. (ed.) 1998. The Dictionary of Forestry. Society of American Foresters

germplasm
1) The genetic material which forms the physical basis of heredity and which is transmitted from one generation to the next by means of the germ cells. 2) An individual or clone representing a type, species or culture, that may be held in a repository for agronomic, historic or other reasons.

Source: IBPGR (comp.) 1991. Elsevier's Dictionary of Plant Genetic Resources

germ plasm
The genetic material of an individual organism contained in the seed, pollen, sperm, eggs, or embryos, which constitutes the heritable characteristics of the organism. The plasm is stored in carefully controlled conditions for future breeding, genetic engineering, derivation of pharmacological products, or conservation of species. Germ plasm can be stored in seed banks, sperm banks, or gene banks.

Source: Dunster, J. & K. 1996. Dictionary of Natural Resource Management. CAB International

germplasm
1. The sum total of the genetic material in a plant: crop plants plus primitive cultivars, landraces, and wild and weedy relatives; also referred to as the wild species, genes from the wild, the world‘s gene pool of the plants, the genetic largess, the common heritage of mankind, plant genetic resources, the “public property” of the Third World countries/ industrial nations, the “primitive landraces”, of the south or the “elite commercial cultivar” of the north (Pecs, 1993). … 5. Living substance of the cell nucleus that determines the hereditary properties of organisms and that transmits these properties from makeup of organism (O.L. Justice and L.N. Bass, 1978). 6. Any plant genetic material used for plant propagation and breeding, with emphasis on its genetic contents (N.P. Louwaars, 1994). 7. The genetic material, especially its specific molecular and chemical constitution, that comprises the physical basis of the inherited qualities of an organism (W.V. Reid and K.R. Miller, 1993). 8. Often synonymous with „genetic material“, when applied to plants it is the name given to seed or other material from which plants are propagated (IDRC 1985; D.A. Posey and G. Dutfield, 1996).

Source: SRD Project. 1996. Glossary of Terms. Ottawa

germplasm
The sum total of the genes and cytoplasmic factors governing inheritance.

Source: FAO. Genetics of forest tree improvement

germplasm
controls heritable traits of species represented in the gene pool.

Source: FAO. 1989. Plant Genetic Resources. Conceptual framework

genetic material
means any material of plant, animal, microbial or other origin containing functions of heredity.

Source: UNEP. Convention on Biological Diversity. Article 2. June 1992

germ plasm
= germplasm; genetic make-up
… of a population or individual organism; often used interchangeably with “gene pool”.

Source: Dermine, P. 1990. Vocabulary of Agriculture. Terminology Bulletin 197. Minister of Supply and Services Canada

germplasm
The hereditary material transmitted to offspring through the germ cells.

Source: King, R.C.; Stansfield, W.D.; 1997. A Dictionary of Genetics. Oxford University Press.

germplasm
Genetic material.

Source: Ahuja, M.R. and Libby, W.J., 1993. Clonal Forestry II. Glossary. Springer Verlag

15 genetic system

Reference definition:

french -> **système génétique**
spanish -> **sistema genético**
german -> **genetisches System**

Other definitions:

16 reproductive system

Reference definition:

french -> **système reproductif**
spanish -> sistema de reproducción
german -> **Fortpflanzungssystem**

Other definitions:

16.1 mating system

Reference Definition:

syn **mating design**

> **The system whereby individuals of opposite sexual type are paired to produce progeny.**
>
> *Source*: Koski, V. et al. Technical guidelines. Euforgen. IPGRI.

french -> **dispositif de croisement**
spanish -> **sistema de cruzamiento**
german -> **Paarungssystem**

Other Definitions:

mating design
The pattern of pollinations set up between individuals.

Source: Helms, J. (ed.) 1998. The Dictionary of Forestry. Society of American Foresters.

16.2 outcrossing

Reference definition:

syn **outbreeding**

> **A system of mating in which parents are less closely related to each other than would be the case if mating occurred at random.**
> **It is the most common mode of sexual reproduction of forest trees.**

french -> **croisement éloigné**
spanish -> **cruzamiento lejano**
german -> **Kreuzung**

Other definitions:

outcrossing
Matings (controlled or natural) among unrelated individuals. May also refer to a species that has specific barriers to selfing, or exhibits such inbreeding depression that inbred individuals never reach maturity.

Source: Maynard, C. 1996. Forest Genetics Glossary. http://www.esf.edu/course/cmaynard/GENE_GLOSSERY.html

outbreeding (=outcrossing)
The production of offspring by the fusion of distantly related gametes. Ant. Inbreeding.

Source: Schmidt, L., 1997. Tree Improvement Glossary. Technical Note 46. Danida

outbreeding
The mating system in which mating events occur successfully between individuals that are less cosely related than average pairs chosen from the population at random. It is the most common mode of sexual reproduction of forest trees.

Source: Koski, V.; Skroppa, T.; Paule, L.; Wolf, H.; Turok, J. Technical guidelines for genetic conservation of Norway spruce (*Picea abies (L.)* Karst.). Euforgen. IPGRI

outbreeding
A system of mating in which parents are less closely related to each other than would be the case if mating occurred at random.

Source: FAO. Genetics of forest tree improvement.

16.3 pollination

Reference definition:

The transfer of pollen from the male organ on the receptive part of a female organ.

french -> **pollinisation**
spanish -> **polinización**
german -> **Bestäubung**

Other definitions:

pollination
The process in which pollen is transferred from an anther to a receptive stigma.

Source: Dunster, J. & K. 1996. Dictionary of Natural Resource Management. CAB International

pollination
Deposition of pollen on the receptive part of the female flower. In angiosperms this is the stigmatic surface, in gymnosperms the ovule tip.

Source: Schmidt, L. 1997. Tree Improvement Glossary. Technical Note 46. Danida

pollination
The transfer of pollen from the anthers to the stigma by a pollinating agent such as wind, insects, birds, bats, or in a few cases the opening of the flower itself.

Source: On-Line Biology Book: Glossary

pollination
The transfer of pollen from the male organ, where it is formed, to the receptive region of a female organ, e.g. from anther to stigma.

Source: BioTech Life Science Dictionary. Mirrored from Jim Croft's Flora of Australia. BioTechResources and Indiana University

pollination
The placing of pollen on the receptive part of a female flower.

Source: Wright, J.W. 1976. Introduction to Forest Genetics. East Lansing, Michigan. Academic Press. (AP) New York

17 phenotype

Reference definition:

The observable appearance of an organism, as determined by environmental and genetic influences (in contrast to genotype).

Source: Glossary of Biodiversity Terms. UNEP-WCMC.

see also **genotpye**

french -> **phénotype**
spanish -> **fenotipo**
german -> **Phänotyp**

Other definitions:

phenotype
The plant or character as we see it; state, description, or degree of expression of a character; the product of the interaction of the genes of an organism (genotype) with the environment. When the total character expressions of an individual are considered, the phenotype describes the individual. Similar phenotypes do not necessarily breed alike.

Source: Schmidt, L. 1997. Tree Improvement Glossary. Technical Note 46. Danida Forest Seed Centre

phenotype
The morphological, physiological, biochemical, behavioral, and other properties of an organism that develop through the interaction of genes and environment. (see genotype)

Source: Biodiversity Glossary of Terms. World Resources Institute. WRI. http://www.wri.org/biodiv/gbs-glos.html

phenotype
(Gr. *phaneros*, showing + type) The visible appearance or set of traits of an organism resulting from the combined action of genotype and environment. *cf g*enotype.

Source: Zaid, A. et al. 1999. Glossary of biotechnology and genetic engineering. FAO Research and Technology Paper No. 7. ISBN 92-5-104369-8 http://www.fao.org/DOCREP/003/X3910E/X3910E00.htm

phenotype
An organism as observed, i.e. as judged by its visually perceptible characters resulting from the interaction of its genotype with the environment. Note: Identical phenotypes do not necessarily breed alike.

Source: Ford-Robertson, F.C. Terminology of Forest Science, Technology Practice and Products. Society of American Foresters, FAO/IUFRO Committee on Forestry Bibliography and Terminology. 1971.

18 progeny

Reference definition:

syn **descendants [~]**

The offspring of a particular tree or a particular combination of one female and one male tree.

french -> **descendance**
spanish -> **progenie**
german -> **Nachkommenschaft**

Other definitions:

progeny
The offspring resulting from sexual reproduction, or from one asexually reproducing individual.

Source: Dunster, J. &K. 1996. Dictionary of Natural Resource Management. CAB International.

progeny
The offspring of a particular tree or a combination of one female and one male tree.

Source: Côté, M. (éd.) 2000. Dictionary of Forestry. Ordre des ingénieurs forestiers. Les Presses de l'Université Laval

progeny
Offspring; descendants of a particular mating or of a particular mate.

Source: Koski, T.; Skroppa, T.; Paule, L. Wolf, H.; Turok, J.; 1997. Technical guidelines for genetic conservation of Norway spruce (*Picea abies* (L.) Karst.). Euforgen. IPGRI.

19 provenance

Reference Definition:

The original geographic source of seed, pollen, or propagules.

In forestry literature the term is usually considered synonymous with "geographic origin", and preferred to "origin".

french -> **provenance**
spanish -> **procedencia**
german -> **Herkunft/Provenienz**

Other definitions:

provenance
(1) The original geographic source of seed, pollen, or propagules. In forest tree breeding the term usually refers to the original native source of a population. When a population is removed from its sources and has grown elsewhere for a number of generations, it is referred to as a 'land race'. (2) The place in which any stand of trees are growing. The stand may be indigenous or non-indigenous.

Source: Schmidt, L. Danida. 1997. Tree Improvement Glossary. Technical Note 46. Danida

provenance
The region or geographical source where a plant or animal was originally found and is native, and where its genetic constitution has developed through natural selection in between periods of glaciation.

Source: Dunster, J.&K. 1996. Dictionary of Natural Resource Management. CAB International

provenance
For seeding material, the provenance is the harvest location; for plants, it is both the harvest location and the location of the nursery.

Source: The Habitat Restoration Group, BioTech Life Science Dictionary, BioTechResources and Indiana University

provenance
It is the geographic location of a seed source.

Source: ITTO. Technical Guidelines for the Establishment and Management of Ex situ Conservation Stands of Tropical Timber Species.

provenance
The geographic source or location to which plants are native and within which their genetic characteristics have been developed through natural selection, e.g. tree provenances.

Source: •umer-Linder, M. 1979. Environmental World-List; Swedish University of Agricultural Sciences, Uppsala

provenance
The geographic origin of a population. Mostly (but not always in European usage) the ultimate natural origin, implying where the population evolved prior to human intervention.

Source: http://www.fgcouncil.Bc.ca/framdocs.htm

provenance
The original geographic source of seed, pollen, or propagules.

Source: FAO.UNEP. The methodology of conservation of forest genetic resources.

provenance
The original geographic source of seed or pollen (*also see* landrace and derived provenance), or the place in which any stand of trees is growing. The stand may be indigenous or exotic.

Source: ODA. Silvicultural Manual for the Solomon Islands, Solomon Island Forest Record N°6, ODA Forestry Series N°1

provenance
The place in which any stand of trees is growing. The stand may be autochthonous or non-autochthonous (see -> origin).

Source: Koski, V. et al. Technical guidelines for genetic conservation Euforgen. IPGRI

provenance
The ultimate natural origin of a tree or group of trees. In forestry literature the term is usually considered synonymous with “geographic origin”, and preferred to “origin”, which could mean “nursery of origin”, “seedhouse of origin”, or “method of propagation”. Sometimes used to denote the trees having a given place of origin.

Source: Wright, J. 1976. Introduction to Forest Genetics. Department of Forestry Michigan State University. Academic Press. (AP) New York

provenance
Fr. (provenience, L.) in European usage, the place where seeds were collected; in North America, synonymous with seed source.

Source: SAETTEM

19.1 land race

Reference definition:

A population of individuals that have become adapted to a specific environment in which it has been planted.

Source: Field Manual No. 6 (RAS/91/004) UNDP/FAO Regional Project.1994.

french -> **rasse locale**
spanish -> **raza local**
german -> **Landrasse**

Other definitions:

landraces
A crop cultivar or animal breed that evolved with and has been genetically improved by traditional agriculturalists, but has not been influenced by modern breeding practices.

Source: Biodiversity Glossary of Terms. WRI. http://www.wri.org/biodiv/gbs-glos.html

landrace
Primitive or antique variety usually associated with traditional agriculture. Often highly adapted to local conditions.

Source: Glossary of Biodiversity Terms. UNEP/WCMC http://www.unep-wcmc.org/reception/glossary.htm

land race
A native crop that has been adapted to the environmental conditions of a locale over the course of many generations of seed-saving by local cultivators; in Spanish, *razas criollas*.

Source: Glossary of critical terms. http://www.anthro.washington.edu/Faculty/Faculty%20Syllabi/Anth469/glossary.htm

19.2 hybridization

Reference definition:

The formation of a hybrid, i.e. the offspring of genetically distinctly different parents.

The term is applied to the progeny from matings within species (intraspecific) as well as to those between species (interspecific).

Source: adapted from Schmidt, L., 1997. Tree Improvement Glossary. Danida

french -> **hybridation**
spanish -> **hibridización**
german -> **Hybridisierung**

Other definitions:

hybrid (L. *hybrida*)
1. The offspring of two parents that are genetically different. A cross between two genetically unlike individuals.
2. A heteroduplex DNA or DNA-RNA molecule.

Source: FAO http://www.fao.org/DOCREP/003/X3910E/X3910E11.htm#TopOfPage

hybridization
The formation of a hybrid. In the context of DNA technology the formation of a double stranded molecule by complementary base pairing between two single stranded molecules.

Source: Schmidt, L., 1997. Tree Improvement Glossary. Technical Note 46. Danida Forest Seed Centre

hybridization
1. Interbreeding of species, races, varieties and so on, among plants or animals; a process of forming a hybrid by cross pollination of plants or by mating animals of different types.
2. The production of offspring of genetically different parents, normally from sexual reproduction, but also asexually by the fusion of protoplasts or by transformation.
3. The pairing of two polynucleotide strands, often from different sources, by hydrogen bonding between complementary nucleotides.
See northern hybridization; Southern hybridization.

Source: FAO http://www.fao.org/DOCREP/003/X3910E/X3910E11.htm#TopOfPage

19.3 introgression

Reference Definition:

The natural spread of genes of one species into another through the process of interspecific hybridization followed by successive backcrosses to the recurrent parent. The hybrid swarm is an intermediate stage in the process.

see also **gene flow**

french -> **introgression**
spanish -> **introgresión**
german -> **Introgression**

Other definitions:

introgression
The introduction of new gene(s) into a population by crossing between two populations, followed by repeated backcrossing to that population while retaining the new gene(s).

Source: Zaid, A. et al. 1999. Glossary of biotechnology and genetic engineering. FAO Research and Technology Paper No. 7. http://www.fao.org/DOCREP/003/X3910E/X3910E00.htm

introgression (introgressive hybridization)
The natural spread of the gene(s) from one species or population to another through hybridization and successive backcrossing of the hybrids. A hybrid swarm may be a stage in the process. The outcome may vary from minor gene infiltration to coalescence of the species. Introgression is principally similar to migration but occurs between species.

Source: Schmidt, L. 1997. Tree Improvement Glossary. Technical Note 46. Danida Forest Seed Centre

introgression
The movement of genes from one population into another through hybridization followed by backcrossing. Usually refers to movement of genes from one species to another or among sub-species that have been geographically isolated then brought back together by changes in

Source: Maynard, C. 1996. Forest Genetics Glossary. http://www.esf.edu/course/cmaynard/GENE_GLOSSERY.html

introgression (genetics)
= introgressive hybridization; ~ vicinism (obsolete)
The natural spread of genes of one species into another through the process of interspecific hybridization followed by successive backcrosses to the recurrent parents. Note: (1) Each species may thereby become more variable and show certain characters of the other species. (2) The hybrid swarm marks a stage in the process.

Source: Ford-Robertson, F.C. Terminology of Forest Science, Technology Practice and Products. Society of American Foresters, FAO/IUFRO Committee on Forestry Bibliography and Terminology. 1971.

20 reproductive material

Reference definition:

All material produced by sexual and asexual means used for plant production.

see also **germplasm**

french -> **matériel de reproduction**
spanish -> **materia de reproducción**
german -> **Vermehrungsgut**

Other definitions:

reproductive material
Seeds (cones, fruits and seeds) and vegetative parts of trees intended for the production of plants as well as plants raised by means of seeds or vegetative parts; also includes natural regeneration.

Source: Koski, V. et al.: Technical guidelines for genetic conservation of Norway spruce (Picea abies (L.) Karst.). Euforgen. IPGRI

reproductive material
All plant tissue produced by sexual or asexual means used for production.

Source: Côté, M. (ed.) Dictionary of Forestry. Ordre des ingénieurs forestiers du Québec. Canada, 2000.

21 species

Reference definition:

A population or series of populations of organisms that are capable of interbreeding freely with each other but not with members of other species.

Source: Keystone Center 1991

french -> **espèce**
spanish -> **especie**
german -> **Art**

Other definitions:

species
A population of organisms which are able to interbreed freely under natural conditions. A species represents a group of organisms which has evolved distinct inheritable features

and occupies unique geographical area. Species do not usually interbreed freely with other species.

Source: Schmidt, L., 1997. Tree Improvement Glossary. Technical Note 46. Danida

species
A group of individuals that have their major characteristics in common and (usually) can only breed with each other.

Source: Dunster, J. & K. 1996. Dictionary of Natural Resource Management. CAB International

species
Groups of populations (which are groups of individuals living together that are separated from other such groups) which can potentially interbreed or are actually interbreeding, that can successfully produce viable, fertile offspring (without the help of human technology).

Source: Mayr, E. 1969. In: BioTech Life Sience Dictionary, BioTechResources and Indiana University

species
It is a group of individuals of similar morphology that are able to breed with each other but not with individuals from outside this group.

Source: ITTO. Technical Guidelines for the Establishment and Management of *Ex situ* Conservation Stands of Tropical Timber Species

species
One or more populations, the individuals of which can interbreed, but which in nature cannot exchange genes with members belonging to other species. The main category of taxonomic classification.

Source: Burley, J. Wood, P.J. (comp.) 1976. A manual on species and provenance research with particular reference to the tropics. Tropical Forestry Papers No. 10, CFI, University of Oxford

species
The unit of taxonomic classification in which genera are sub-divided. A group of similar individuals different from other similar arrays of individuals. In sexually reproducing organisms, the maximum inter-breeding group isolated from other species by barriers of sterility or reproductive capacity.

Source: FAO/UNEP. The methodology of conservation of forest genetic resources. Report pilot study

species
A group of similar organisms, capable of interbreeding, and more or less distinctly different in geographic range and/or morphological characteristics from other species in the same genus.

Source: Wright, J.W. 1976. Introduction to Forest Genetics. Department of Forestry Michigan State University. East Lansing, Michigan. Academic Press. (AP) New York

species
(ecol) The main category of taxonomic classification into which genera are subdivided, comprising a group of similar interbreeding individuals sharing a common morphology, physiology, and reproductive process.

(silv) A group of individuals that have their major characteristics in common, e.g. tree species.

Source: Côté, M. (éd.) 2000. Dictionary of Forestry. Ordre des ingénieurs forestiers du Québec. Les Presses de l'Université Laval. Québec, Canada

species
The smallest unit of classification commonly used. Groups of interbreeding natural populations which are reproductively isolated from other such groups.

Source: •umer-Linder, M. 1979. Environmental World-List. Swedish University of Agricultural Sciences, Ecological studies 3, Uppsala

species
Category of taxonomic classification below genus rank including individuals with similar morphological characteristics and defined by breeding potential and gene flow. Interbreeding occurs between individuals within a species resulting in gene flow to the next generation. Such interbreeding does not normally occur between individuals of different species.

Source: SAETTEM

21.1 forest tree species

Reference Definition:

french -> **espèces forestières**
spanish -> **especies forestales**
german -> **Waldbaumarten**

Other definitions:

forest tree species
… Many forest tree species are characterized by inherently high levels of variation and extensive natural ranges. This high level of genetic variation is needed to ensure present-day and future adaptability of the species as well as their continued evolution. It is also needed to maintain options and potential for improvement to meet changing end use requirements and dynamically evolving environmental conditions.

Source: http://www.fao.org/forestry/FOR/FORM/FOGENRES/homepage/What-e.stm

21.2 (forest tree) population

Reference definition:

A group of individual trees living in the same area at the same time and sharing a common gene pool.

(Statistics) In forest inventories, the population is usually a forested area for which information is required.

french -> **population (d'arbres forestiers)**
spanish -> **población (de árboles forestales)**
german -> **(Waldbaum-)Population**

Other definitions:

population
Genetically, a group of similar individuals related by descent and so delimited in range by environmental or endogenous factors as to be considered a unit. In cross-bed organisms the population is often defined as the interbreeding group.

Source: Schmidt, L. Tree Improvement Glossary, Technical Note 46 DANIDA Forest Seed Centre

population
A group of individual trees having some characteristics in common, either location, family ancestry, or intended use.

Source: Maynard, C. 1996. Glossary. http://www.esf.edu/course/cmaynard/GENE_GLOSSERY.html

population
The number of organisms of the same species inhabiting the same area, that potentially interbreed and share a common gene pool.

Source: Dunster J. & K. 1996. Dictionary of Natural Resource Management. CAB International.

population
A (Mendelian) population is defined as a unit present under certain (environmental) conditions, composed of biological organisms which are able to reproduce sexually and where every pair of individuals is enabled and allowed to have common ancestry over generations.

Source: Koski, V. et al. Technical guidelines for genetic conservation. Euforgen. IPGRI

population
(1) Genetically, a group of individuals related by common descent and treated as a unit for convenience. There is no definite limit to the size or amount of variability contained within a population, nor is there necessarily a connotation that populations differ by any set amount. (2) Statistically, a group of homogenous observations or the individuals on which such observations were made.

Source: Wright, J.W. 1976. Introduction to Forest Genetics. Department of Forestry Michigan State University. East Lansing, Michigan. Academic Press. (AP) New York

22 trait

Reference definition:

> **A distinctive and usually variable feature, e.g. colour, size, performance, exhibited by all individuals or a group capable of being described or measured.**

french -> **caractère**
spanish -> **carácter**
german -> **Merkmal**

Other definitions:

trait
A distinguishing characteristic or quality of an organism.

Source: BIOTECanada. What is Biotechnology? http://www.biotech.ca/EN/what_glossary.html

trait
In genetics, a category within which alternate characteristics, such as height and eye color, can be observed.

Source: Militano's Honors Biology. Fundamentals of Genetics. http://www.grulpages.com/mhbio/ch9.html

character (trait)
A distinctive but not necessarily invariable feature exhibited by all individuals of a group and capable of being described or measured; e.g., size, straightness, form, and performance. A character of a given individual will have a certain phentoype (state) as determined by the individual's genotype and environment. Selection is based on characters. Desired characters for wood producing species can be fast growth and straightness, while undesired characters may be crookedness, low branching and susceptibility to deseases.

Source: Schmidt, L. 1997. Tree Improvement Glossary. Technical Note 46. Danida

character
A distinctive phenotypic expression exhibited by all individuals of a group, capable of being described and measured and determined by the individual's genotype and environment.

Source: Koski, V. et al. Technical guidelines for genetic conservation. Euforgen. IPGRI

character, characteristic
The phenotypic result of the interaction of a gene or group of genes and the environment.

Source: FAO. Genetics of Forest Tree Improvement

character, characteristic
The detectable phenotypic expression of the action of a gene or group of genes. A trait. A feature used to distinguish among individuals or populations.

Source: FAO. Forest Genetics Glossary.

(adaptive) traits
So, the effect of natural selection on the population will be either to increase the frequency of beneficial (adaptive) traits, or decrease the frequency of detrimental (non-adaptive) traits.
It is important that the effect of the environment may not be constant. As conditions change an adaptive trait may rapidly become non-adaptive. As they continue to change, the trait may again become adaptive.

Source: Farabourgh, Ph. 2000. Biology Century. 100 Concepts of Biology. http://members.home.net/biologycentury/pages/

quantitative trait
More common term for continuous trait; a trait that has a quantitative value (yield, IQ). Quantitative traits are controlled by multiple genes, each segregating according to Mendel's laws. These traits can also be affected by the environment to varying degrees.

Source: North Dakota State University. Introduction to Quantitative Genetics. http://www.ndsu.nodak.edu/

23 tree breeding

Reference Definition:

The application of genetic principles and practices to develop improved trees.

french -> **amélioration génétique**
spanish -> **mejora genética**
german -> **Waldbaumzüchtung**

Other definitions:

breeding (forest tree b.)
The application of genetic principles and practices to the development of individual trees, varieties or populations more suited for the human needs.

Source: Koski, V.; Skroppa, T.; Paule, L.; Wolf, H.; Turok, J. Technical guidelines for genetic conservation of Norway spruce (*Picea abies (L.)* Karst.). Euforgen. IPGRI

forest tree breeding
The genetic study of trees to solve some specific problem or to produce a specially desired product.

Source: Forestry Canada. 1992. Silvicultural Terms in Canada. Ottawa.

forest tree breeding
The application of knowledge of genetics to developing improved trees.

Source: Helms, J. A. (ed.) 1998. The Dictionary of Forestry. Society of American Foresters

forest tree breeding
Practices applying knowledge of genetics to develop improved trees. Conventional tree breeding is based on selection of individuals for certain desired characters and mating these individuals to produce an improved population. Forest tree breeding may connote breeding systems varying from harvesting seed from only the best sources (mass selection) to sophisticated multi-phase, multigeneration programmes or controlled pollination.

Source: Schmidt, L., 1997. Tree Improvement Glossary. Technical Note 46. Danida

forest tree breeding
Applying knowledge of genetics to develop improved trees. In a narrow sense, the term refers to propagation by artificial pollination. Usually, however, it connotes breeding systems varying from harvesting seed from only the best sources (mass selection) to sophisticated multiphase, multigeneration programs of controlled pollination.

Source: E.B. Snyder. 1972. Glossary for Forest Tree Improvement Workers. USDA- FS.

breeding
The propagation and genetic manipulation by hybridization or deliberate self-crossing of plants, for the purpose of selecting improved offspring.

Source: International Board for Plant Genetic Resources (IBPGR) (comp.), 1991. Elsevier's Dictionary of Plant Genetic Resources. Italy

24 tree improvement

Reference Definition:

The application of genetics to produce trees or a source of seed to create trees with specific desirable traits based on their phenotypic and genotypic characteristics.

Usually syonymous with -> tree breeding, but may refer to breeding in combination with silvicultural practices.

french -> **amélioration générale des arbres forestiers**
spanish -> **mejora de árboles forestales**
german -> **Waldbaumveredelung**

Other definitions:

tree improvement
A misnomer for tree selection, evaluation and breeding for more desirable characteristics, such as faster growth, drought, disease or insect resistance.

Source: Aird, P. L. (comp.) 1994. Compendium of Concepts and Terms. Forestry Chronicle Vol. 70

forest tree improvement
The practice of tree breeding in combination with cultural practices – synonym *forest tree breeding*

Source: Helms, J.A. 1998. The Dictionary of Forestry. Society of American Foresters

forest tree improvement
1 The application of genetics to produce trees or a source of seed to create trees with specific desirable traits based on their phenotypic and genotypic characteristics. In some cases, the improved trees can be cloned by growing genetically identical trees from a limited source of germ plasm. 2 The improvement or enhancement of wood quality, volume, and growth rates using a combination of genetic improvement and silvicultural activities, such as fertilization and pruning.

Source: Dunster, J.&K. 1996. Dictionary of Natural Resource Management. CAB International

forest tree improvement
Usually synonymous with *forest tree breeding*, but may refer to tree breeding in combination with silvcultural practices and mass production of improved material.

Source: Schmidt, L., 1997. Tree Improvement Glossary. Technical Note 46. Danida

forest tree improvement
The application of genetic principles to the improvement and management of forest trees.

Source: Maynard, C., 1996: Glossary. http://www.esf.edu/course/cmaynard/GENE_GLOSSERY.html

forest tree improvement
The control of parentage combined with other silvicultural activities (such as site preparation or fertilizing) to improve the overall yield and quality of products from forest lands.

Source: Côté, M. (ed.) 2000. Dictionary of Forestry. Ordre des ingénieurs forestiers du Québec. Canada

24.1 domestication

Reference Definition:

The process by which evolution has been influenced by humans to meet their needs.

french -> **domestication**
spanish -> **domesticación**
german -> **Domestikation**

Other definitions:

domestication
To bring under human control; wild trees brought into cultivation in plantations become genetically altered over generations of selections.

Source: Schmidt, L., 1997. Tree Improvement Glossary. Technical Note 46. Danida

domestication
The genetic adaptation of plants to the cultivation environment through selection (N.P. Louwaars, 1994).

Source: SRD Project. 1996. Glossary of Terms. Ottawa, Canada.

domestication
The evolution of plants or animals either naturally or through artificial selection, to forms more useful to man, e.g. non-shattering seeds. These characteristics of domestication are frequently absent in wild types of the organism and may constitute a negative genetic load for survival in the wild state.

Source: International Board for Plant Genetic Resources (IBPGR) (comp.), 1991. Elsevier's Dictionary of Plant Genetic Resources. Rome

domestication
The process by which a plant is introduced into cultivation by man.

Source: Ayad, W.G. 1980. A Glossary of Plant Genetic Resources Terms (in English and Arabic). IBPGR Secretariat

domesticate
The caring, cultivation, or taming of wild organisms to serve human needs.

Source: Dunster, J.&K. 1996. Dictionary of Natural Resource Management. CAB International

domesticate
To care for, to cultivate, or to tame a wild organism to serve human needs.

Source: Aird, P. L. (comp.) 1994. Compendium of Concepts and Terms. Forestry Chronicle Vol. 70

domesticated species
Organisms that have been trained to live with or be of service to humans, include agricultural plants, livestock, household pets, laboratory animals, and others.

Source: King, R.C.; Stansfield, W.D.; 1997. A Dictionary of Genetics. Oxford University Press

24.2 plus tree

Reference definition:

A phenotypically superior but untested tree.

Not to be confused with 'elite tree'.

french -> **arbre plus**
spanish -> **árbol plus**
german -> **Plusbaum**

Other definitions:

plus tree
A tree selected on the basis of its outstanding phenotype but not yet clonally or progeny tested.

Source: Côté, M. Dictionnaire de la foresterie. Ordre des Ingenieurs forestiers du Québec. Les presses de l'Université Laval

plus tree
A phenotpye judged (but not proved by test) to be unusually superior in some quality or quantity, e.g. exceptional growth rate, desirable growth habit, high wood density, exceptional apparent resistance to disease and insect attack or to other adverse environmental factors.

Source: Nieuwenhuis, M. Terminology of Forest Management. IUFRO World Series 9-en. Vienna, 2000.

plus
Appearing distinctly superior ot the average. The term is used for describing phenotypes of both stands (plus stands) and single trees (plus trees). The superior character(s) should be specified, i.e. plus for volume, quality, pest-resistance, or combination of characters.

Source: Schmidt, L. 1997. Tree Improvement Glossary. Technical Note 46. Danida Forest Seed Centre

plus stand
A stand containing a preponderance of good phenotypes, not necessarily plus trees.

Source: Schmidt, L. 1997. Tree Improvement Glossary. Technical Note 46. Danida Forest Seed Centre

elite tree
A phenotypically superior tree in a tree breeding programme.

Source: Zaid, A. et al. Glossary of Biotechnology for Food and Agriculture. FAO Research and Technology Paper 9. Rome, 2001.

elite tree
One that has been shown by testing to be capable of producing progeny with superior (i.e. more desired) qualities and is therefore of superior genotype.

Source: Nieuwenhuis, M. Terminology of Forest Management. IUFRO World Series 9-en. Vienna, 2000.

25 vegetative propagation

Reference Definition:

The multiplication of plants by asexual means, as in budding, grafting, air layering.

Sometimes the term is used synonymously with asexual reproduction, in which case it includes all forms of reproduction (other than partenogenesis) in which daughter individuals are produced without the sexual processes of gamete and zygote formation.

french -> **multiplication végétative**
spanish -> **multiplicación vegetativa**
german -> **vegetative Vermehrung**

Other definitions:

vegetative propagation
Propagation of a plant by asexual means, as in budding, dividing, grafting, rooting of cuttings, and air-layering. Hereditary characteristics of the resulting clone (ramets) are identical with those of the original plant (ortet).

Source: Schmidt, L., 1997. Tree Improvement Glossary. Technical Note 46. Danida

vegetative propagation
The propagation of a plant by asexual means, as in budding, grafting, rooting, air layering, and tissue or cell culture – note the genotypes of the resulting ramets are identical to those of the original plant (ortet).

Source: Helms, J.A. (ed.) 1998. The Dictionary of Forestry. Society of American Foresters

vegetative propagation
The traditional methods of vegetative propagation (macropropagation) involve multiplication by rooted cuttings, grafting, rooted needle fascicles (in pines) and root suckers (aspen)…. see *macropropagation*

Source: Mátyás, C. (ed.) 1997. IUFRO World Series Vol. 6. University Sopron, IUFRO Vienna

vegetative propagation
The propagation or multiplication of plants by asexual means.

Source: Klopfenstein, N. B. (ed.), 1997. USDA Forest Service General Technical Report RM-GTR-297

vegetative reproduction
The production of a new individual(s) by detachment of some part of the parent individual, such as a gemma, rhizome, bulb, tuber or corm. Sometimes this term is used synonymously with asexual reproduction, in which case it includes all forms of reproduction (other than partenogenesis) in which daughter individuals are produced without the sexual processes of gamete and zygote formation.

Source: International Board for Plant Genetic Resources (IBPGR) (comp.), 1991. Elsevier's Dictionary of Plant Genetic Resources. Rome, Italy

25.1 micropropagation

Reference definition:

Vegetative propagation of plants by *in-vitro* technology producing plantlets, micropropagules, or somatic embryos.

The term often used synonymous with tissue culture.

french -> **micropropagation**
spanish -> **micropropagación**
german -> **Mikropropagation**

Other definitions:

micropropagation
The in-vitro vegetative propagation of plants producing plantlets, micropropagules, or somatic embryos.

Source: Helms, J.A. (ed.) 1998. The Dictionary of Forestry. Society of American Foresters

micropropagation
Production of plants from very small plant parts, tissues, or cells grown aseptically in a test tube or other container where the environment and nutrition can be rigidly controlled. The term often used synonymous with *tissue culture.*

Source: Schmidt, L., 1997. Tree Improvement Glossary. Technical Note 46. Danida

micropropagation
… that is, clonal propagation by *in vitro* technology, via organogenesis and somatic embryogenesis …

Source: Mátyás, C. (ed.) 1997. IUFRO World Series Vol. 6. Perspectives of Forest Genetics and Tree Breeding in a Changing World. University of Sopron, IUFRO Secretariat Vienna

micropropagation
Micropropagation (in vitro regeneration) of plants may be carried out by following at least one of the two pathways from the somatic tissues. One pathway involves *organogenesis*, ….. the second pathway from somatic tissues may proceed via *somatic embryogenesis*.

Source: Mátyás, C. (ed.) 1997. IUFRO World Series Vol. 6. Perspectives of Forest Genetics and Tree Breeding in a Changing World. University of Sopron, IUFRO Secretariat Vienna

***in vitro* propagation**
micropropagation
The propagation of plants in a controlled, artificial environment, using plastic or glass culture vessels, aseptic techniques and a defined growing medium.
The procedures used for *in vitro* propagation comprise: 1) the selection of suitable explants, their sterilization and transfer to nutrient medium, 2) the proliferation of shoots on multiplication medium and 3) transfer of shoots to a rooting (or storage) medium and planting out.

Source: Boudreault-Lapointe, L. 1988. Plant Biotechnology Vocabulary. Terminology Bulletin 180

micropropagation
Refers to propagation in culture by axillary or adventitious means, a general term for vegetative (asexual) *in vitro* propagation.

Source: Klopfenstein, N. B/Chun, Young Woo/Kim, Mee-Sook/Raj Ahuja, M. (ed.), 1997. USDA Forest Service General Technical Report RM-GTR-297

tissue culture
The growth of isolated plant cells or small pieces of tissue under controlled conditions in a sterile growth medium. The medium is designed to meet the requirement of the tissue involved, e.g. by application of hormones and nutrients.

Source: Schmidt, L., 1997. Tree Improvement Glossary. Technical Note 46. Danida

tissue culture
A general term for aseptic cell, tissue, organ and protoplast culture.

Source: Ahuja, M.R. and Libby, W.J., 1993. Clonal Forestry II. Glossary. Springer Verlag.

tissue culture
The growth and maintenance of cells from higher organisms *in vitro*, outside the tissue of which they are normally a part.

Source: Boudreault-Lapointe, L. 1988. Plant Biotechnology Vocabulary. Terminology Bulletin 180. Issued by the Translation Bureau, Terminology and Linguistic Services Branch

tissue culture
A technique for cultivation cells, tissues, or organs of plants in a sterile, synthetic medium; includes the tissues excised from a plant and the culture of pollen or seeds.

Source: Maynard, C., 1996: Forest Genetics Glossary. SUNY College of Encironmental Science and Forestry. http://www.esf.edu/course/cmaynard/GENE_GLOSSERY.html

25.2 macropropagation

Reference Definition:

Vegetative propagation from cuttings, air-layering, grafting or other large plant part.

As distinguished from -> micropropagation or tissue culture.

french -> **macropropagation**
spanish -> **macropropagación**
german -> **Makropropagation**

Other definitions:

macropropagation
Macropropagation from mature trees is generally difficult and usually employs grafting older scions onto younger rootstocks for rejuvenation of the scion and subsequent propa-

gation. The rejuvenation from mature trees may require serial grafting before *vege-tative propagation*, and this can become labour intensive and time consuming. Further, by conventional methods of *vegetative propagation*, the number of plants that can be multiplied from selected trees in a growing season are often relatively small. The limiting factors for large scale *macropropagation* of selected material may be restricted availability of improved genotypes as planting material, seasonal restrictions, and available space. To overcome these and related problems, biotechnological approaches offer opportunities for not only mass cloning of elite gentopyes throughout the year, but also for *in vitro* rejuvenation, and genetic manipulation of trees (Ahuja, 1988a, 1991a, 1993a).

Source: Mátyás, C. (ed.) 1997. IUFRO World Series Vol. 6. Perspectives of Forest Genetics and Tree Breeding in a Changing World. University of Sopron, IUFRO Secretariat Vienna

25.3 clone/cloning

Reference Definition:

A group of plants derived from a single individual by asexual reproduction and thus having identical genetic constitution.

Clones are named with non-Latin names preceded by the abbreviation "cl".

french -> **clone**
spanish -> **clon**
german -> **Klon**

Other definitions:

clone
A population of genetically identical cells or individuals. Such a population is obtained by mitotic division or by asexual reproduction.

Source: Schmidt, L., 1997. Tree Improvement Glossary. Technical Note 46. Danida

clone
1. To propagate a plant asexually usually by grafting, rooting cuttings, tissue culture, or apomictic seed. Except for an extremely low level of mutation, all plants from a clone are genetically identical. (This is the usage most common in agronomy, horticulture and forestry.) (See ortet and ramet.) 2. To regenerate a whole plant from a single cell.(This usage is common in tissue culture research.) 3. To identify and isolate a gene controlling a specific trait from an organism. (This usage is common in molecular biology.)
4. A group of plants produced from cuttings, stump or root sprouts, tissue culture, or some other method that produces offspring genetically identical to the original plant. Most commonly used in forestry to establish grafted seed orchards, but becoming more common for commercial plantations.

Source: Maynard, C. 1996: Forest Genetics Glossary. http://www.esf.edu/course/cmaynard/GENE_GLOSSERY.html

clone
A population of individuals all originating asexually from the same single parent and, therefore, genetically identical. Clones are named with non-Latin names preceded by the abbreviation 'cl'.

Source: Dunster J. & K. 1996. Dictionary of Natural Resource Management. CAB International.

clone
1.A population of cells all descended from a single cell. 2. A number of copies of a DNA fragment to be replicated by a phage or plasmid.

Source: BioTech Resources. BioTech Life Science Dictionary, BioTechResources and Indiana University

clone
Group of individuals (ramets) derived originally from a single ancestor individual (ortet) by vegetative propagation (e.g. cuttings, grafts, layers) and thus having identical genetic constitution.

Source: Koski, V. et al. Technical guidelines for genetic conservation of Norway spruce (*Picea abies (L.)* Karst.). Euforgen. IPGRI

clone
All plants (ramets) reproduced asexually from a common ancestor (ortet) and having identical genotypes. Named clones are given non-Latin names preceded by the abbreviation "cl.".

Source: Wright, J.W. 1976. Introduction to Forest Genetics. East Lansing, Michigan. Academic Press.

clone
An individual or group of individuals reproduced asexually from a single organism, and therefore genetically identical to the parent/progenitor.

Source: Côté, M. (ed.) 2000. Dictionary of Forestry. Ordre des Ingénieurs forestiers du Québec. Canada

clone
A group of vegetatively propagated organisms consisting of an ortet and its ramets; a cell line of single cell origin; a gene or piece of DNA replicated in a host bacterium; all definitions imply genetically identical material and reproduction by miotic division.

Source: Klopfenstein, Ahuja, M. (ed.) 1997. Micropropagation, Genetic Engineering, and Molecular Biology of Populus; USDA Forest Service General Technical Report RM-GTR-297

clone
A group of plants derived from a single individual (ortet) by asexual reproduction. All members (ramets) of a clone have the same genotype and consequently tend to be uniform.

Source: Snyder, E. B. (ed.) Glossary for Forest Tree Improvement Workers; published for the Society of American Foresters by the Southern Forest Experiment Station, Forest Service, USDA

clone
Group of genetically identical plants produced by vegetatively propagating a single plant over one or more vegetative generations; accomplished in woody plants by rooting stem cuttings, budding, grafting, or air layering.

Source: SAETTEM

26 alien species

Reference definition:

A species occurring in an area outside its historically known natural range as a result of intentional or accidental dispersal by human activities. Also known as introduced species.

Source: Glossary of Biodiversity Terms. UNEP-WCMC. WRI

see also **exotic species**
introduced species

french -> **espèce étrangère**
spanish -> **especie extranjera**
german -> **gebietsfremde Art**

Other definitions:

alien species
"Alien species" (non-native, non-indigenous, foreign, exotic) means a species, subspecies, or lower taxon occurring outside of its natural range (past or present) and dispersal potential (i.e. outside the range it occupies naturally or could not occupy without direct or indirect introduction or care by humans) and includes any part, gametes or propagule of such species that might survive and subsequently reproduce.

Source: IUCN. 2000. IUCN Guidelines for the Prevention of Biodiversity Loss Caused by Alien Invasive Species. IUCN Species Survival Commission (SSC) – ISSG (Invasive Species Specialist Group), 2000.

alien species
"Alien species" (synonyms: non-native, non-indigenous, foreign, exotic): a species, subspecies, or lower taxon introduced outside its normal past or present distribution; includes any part, gametes, seeds, eggs, or propagules of such species that might survive and subsequently reproduce.

Source: Working definitions used by the Global Invasive Species Programme (GISP) (UNEP/CBD/SBSTTA/6/INF/5 Annex II.)

alien plant
Alien plants, also known as exotic, non-native, or nonindigenous plants, are species intentionally or accidentally introduced by human activity into a region in which they did not evolve. Many alien species are well known and economically important in agriculture and horticulture, such as wheat, soybeans, and tulips. Alien species, whether plant or animal, often do not become established outside of cultivation and, if they do, they usually have few impacts on natural communities.

Source: Invasive Alien Plant Species of Virginia. http://www.dcr.state.va.us/dnh/invinfo.htm

27 exotic species

Reference definition:

syn **non-native**

A species which is not native to the region in which it occurs.

Source: A Glossary of Plant Genetic Resources Terms. IBPGR.

see also **alien species**
introduced species

french -> **espèce exotique**
spanish -> **especie exótica**
german -> **exotische Art**

Other definitions:

exotic species
An organism that exists in the free state in an area but is not native to that area. Also refers to animals from outside the country in which they are held in captive or free-ranging populations.

Source: Glossary of Biodiversity Terms. UNEP-WCMC. http://www.unep-wcmc.org/reception/glossary.htm

exotic (= non-native)
A plant grown outside its natural range of distribution, e.g. teak in Africa. Ant. Indigenous.

Source: Schmidt, L. 1997. Tree Improvement Glossary. Technical Note 46. Danida Forest Seed Centre

exotic
Broad definition: A non-native population introduced into a new area. Narrow definition: a species introduced from another country.

Source: Maynard, C. 1996. Forest Genetics Glossary. http://www.esf.edu/course/cmaynard/GENE_GLOSSERY.html

nonnative (= exotic)
A plant grown outside its natural range. Ant. Indigenous. (see indigenous, land race)

Source: Glossary of Terms Used in Forest Tree Improvement. Field Manual No. 6 (RAS/91/004) UNDP/FAO Regional Project, 1994.

nonindigenous
Not existing or having not originated naturally in a particular region or environment

Source: TEACH Great Lakes. Glossary. In: Great Lakes Information Network (GLIN). http://www.great-laeks.net/teach/glossary/

28 indicator species

Reference definition:

A species whose status provides information on the overall condition of the ecosystem and of other species in that ecosystem. Species which flag changes in biotic or abiotic conditions.

They reflect the quality and changes in environmental conditions as well as aspects of community composition.

Source: Heywood,V.H., Watson, R.T. Global Biodiversity Assessment. UNEP.

french -> **espèce indicatrice**
spanish -> **especie indicatora**
german -> **Weiserart**

Other definitions:

indicator species
1. Species, usually plants, used to indicate an ecological condition such as soil moisture or nutrient regime that may not be directly measured. 2. A plant, animal, or microbial species characteristic of, or that displays characteristic responses to, a specific site, habitat, ecosystem, or environmental condition.

Source: Côté, M. 2000. Dictionnaire de la foresterie. Ordre des Ingénieurs forestiers du Québec.

29 introduced species

Reference definition:

An established species not native to the ecosystem, region or country.

see also **alien species**
exotic species

french -> **espèce introduite**
spanish -> **especie introducida**
german -> **eingeführte Art**

Other definitions:

introduced species
A species occurring in an area outside of its historically known natural range as a result of intentional or accidental dispersal by human activities. Also known as alien species.

Source: Biodiversity Glossary of Terms. World Resources Institute. http://www.wri.org/biodiv.html

30 invasive species

Reference definition:

Invasive species are organisms (usually transported by humans) which successfully establish themselves in, and then overcome, otherwise intact, pre-existing native ecosystems

Source: IUCN/SSC Invasive Species Specialist Group

see also **invasive alien species**
introduced species
exotic species

french -> **espèce envahissante**
spanish -> **especie invasiva**
german -> **invasive Art**

Other definitions:

invasive plant
An alien plant spreading naturally (without the direct assistance of people) in natural or seminatural habitats, to produce a significant change in terms of compostion, structure or ecosystem processes.

Source: Cronk and Fuller 1995, Invasive Plants.

invasive species
An introduced species which invades natural habitats.

Source: Heywood,V.H., Watson, R.T. Global Biodiversity Assessment. UNEP

invasive species
An "invasive species" is defined as a species that is 1) non-native (or alien) to the ecosystem under consideration and 2) whose introduction causes or is likely to cause economic or environmental harm or harm to human health (Executive Order 13112).
Invasive species can be plants, animals, and other organisms (e.g. microbes). Human actions are the primary means of invasive species introductions.

Source: Invasivespecies.gov. A gateway to Federal and State invasive species activities and programs. National Agricultural Library for the National Invasive Species Council. http://www.invasivespecies.gov/

invasive species
An invasive species is a species occurring as a result of human activities beyond its accepted normal distribution and which threatens valued environmental, agricultural or personal resources by the damage it causes.
Invasive species include: feral animals; introduced marine pests; weeds; diseases and parasites; dieback caused by the root-rot fungus - Phytophthora cinnamomi; non-native insects and other invertebrates; honeybees; european wasps

Source: Biodiversity. Invasive Species. Natural Heritage Trust. Environment Australia. http://www.ea.gov.au/biodiversity/invasive/index.html

invasive species
Whether they are called invasive, nonnative, alien, exotic, or nonindigenous, introduced species are those that evolved elsewhere and have been purposely or accidentally relocated. While some species have invaded habitats on their own (e.g., migrating wildlife, plants and animals rafting on floating debris), human exploration and colonization have dramatically increased the diversity and scale of invasions by exotic species. Introduced species often find no natural enemies in their new habitat and therefore spread easily and quickly.

Source: Ecological Society of America. Fact Sheet – Invasive Species. http://esa.sdsc.edu/inva3.htm

invasive species
Invasive species are organisms (usually transported by humans) which successfully establish themselves in, and then overcome, otherwise intact, pre-existing native ecosystems. Biologists are still trying to characterise this capability to invade in the hope that incipient invasions can be predicted and stopped. Factors may include: an organism has been relieved of the pressures of predators or parasites of its native country; being biologically "hardy", for example, has short generations and a generalist diet; arriving in an ecosystem already disturbed by humans or some other factor. But whatever the causes, the consequences of such invasions – including alteration of habitat and disruption of natural ecosystem processes – are often catastrophic for native species.

Source: IUCN/SSC (Species Survival Commission) Invasive Species Specialist Group (ISSG). http://www.issg.org/

invasive species
Invasive plants have become recognized in recent years as a major threat to the integrity of natural areas. These species have the ability to invade natural systems and proliferate, often dominating a community to the detriment and sometimes the exclusion of native species. Invasive species can alter natural ecological processes by reducing the interactions of many species to the interactions of only a few species. Introduced species may compete directly with native species for nutrients, sunlight, and space, and indirectly by altering the food web or physical environment. Invasive species may also prey on or hybridize with natives. Native species with limited population size or ecological range are particularly susceptible to displacement by aggressive exotic or translocated species.
… Invasive Species Defined: Most invasive species are ecological pioneers and colonizers which, once introduced, quickly establish themselves in ecologically disturbed communities. Invasive species typically displace native flora due to faster growth rates, efficient dispersal mechanisms, and tolerance of a wider range of conditions. Invasive species often lack natural predators and diseases which control populations in their native environments. As the diversity and populations of native plants decrease, so does the variety of habitats available for wildlife.
For the purposes of this manual, invasive species are described as either exotic (alien), translocated, or opportunistic. Exotics are primarily European and Asian species that have been intentionally or accidentally introduced to North America. Translocated species are native North American species whose pre-settlement range either did not include Wisconsin, or did not include certain areas of Wisconsin in which they are now a problem. Opportunistic species are native colonizers which can dominate certain natural communities and decrease species diversity.

Source: Wisconsin's Invasive Plants. Wisconsin Department of Natural Resources. http://www.dnr.state.wi.us/org/land/er/invasive/intro.htm

invasive
tending to spread, infringe or encroach upon

Source: Glossary. Great Lakes Information Network (GLIN). http://www.great-laeks.net/teach/glossary/

invasive
Any plant that grows aggressively enough to crowd out other plants. Usually, but not always, applied to non-native species.

Source: Native Plants? Glossary of Terms. California Native Plant Society. http://www.cnps.org/activities/terms.htm

immigrant species
Species that migrate into an ecosystem or that are deliberately or accidentally introduced into an ecosystem by humans. Some of these species are beneficial, whereas others can take over and eliminate many native species. Compare with indicator species, keystone species, and native species.

Source: Pidwirny, M. Glossary of Terms. Department of Geography, Okanagan, University College. www.geog.ouc.bc.ca/conted/onlinecourses/enviroglos/

31 invasive alien species

Reference definition:

short **IAS**

Alien species, which becomes established in natural or semi-natural ecosystems or habitat, is an agent of change, and threatens native biological diversity.

Source: IUCN. 2000. Guidelines for the Prevention of Biodiversity Loss Caused by Alien Invasive Species.

see also **invasive species**
alien species

french -> **espèce exotique envahissante**
spanish -> **especie exótica invasiva**
german -> **invasive gebietsfremde Art**

Other definitions:

invasive alien species
Invasive alien species are species introduced deliberately or unintentionally outside their natural habitats where they have the ability to establish themselves, invade, outcompete natives and take over the new environments. They are widespread in the world and are found in all categories of living organism and all types of ecosystems. They are known to

affect biological diversity whether within or outside protected areas and influence ecosystems, natural habitats and surrounding populations. Invasive alien species can cause significant irreversible environmental and socio-economic damages at the genetic, species and ecosystem levels.

Source: Council of Europe/UNEP: Second Intergovernmental Conference "Biodiversity in Europe". Sixth Meeting of the Council for the Pan-European Biological and Landscape Diversity Strategy. 2002

alien invasive species
Different terms are used for alien species generally (non-indigenous, non-native, exotic, foreign, new) and for the subset that cause damage (pest, weed, harmful, injurious, invasive, environmentally dangerous). There are marked differences in use of terms in different sectors. Sanitary and phytosanitary instruments use "pest" and "weed" terminology, backed by clear definitions, and do not distinguish by source or origin: this means they also cover native pest. The International Plant Protection Convention (IPPC) uses the term "quarantine pest" to distinguish by source and by level of damage. Multilateral environmental agreement (MEA) requirements usually refer to "alien" or "exotic" species (almost never defined) in combination with harm/invasiveness criteria to identify those species that should be subject to controls. This generally excludes native species that become invasive.

Source: Council of Europe/UNEP: Second Intergovernmental Conference "Biodiversity in Europe". Sixth Meeting of the Council for the Pan-European Biological and Landscape Diversity Strategy. 2002

invasive alien species
"Invasive alien species": an alien species whose establishment and spread threaten ecosystems, habitats or species with economic or environmental harm. These are addressed under Article 8(h) of the Convention on Biological Diversity (CDB).

Source: Working definitions used by the Global Invasive Species Programme (GISP) (UNEP/CBD/SBSTTA/6/INF/5 Annex II.)

invasive alien species
Alien species are, with respect to a particular ecosystem, any species, including its seeds, eggs, spores, or other biological material capable of propagating that species, that is not native to that ecosystem.[2] When they cause changes in ecosystems, displacing native organisms by predation or parasitism, by competition for space and nutrients or food, or by alteration of habitats, alien species are considered to be invasive. When their impacts are beyond acceptable levels, resulting in environmental damage and economic and social losses, alien species become known as pests. In a more narrow classification, the 1997 revised text of the International Plant Protection Convention (IPCC) defines a quarantine pest as "a pest of potential economic importance of the area endangered thereby and not yet present there, or present but not widely distributed and being officially controlled.
[2] Clinton, W.J. 1999. Executive Order 13112 of February 3, 1999. Invasive Species.

Source: North American Forest Commission. Item 6(b) of the Provisional Agenda. Alien Species Harmful to North American Forests. FAO. FO:NAFC/2000/8(b) April 2000.

invasive alien species
Invasive alien species are now acknowledged as one of the major threats to biodiversity, together with habitat loss and fragmentation. Furthermore, it is predicted that biological invasions will become the major engines of ecological disintegration in the future; this is

because of the increase spread of alien species, due to the greater mobility of human population, rapidly growing transport technology, expanding tourism and travel activities, and world-wide free trade (Cox 1999, Ruesink et al. 1995).

Source: Council of Europe/UNEP: Second Intergovernmental Conference "Biodiversity in Europe". Sixth Meeting of the Council for the Pan-European Biological and Landscape Diversity Strategy. 2002.

invasive alien species

Invasive alien species (IAS) are non-native organisms that cause, or have the potential to cause, harm to the environment, economies, or human health. Invasive alien species (IAS) are one of the most significant drivers of environmental change worldwide. They contribute to social instability and economic hardship, placing constraints on sustainable development, economic growth, and environmental conservation. The direct costs of IAS to a single country can be in the billions of dollars annually. However, the costs to society greatly exceed those that can be measured in currency. …. Failure to address the underlying causes of biological invasion and mitigate the impacts of IAS will result in both losses and gains. We will, for example, lose numerous species, genetic resources, and quite possibly the entire concept of "protected" areas. Poverty, malnourishment, human migration, and disease epidemics will, on the other hand, increase.
Thus far, national and international responses to the IAS problem have been insufficient to counter their increasing toll on our natural resources and society. ….. Although the prevention and control of IAS present scientific, political, and ethical challenges, the problem can be dramatically reduced through concerted action. Stakeholders need to be made aware of the problem and motivated to address it. Scientifically-sound information and effective tools need to be provided to policy makers and resource managers so that well-informed decisions can be enacted. Co-operative programmes need to be forged among governments and other institutions to enable the problem to be addressed in a strategic, holistic, and timely manner.

Source: Global Invasive Species Programme (GISP). Department of Biological Sciences. Stanford University. http://jasper.stanford.edu/gisp/

invasive alien plants

Invasive alien plants, however, escape cultivation and become agricultural pests, infest lawns as weeds displace native plant species, reduce wildlife habitat, and alter ecosystem processes. Across the country and around the world, invasive alien plants and animals have become one of the most serious threats to native species, natural communities, and ecosystem processes. …. Invasive alien plants typically exhibit the following characteristics:

- rapid growth and maturity
- prolific seed production
- highly successful seed dispersal, germination and colonization
- rampant vegetative spread
- ability to out-compete native species
- high cost to remove or control.

Source: Invasive Alien Plant Species of Virginia. http://www.dcr.state.va.us/dnh/invinfo.htm

invasive alien species

As commonly described, an invasive alien species is a species that is new to a region, and has a negative impact on the new environment, either, ecologically, economically or socially. Invasives represent all taxonomic groups and originate from all continents. There

has been a massive mixing of biota globally driven by intercontinental commerce, and this mixing has been both purposeful and accidental. It has led to biotic enrichment as well as impoverishment. While only a small fraction of alien species have become invasive, these few have done enormous damage.
Invasive alien species represent a major disruption for all biotic systems including terrestrial and aquatic, managed and wild. Invaders can have enormous economic and human health impacts as well as degrading many system properties that society values. Invasive alien species have altered evolutionary trajectories, disrupted community and ecosystem processes, and caused large economic losses. There is a long list of ways that invasives can threaten the goods and services provided by natural systems and upon which society depends. Invasives can disrupt fire cycles, deplete water supplies, cause disease, decimate crops, forests and fisheries, impede navigation, clog water works, destroy grazing lands, homes and gardens, eliminate species, and even cause noise pollution.
Invasives pose special challenges for their control and eradication. Invasive microorganisms and insects, in particular, can quickly evolve responses to control efforts. Invaders alter and respond to community interactions in complex ways. As the global movement of people and goods increases, so too does the movement of potential invasive material. At the same time, other global changes — like climate change — mostly favor invasives.

Source: Mooney, H. Stanford University. Invasive Alien Species: The Nature of the Problem. American Association for the Advancement of Science. http://www.aaas.org/international/africa/invasives/mooney.shtml

invasive non-native species
Species of plants and animals that are not native (natural) to an area are known as: non-native species, introduced species, exotic species, non-indigenous species, alien species, transplants, invasive species.
Established ecosystems have developed their own natural balance and controls over time, and the plants and animals within those systems find this balance suitable for survival, or they have been able to adapt in order to survive within those conditions. When non-native species from other ecosystems are introduced, they can upset that balance and bring harm to the established plants and animals, and the whole ecosystem. Non-native species come from somewhere else and they are not natural to the ecosystem they have been introduced to. They may be harmless and beneficial in their natural surroundings, but they can totally devastate different environments. When alien species enter into an ecosystem, they can disrupt the natural balance, reduce biodiversity, degrade habitats, alter native genetic diversity, transmit exotic diseases to native species, and further jeopardize endangered plants and animals. When there are no established natural controls, such as predators to keep the non-native harmful species in check, there can be a population explosion of the invasive non-native species causing an ecological catastrophe.
Not all non-native species are invasive and harmful. But many can completely take over and entirely change whole established ecosystems. These are the non-natives that *invade* an established environment; therefore, they are *invasive*.

Source: Invasive Non-Native Species. Eco-Pros. http://www.eco-pros.com/invasive_non-native_species.htm

32 keystone species

Reference definition:

A species whose loss from an ecosystem would cause a greater than average change in other species populations or ecosystems processes; species that have a disproportionately large effect on other species in a community.

Source: Heywood,V.H., Watson, R.T. Global Biodiversity Assessment. UNEP.

see also **indicator species**
native species

french -> **espèce clé**
spanish -> **especie clave**
german -> **Schlüsselart**

Other definitions:

keystone species
Species that interacts with a large number of other species in a community. Because of the interactions, the removal of this species can cause widespread changes to community structure. Compare with immigrant species; indicator species, and native species.

Source: Pidwirny, M. Glossary of Terms. Department of Geography, Okanagan, University College. www.geog.ouc.bc.ca/conted/onlinecourses/enviroglos/

keystone species
A species that plays an important ecological role in determining the overall structure and dynamic relationships within a biotic community. A keystone species presence is essential to the integrity and stability of a particular ecosystem.

Source: Glossary of Forestry Terms. Government of British Columbia. http://www.for.gov.bc.ca/pab/publctns/glossary/glossary.htm

key species
A species which must, because of its importance, be considered in the management program.

Source: Côté, M. (éd.) 2000. Dictionnaire de la foresterie. Ordre des ingénieurs forestiers du Québec.

keystone species
A species that plays a pivotal role in an ecosystem and upon which a large part of the community depends.

Source: Reed F. Noss, Allen Y. Cooperrider (1994) Glossary of Conservation Terms. http://www.msu.edu/~jaroszjo/greenway/glossary/glossary.htm

33 native species

Reference definition:

syn **indigenous**

> **Plants, animals, fungi, and microorganisms that occur naturally in a given area or region.**
>
> *Source*: Glossary of Biodiversity Terms. UNEP-WCMC. WRI.

french -> **espèce indigène**
spanish -> **especie indigena**
german -> **einheimische Art**

Other definitions:

native species
Species that normally exists and reproduces in a specific region of the Earth. Compare with immigrant species, indicator species, and keystone species.

Source: Pidwirny, M. Glossary of Terms. Department of Geography, Okanagan, University College. www.geog.ouc.bc.ca/conted/onlinecourses/enviroglos/

native
A plant or animal indigenous to a particular locality.

Source: Glossary of Biodiversity Terms. UNEP-WCMC. http://www.unep-wcmc.org/reception/glossary.htm

native species
A species which is a part of the original flora of the area.

Source: A Glossary of Plant Genetic Resources Terms (English/Arabic). International Board for Plant Genetic Resources.

indigenous, (indigenous species)
Species native to the country or area. Ant. Nonnative or exotic. (see exotic, land race, nonnative.)

Source: Glossary of Terms Used in Forest Tree Improvement. Field Manual No. 6 (RAS/91/004) UNDP/FAO Regional Project on Improved Productivity of Man-Made Forests Through Application of Technological Advances in Tree Breeding and Propagation. FAO, 1994.

34 naturalized species

Reference definition:

An intentionally or unintentionally introduced species that has adapted to and reproduces successfully in its new environment.

french -> **espèce naturalisée**
spanish -> **especie naturalisada**
german -> **eingebürgerte Art**

Other definitions:

naturalization
A concept by which, after some time or generations, immigrants or their descendants are considered to be native.

Source: Glossary of Expressions in Biological Control. http://biocontrol.ifas.ufl.edu/glossary.htm

naturalization
Introduced and cultivated plants that have spread from the cultivated areas into the wild where they spread and multiply by natural regeneration. Antonym: Domestication.

Source: Schmidt, L., 1997. Tree Improvement Glossary. Technical Note 46. Danida Forest Seed Centre

naturalized
Pertaining to a plant that was introduced but that is well established, acclimatized for several years, thus constituting an integral part of a region's flora.

Source: Côté, M. 2000. Dictionnaire de la foresterie. Ordre des Ingénieurs forestiers du Québec.

35 weed/weediness

Reference definition:

An aggressive, invasive, easily dispersed plant, one which commonly grows in cultivated ground to the detriment of a crop.

Source: Van Den Bosch, R. et al. An Introduction to Biological Control, 1982

french -> **mauvaise herbe**
spanish -> **mala hierba**
german -> **Unkraut**

Other definitions:

weed
A plant growing where it is not wanted. Generally used to describe plants which colonize readily, and can compete for resources with a planted crop.

Source: Zaid, A. et al. 1999. Glossary of biotechnology and genetic engineering. FAO

weed
A plant which is adapted to disturbed or open habitats, it may have a particular ability to take advantage of human disturbances.

Source: A Glossary of Plant Genetic Resources Terms (English/Arabic). IBPGR

weed
Generally, the term weed is used to describe any plant that is unwanted and grows or spreads aggressively. The term exotic weed describes an invasive unwanted non-native plant. Terms such as invasive weed or noxious weed are used somewhat interchangeably to refer to weeds that infest large areas or cause economic and ecological damage to an area. The term „noxious" weed has legal ramifications in some states that maintain official lists of noxious weeds. What is considered a weed in one area may not be a weed in another.

Source: How to Prevent the Spread of Noxious Weeds. Bureau of Land Management Environmental Education Homepage. http://www.blm.gov/education/weed/whats_a_weed.htm

weed races
Races of plants which are adapted to habitats disturbed by man.

Source: A Glossary of Plant Genetic Resources Terms (English/Arabic). IBPGR

weediness
The ability of a plant to colonize a disturbed habitat and compete with cultivated species.

Source: Zaid, A. et al. 1999. Glossary of biotechnology and genetic engineering. FAO Research and Technology Paper No. 7. http://www.fao.org/DOCREP/003/X3910E/X3910E00.htm

weeding (silviculture)
(1) (Cw part) Generally, a cultural operation eliminating or suppressing undesirable vegetation, mainly herbaceous, during the seedling stage of a forest crop and therefore before the first cleaning, so as to reduce competition with the seedling stand.
(2) (Cw) more particularly, to eliminate interfering (and largely herbaceous) vegetation, as commonly in nursery beds. Cf. thinning out.
Note: if either (1) or (2) is done by chemicals, termed chemical weeding.

Source: Ford-Robertson, F.C. Terminology of Forest Science, Technology Practice and Products. Society of American Foresters, FAO/IUFRO Committee on Forestry Bibliography and Terminology. 1971.

weed tree (s.c.) (silviculture)
(1) [Cw] Any tree of a species having little or no economic value on the site in question.
(2) > wolf tree
A tree of little or no economic value, more particularly when menacing one or more desirable timber trees at any stage of development and therefore due for elimination from the crop.

Source: Ford-Robertson, F.C. Terminology of Forest Science, Technology Practice and Products. Society of American Foresters, FAO/IUFRO Committee on Forestry Bibliography and Terminology. 1971.

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