

Decentralized tree improvement in □ ecological managed forests

Hubert Wellendorf
Royal Vet- and Agric University, Dep of Economics and Natural Resources,
Arboretum, Hørsholm, Denmark. Hwe@kvl.dk

Idea:

Basically,

tree breeders have only one shot in the gun

-

and that is with

afforestation

or with

**introduction of
new species or provenances**

This puts even more stress on the breeder
and there may only be room for
the ultimate deployment strategy:

-

place your best genotypes directly in the forest
and

let nature and foresters take care of successive
improvement and
further evolution of local strains.

Clone-mixtures are a prerequisite

Demands:

- Worthwhile genetic gain at the mature stage
- Sufficient genetic diversity for future evolution - man-made and/or by natural selection.

Traditional breeding in the form of centralized clonal- or seedling seed orchards are time-consuming, and especially seedling seed orchards based on OP-progeny of mature plus-trees rely much on within-family early selection.

The proposed strategy is outlined in the following flow-chart:

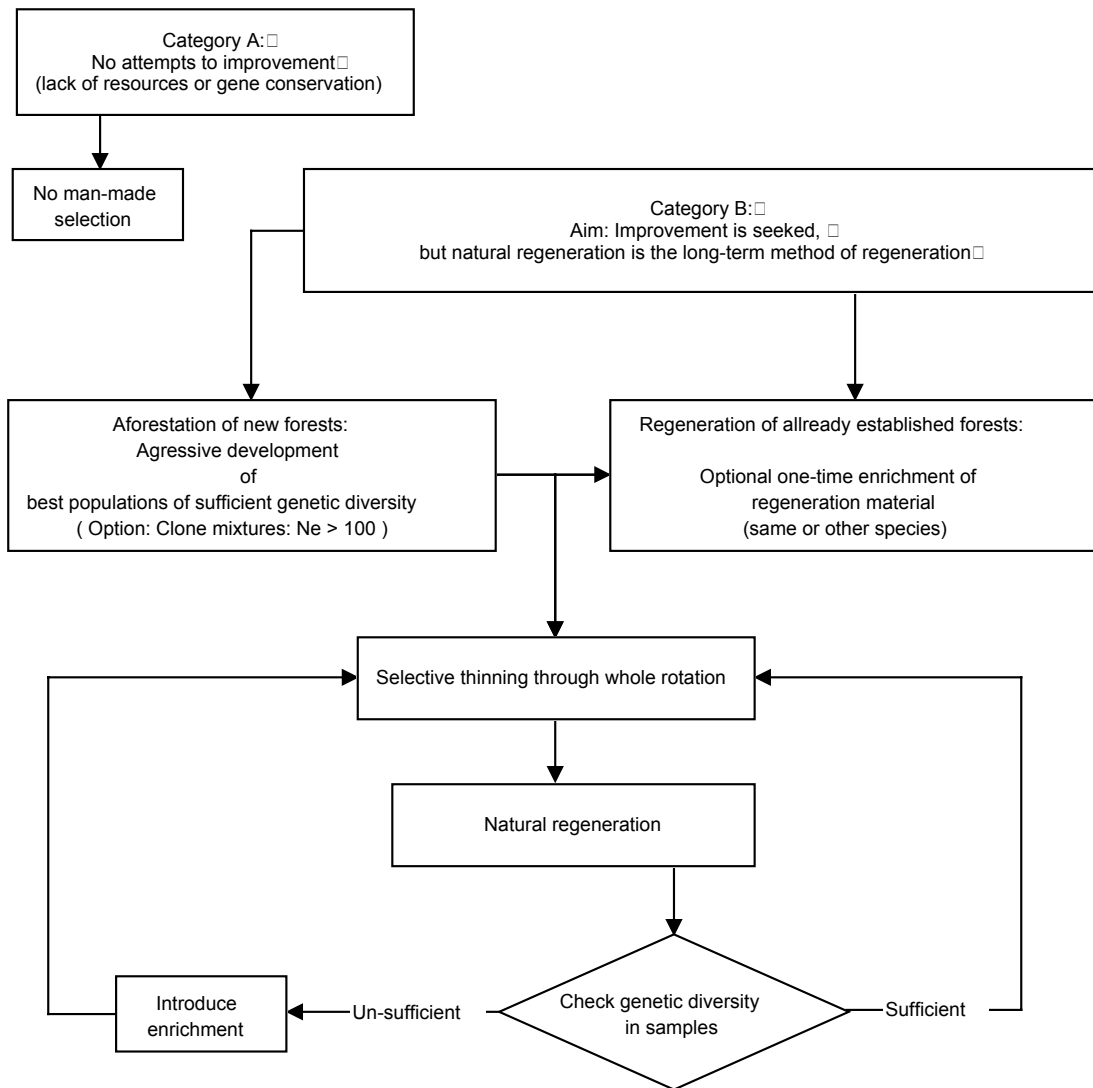
Decentralized tree improvement in ecological managed forests

Hubert Wellendorf
Royal Vet- and Agric University, Dep of Economics and Natural Resources,
Arboretum, Hørsholm, Denmark.

Basic idea:

The developed options assume, that natural regeneration is prevailing . From a breeding point of view this implies, that once a forest is established or regenerated by planting, further improvement must be performed "in situ," i.e. without inclusion of external genetic material other than the inevitable geneflow through migrating pollen clouds. However, optional one-time enrichment may be accepted.

A typical species in this category is **beech** in Central and Northern Europe. The developed options refer to Danish conditions where natural provenances as well as imported provenances from central Europe have been planted and where the present trend is to convert to natural regeneration and convert pure stands to mixtures with other species.



In the proposed strategy, individual forest districts are acting as decentralized managers of the improved gene resources in the form of stands initiated with clone mixtures founded by heavily selected mature plus-tree. During the rotation, they may be object for selective thinning on phenotypes - and this gives the opportunity to accumulate further gain on top of the response obtained with the original plus-tree selection.

However, as a result of this, the genetic diversity may decline - and therefore a check of diversity may be performed with molecular markers. The marker-genotype of individual clones is supposed to be determined during the vegetative propagation.

Pro- and contra's for the suggested strategy:

PRO	CONTRA
• Tree Improvement in ecological managed forestry applying natural regeneration	• Requires development of tissue culture techniques to operational level
• Dynamic adjustment over time and site type in composition of clone-mixtures for aforestation	• Requires convincing arguments to get the idea accepted by ecologists and the general society
• Revival of foresters interest in selective thinning	
Other aspects	
• The improvement is decentralized in the sense, that each forest district is responsible for developing it own “land race” - partly composed of different initial clone mixtures and partly through different systems of selective thinning.	