
Sources of Forest
Reproductive Material

European Union regulations

Council Directive 1999/105/EC on the marketing of forest reproductive material

Commission Regulation (EC) No 1597/2002, laying down detailed rules for the application of Council Directive 1999/105/EC in respect of the format of national lists of basic sources of forest reproductive material

Commission Regulation (EC) No 1602/2002, laying down detailed rules for the application of Council Directive 1999/105/EC in respect of the authorisation of a Member State to prohibit the marketing of specified forest reproductive material to end-users

Commission Regulation (EC) No 2301/2002, laying down detailed rules for the application of Council Directive 1999/105/EC in respect of the definition of small quantities of seed

Commission Regulation (EC) No 1598/2002, laying down detailed rules for the application of Council Directive 1999/105/EC in respect of the provision of mutual administrative assistance by official bodies

Council Decision (EC) No 971/2008 on the equivalence of forest reproductive material produced in third countries

Council Decision (EC) No 989/2008, authorizing Member States to adopt decisions in accordance with Council Directive 1999/105 / EC on the same guarantees granted in respect of forest reproductive material to be imported from certain third countries

Regulations of the Czech Republic:

"Act on Forests" No. 289/1995 Coll. (Section 29)
Regulation No. 139/2004 Coll.
"Act on Trade in Forest Reproductive Material" No. 232/2013 Coll.
Regulation No. 29/2004 Coll.

1. Reproductive material

seed material
(cones, infructescenses, fruits, seeds)



parts of plants
(cuttings, grafts, explants, shoots ...)



planting stock
(plants from seeds, from parts of plants or from natural regeneration)


Do not harvest seeds or remove tree seedlings from forests!

1.1 Sources of forest reproductive material

1.1.1 Source of seeds

- tree in or outside of forests
- only for the harvesting of seed material

1.1.2 Stand

- the most common source of reproductive material

- for harvesting seed material and planting stock from natural regeneration

Efforts to reproduce quality stands ⇒ classify stands

⇓

Phenotype classification of stands

Stands of the following species are classified:

- **alder (*alnus* sp.), poplar (*populus* sp.), birch (*betula* sp.)**
  … from 30 years
- **Douglas fir (*Pseudotsuga menziesii*), eastern white pine (*Pinus strobus*), grand fir (*Abies grandis*)**
  … from 40 years
- **other trees**
  … from 60 years

Classification criteria:

1. information about origin

- **autochthonous indigenous stand** (same natural forest area and location)
- **autochthonous non-indigenous stand** (same natural forest area, different location)
- **non-autochthonous non-indigenous stand** (different natural forest area)

2. volume production

- **according to the mean value of the volume increment of wood mass**

3. health condition

- **damage due to harmful factors, resistance, adaptability**

4. morphologic characteristics of trees

- **especially straightness, fullboledness, trunk circular cross-section, suitable branching type, good natural pruning ability of the trunk and minimum proportion of twin-trunks**

5. wood quality

- **probability of the occurrence of resonance and other valuable cutouts, heartwood, sapwood, etc.**

Phenotype classes:

A - highly economically valuable stands

- autochthonous or non-autochthonous, but excelling in quantity or quality of production, morphological characteristics and resistance, or in other valuable characteristics

B - other stands of above-average economic value

- both autochthonous and non-autochthonous, above-average volume production and morphological characteristics and good health condition

C - stands of average economic value

- average production and good health condition

D - genetically and economically unsuitable stands

- stands unsuitable in terms of genetics and management or those in worse health condition or with notably worse quality
- suitable for reconstruction

1.1.3 Seed orchard

- purposeful planting of selected clones (grafts) or reproductive material obtained from a parent of a family that is isolated or managed so that pollination from plants outside the orchard is minimised

Goals:

- **facilitate intercrossing of quality individuals**
- **accelerate the start of fertility**
- **make harvesting easier**

Principles of seed orchard establishment

- **most commonly, seed orchards are established with Norway spruce, Scots pine and European larch, but also with lime, maple, elm, cherry, pear...**

(the efficiency of beech, oak and fir seed orchards is low)

- **graft source = individuals of exceptional quality (clone ortets)**
- **establishment in suitable conditions** (climate, soil, exposition...)
- **area** of 4-5 ha, **spacing** of 10 x 10 to 12 x 12 m
- **sufficient number of clones** (genetic variability)

Seed orchard area	Min. number of clones
2 ha	36 clones
2-3 ha	49 clones
up to 5 ha	64 clones
above 5 ha	81 clones

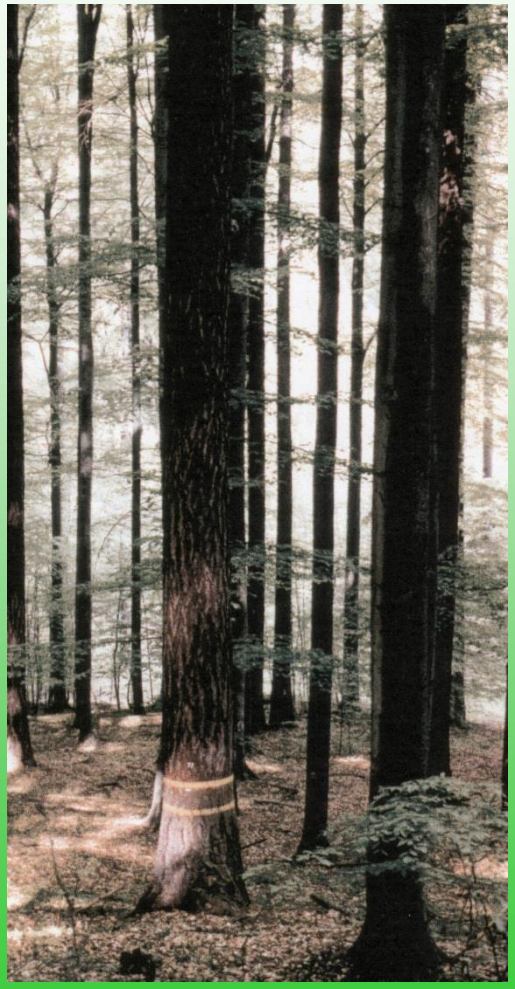
- **isolation from other stands of the same tree species**

Project:

1. **deciding on the location** of the seed orchard
2. **tree species** for which the seed orchard is being founded
3. **number and list of clones,** including their origin and provenance
   - a sufficient number of clones - efforts to secure desired genetic variation of the seed produced
4. **planting plan (placement of grafted plants)**
   - the goal is to create preconditions for panmyxia (even pollination between the clones)
   - the same clones must not be adjacent in order to limit the likelihood of self-pollination and inbreeding
   - inbreeding results in growth depression or the creation of empty seeds
5. **distance from stands of the same tree species**
   - pollination from foreign pollen reduces genetic gain
   - stands of the same tree species in the surroundings should be felled in preference or the seed orchards should be established in stands of other tree species

1.1.4 Parent of family

= a tree intended for production of progeny by controlled or free pollination



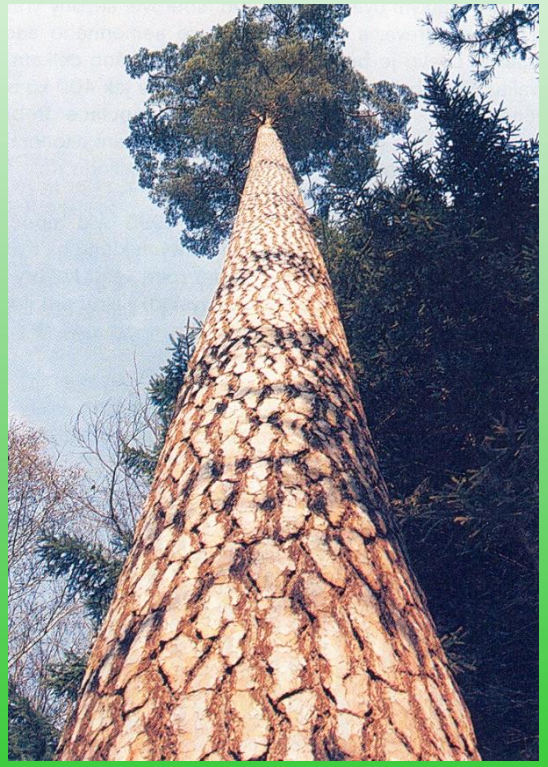
- **excels in:**
  - **volume production**
  - **morphological quality**
  - **other possible characteristics**

- **for generative reproduction**

1.1.5 Clone

= a vegetative progeny of one original individual

- **original individuals (clone "ortets") are exceptionally high quality trees** ... ditto parent of family
- **for vegetative reproduction (establishment of seed orchards)**



Note:

- parent of family for seed harvesting
- clone ortet for graft collection

1.1.6 Clonal mixture

= a mixture of specified clones with certain proportions

- **identifiable clones (ramets)**
- **for vegetative reproduction**
- **example:**
  - **a parent tree (graft collection for vegetative reproduction)**
  - **a clone archive (archiving trees with threatened existence, preserving their genotypes)**

2. Certification of sources of reproductive material

= official approval for collection of reproductive material

All reproductive material for forest regeneration must come from certified sources!!!

- **the owner of the source sends an application to an authorized person** (Forest Management Institute)

- the authorized person makes a decision based on local investigation (not necessary for identified sources)**, issues a certificate and assigns a registration number**

- central register of certified sources (ERM) managed by the authorized person + National Resource List managed by the Ministry of Agriculture

2.1 Requirements for source approval

The source of identified reproductive material

can be approved:

a) the source of seeds
b) stands of phenotype class C (or A or B if they were not approved as sources of selected or tested reproductive material)

Requirements: none, only field identification is required (e.g. GPS coordinates)

Source of selected reproductive material

- phenotype classes A or B can be approved

Requirements:

- stands of phenotype class D must be no closer than 100 m from stands of class B and 200 m from stands of class A
- an area of at least 1 ha
  (a smaller area is only possible for stands created by ownership division or for remnants of valuable populations, but the minimum number of trees is 40)
- species purity 99%
- homogeneity
- adaptation to the site

Sources of qualified reproductive material

- seed orchards, parents of families, ortets, clones, clonal mixtures can be approved

Requirements:

a seed orchard

- the number and positioning of clones according to the project
- good health condition
- fertility has started (> 50% of clones are fertile)

parent of family, clone ortet

- trees with the required characteristics, identifiable in the field
- marked with two yellow stripes and a registration number

clonal mixture

- identifiable clones
- sufficient genetic diversity

Sources of tested reproductive material

that can be approved:

- stands, seed orchards, parents of families, ortets, clones, and clonal mixtures whose characteristics have been verified by comparative or genetic tests

Source	Categories of reproductive material			
	identified	selected	qualified	tested
Method of source selection	no selection	mass selection	individual selection	after the verification of genetic characteristics
source of seeds	x			
stand	x	x		x
seed orchard			x	x
parent of family			x	x
clone			x	x
clonal mixture			x	x

2.2 General principles of source certification

- approval **for all tree species**
- **for a fixed period** (usually the period of the forest management plan validity)
- reproductive material of **Norway spruce, Scots pine, European larch and Euro-Japanese larch** can be introduced to the market and used only as **selected, qualified or tested**
- each “certified unit” has a **registration number**

Certified unit

= one or more approved sources providing reproductive material of the same category

...proposed by the authorized person

- sources of identified and selected reproductive material

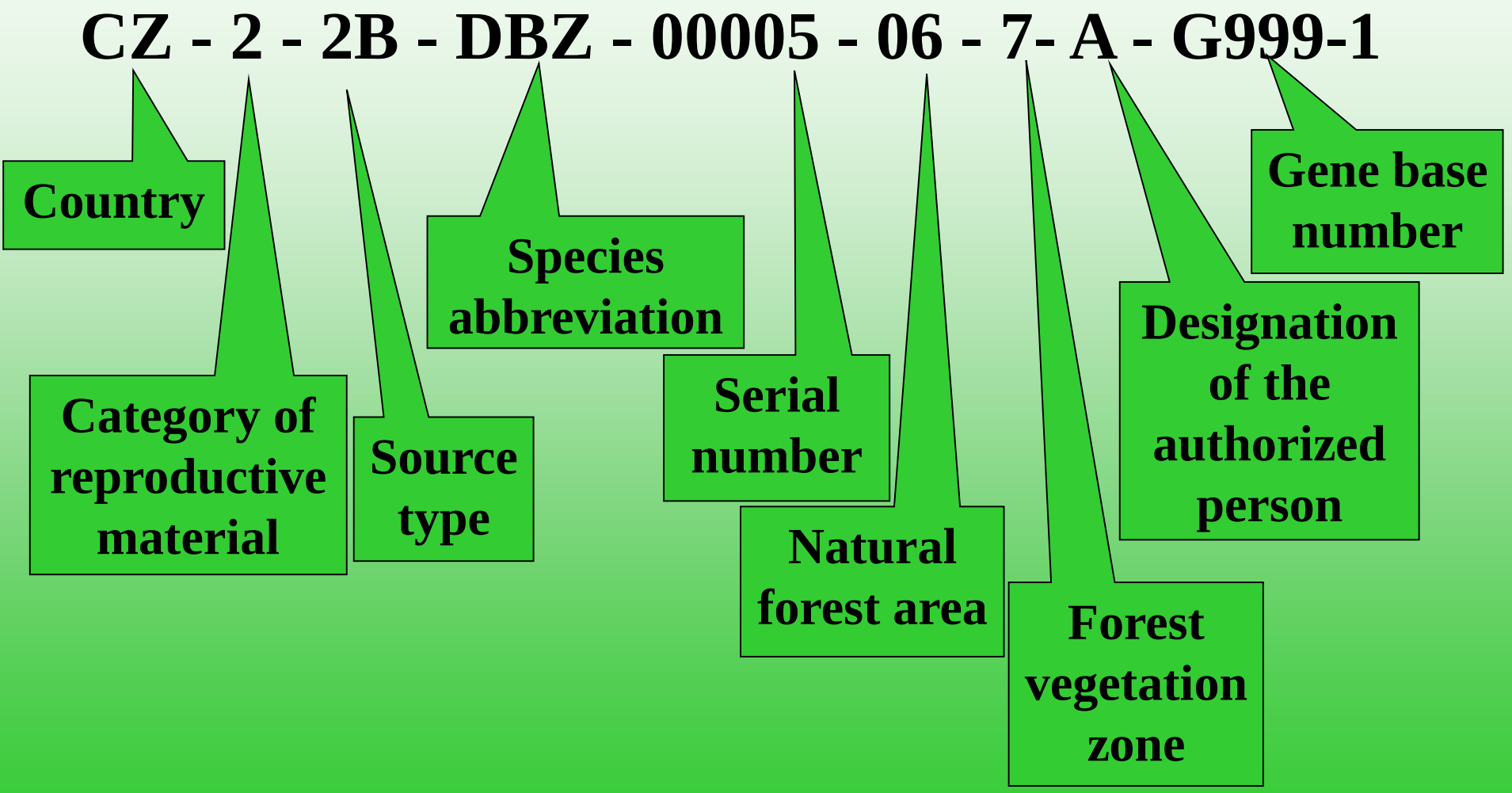
stands of phenotype class A must not be combined into one certified unit!

stands of phenotype class B and C may be combined within the:
- same phenotype class
- same tree species
- same owner
- same area of provenance
- same forest vegetation zone
- same gene base

- sources of qualified and tested reproductive material

must not be combined!

Registration number of an certified unit



- **an authorized person may set a protection period (postpone harvesting) for sources of selected and tested reproductive material**

During the protection period - planned felling only after approval by the authorized person, for the purpose of:

- seed harvesting
- improving stand quality
- supporting natural regeneration

3. National program for the protection and reproduction of forest tree species gene pools

Gene bases

= complexes of forest stands with a significant proportion of **valuable regional populations** of trees with an area sufficient to **maintain the biological diversity** of the population, which is able to **reproduce itself**