

Seed orchard management in Germany

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Content

- Regulations
- Statistics
- Management recommendations
- Examples
- Tested seed orchards

German Act for Forest Reproductive Material

- in accordance with the EC Directive on the marketing of forest reproductive material 1999/105
- 26 species and one genus
- seed orchards in categories “qualified” and “tested”
- minimum requirements are regulated

How to establish a seed orchard in Germany

A new seed orchard has to be authorised by the responsible authority

➤ this authority checks:

- purpose (forestry, gene conservation ...)
- genetic diversity (number of clones, ramets per clone)
- isolation (more than 400 m to populations of poor phenotype)
- design (similar number of ramets/clone, good cross pollination, no selfing)
- location



Scots pine graft (Photo: D. Schneck)

Selection of plus trees for seed orchards

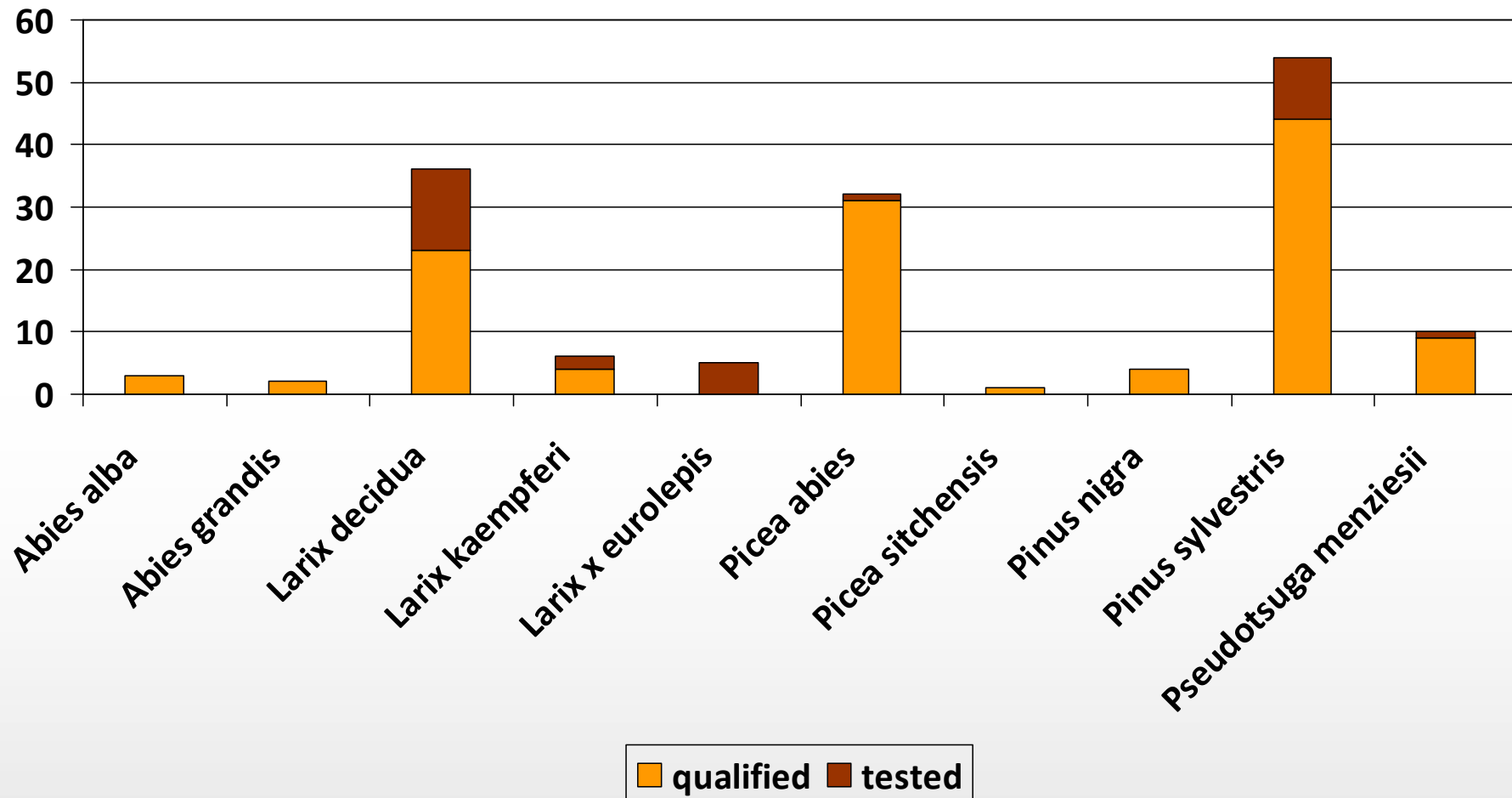
Requirements:

- age → 20 years (Poplar) to 70 years (fir, beech, oak)
- well adapted, good health status, resistance
- superior volume growth
- wood quality (e.g. no spiral growth)
- good stem form
- crown architecture (branching, no forks, branch angle)

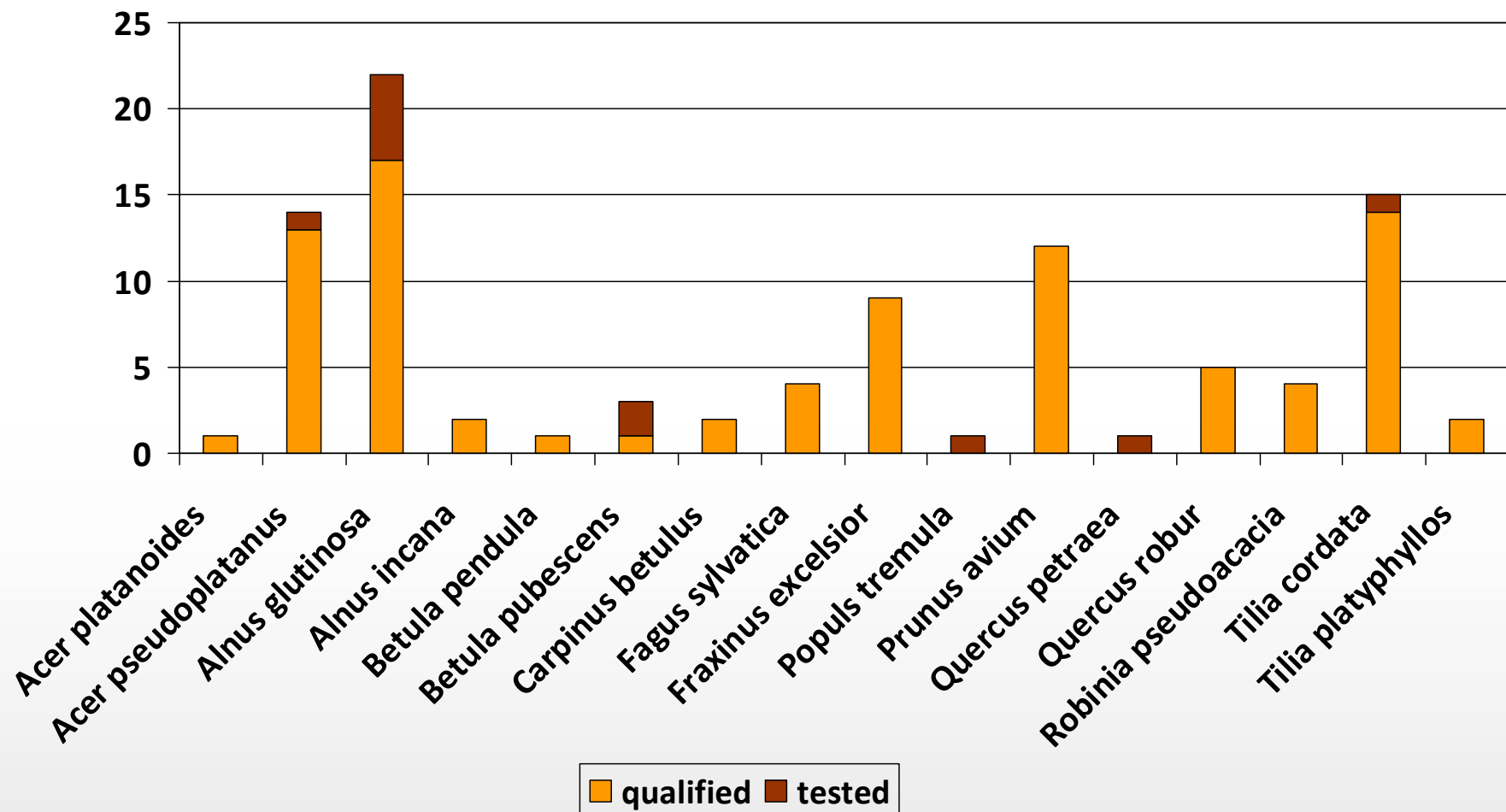


wild cherry plus tree (Photo: D.Schneck)

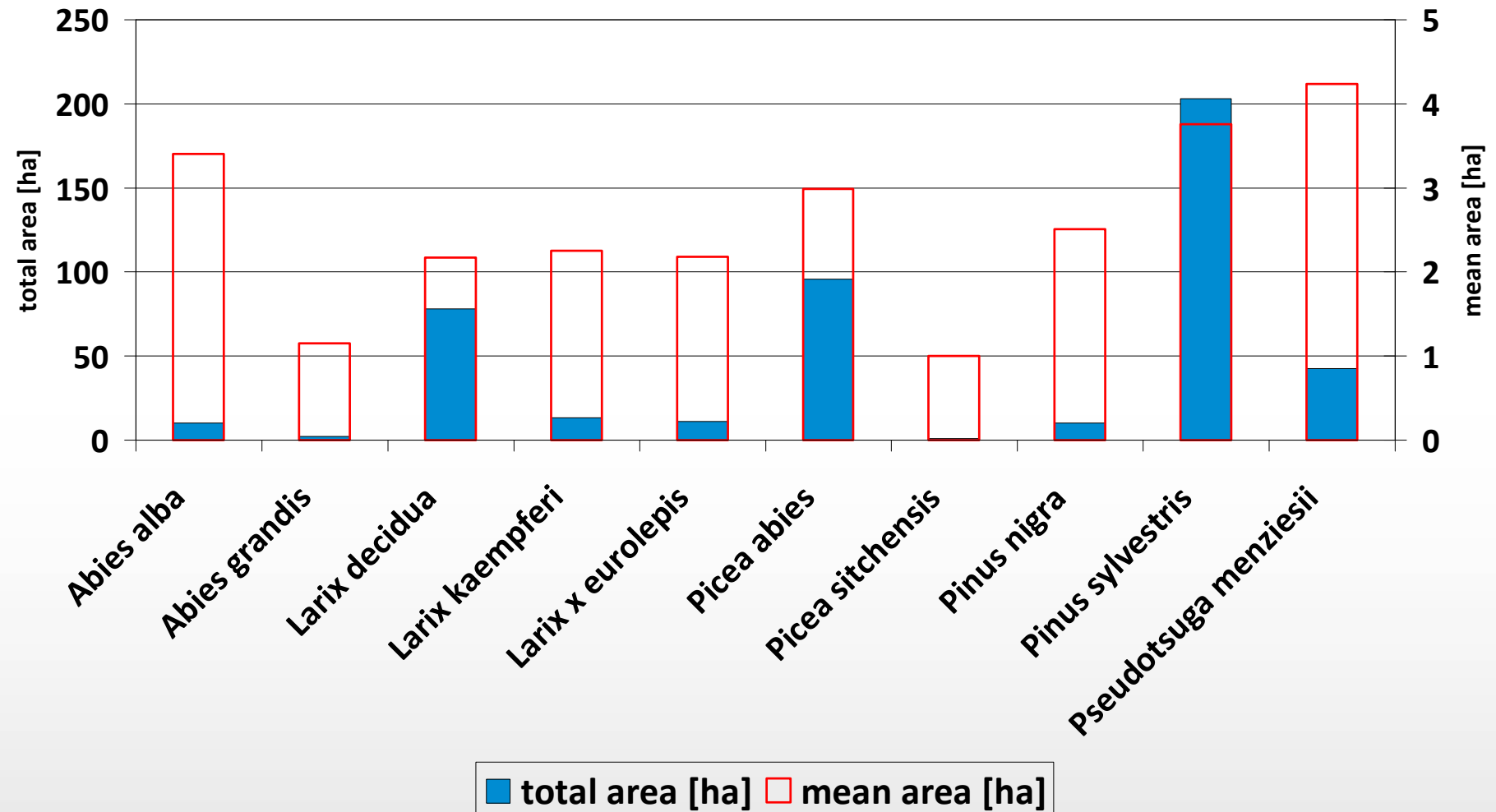
Seed orchards in Germany - conifers



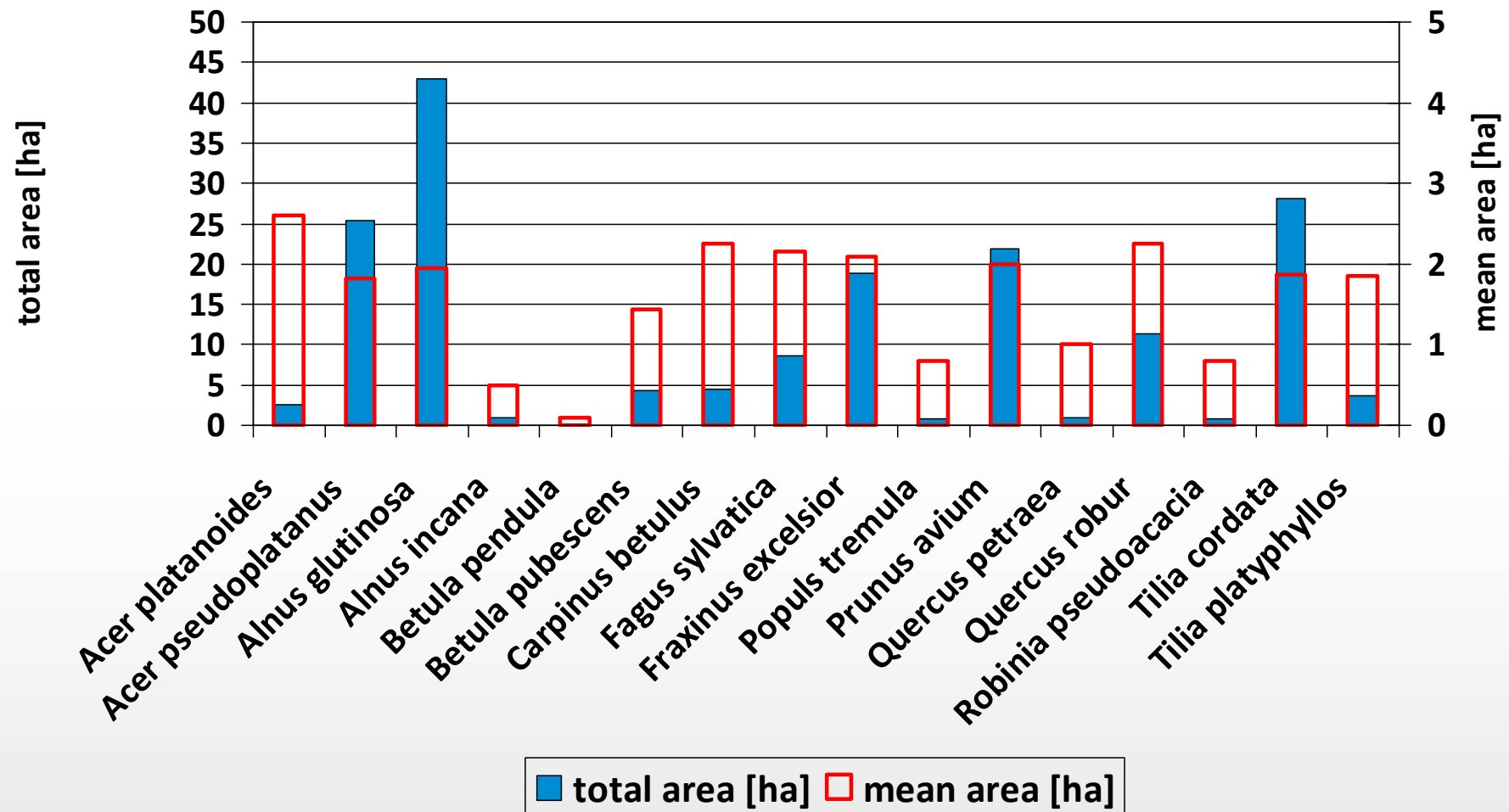
Seed orchards in Germany - broadleaves



Area of seed orchards in Germany - conifers



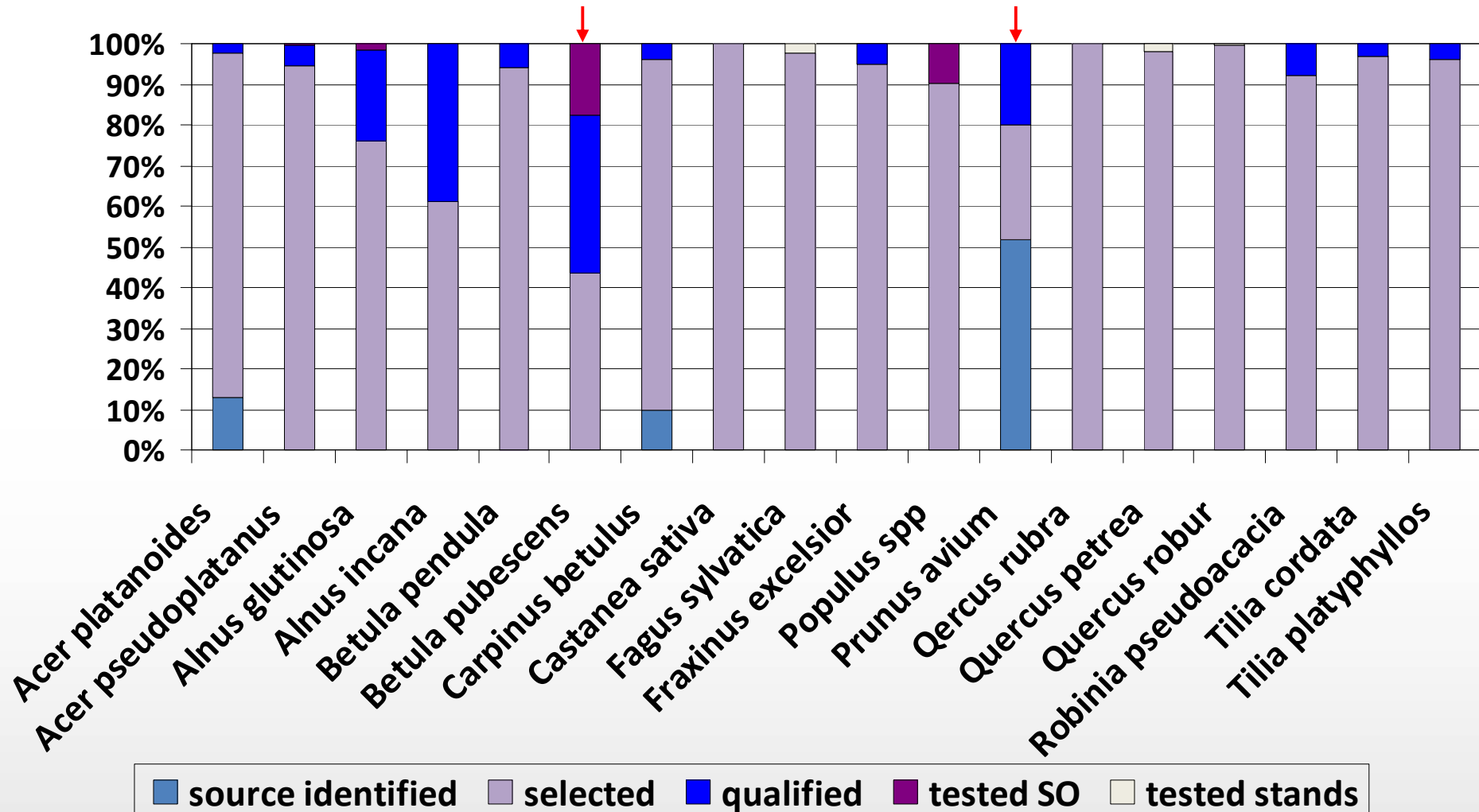
Area of seed orchards in Germany - broadleaves



Percentage of different categories of FRM for seed yield 2003/04 to 2011/12 - conifers



Percentage of different categories of FRM for seed yield 2003/04 to 2011/12 - broadleaves



Recommendations for management of seed orchards – Example Brandenburg I

- spacing 5 x 5 m, 8 x 4 m
- fencing
- new established orchards – tillage and mowing within and between the rows
- after 3 years mowing and cutting of naturally regenerated plants if necessary
- top pruning starts if trees become taller than 2 m
- limitation of tree height (< 6 m), reduce longer branches
- no pruning for fir, Douglas fir and (spruce)

Recommendations for management of seed orchards – Example Brandenburg I



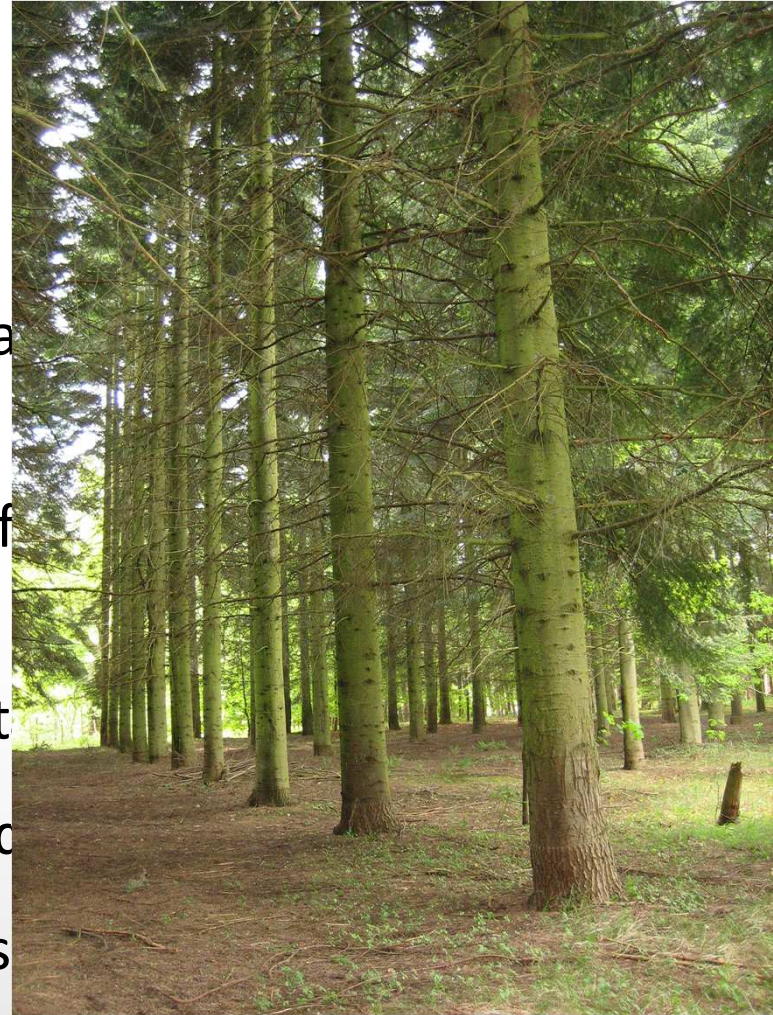
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Recommendations for management of seed orchards – Example Brandenburg II

- combination of pruning and seed harvest
- fertilization only after foliar and/or soil analysis
- no treatments for flower stimulation
- documentation



Scots pine seed orchard – „Lug-Rostock“

- category “tested”
- established 1988
- 24 clones
- 7.8 ha
- seed yield 2009 and 2010 – about 10 kg/ha



Seed orchard European larch - pruning



Douglas fir seed orchard „Kahlenberg – Humptulips“

- plus trees selected in an old IUFRO-provenance trial
- 37 clones of provenance „Humptulips“
- established 1990 under a shelter of poplars (against frost)
- grafts and cuttings
- 2.3 ha
- first harvest 2004
- 2011 seed yield 14 kg /ha
- since 2011 planting of a new orchard with the same material



Norway spruce – conservation seed orchard

- conservation of an autochthonous population of lowland spruce from Lower Lusatia
- established 1995/96
- 60 clones
- seed production has started



Small-leaved lime



Black locust

- established 2005
- 25 clones
- special design and management
- since 2010 seed production



Tested seed orchards

two ways:

- comparative testing
- evaluation of components

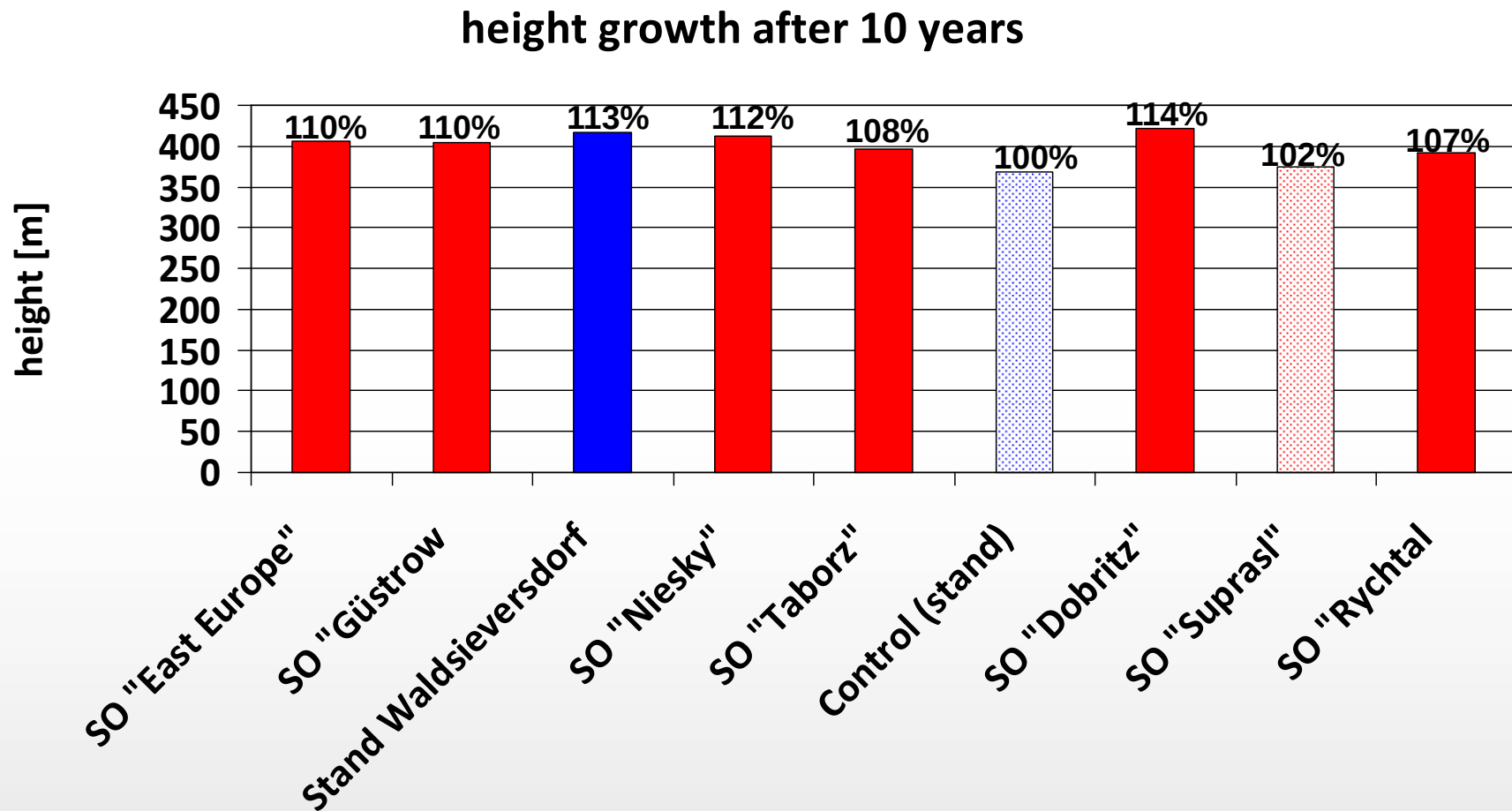
Comparative testing:

- seed orchards have to flower and produce seeds 8 – 15 years
- seed harvest, plant production, trial establishment 3 – 7 years
- measurement and analysis 10 – 20 years

Comparative Testing of offspring of Scots pine seed orchards

- orchards established between 1978 and 1985
- seed harvest 1995-1997 → 8 orchards, 2 stands
- plant production 1997-1998
- test plantations 1999 → 3 sites,
- measurement and analysis 2008/09
- approval of 7 orchards in the category tested 2010

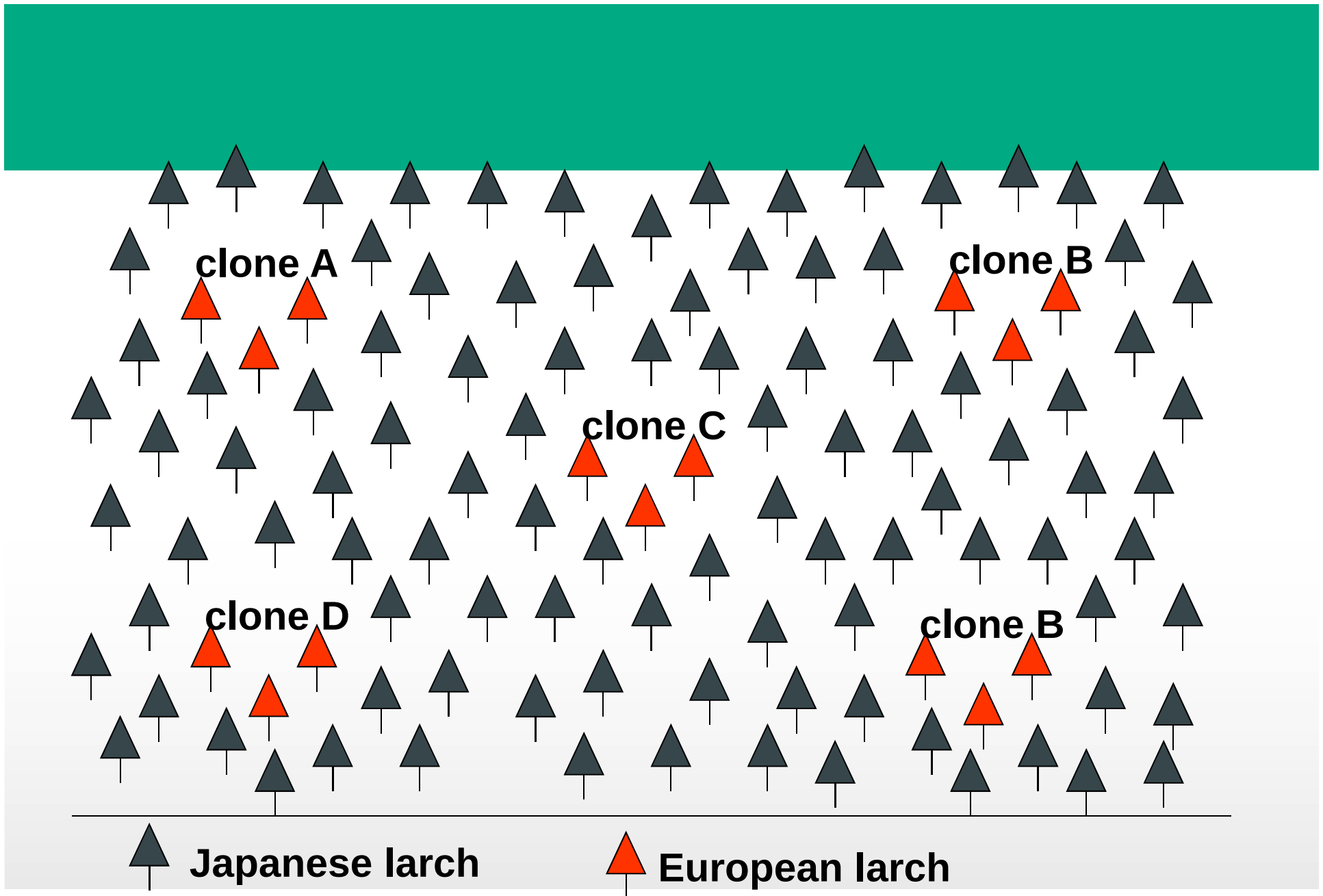
Comparative Testing of offspring of Scots pine seed orchards



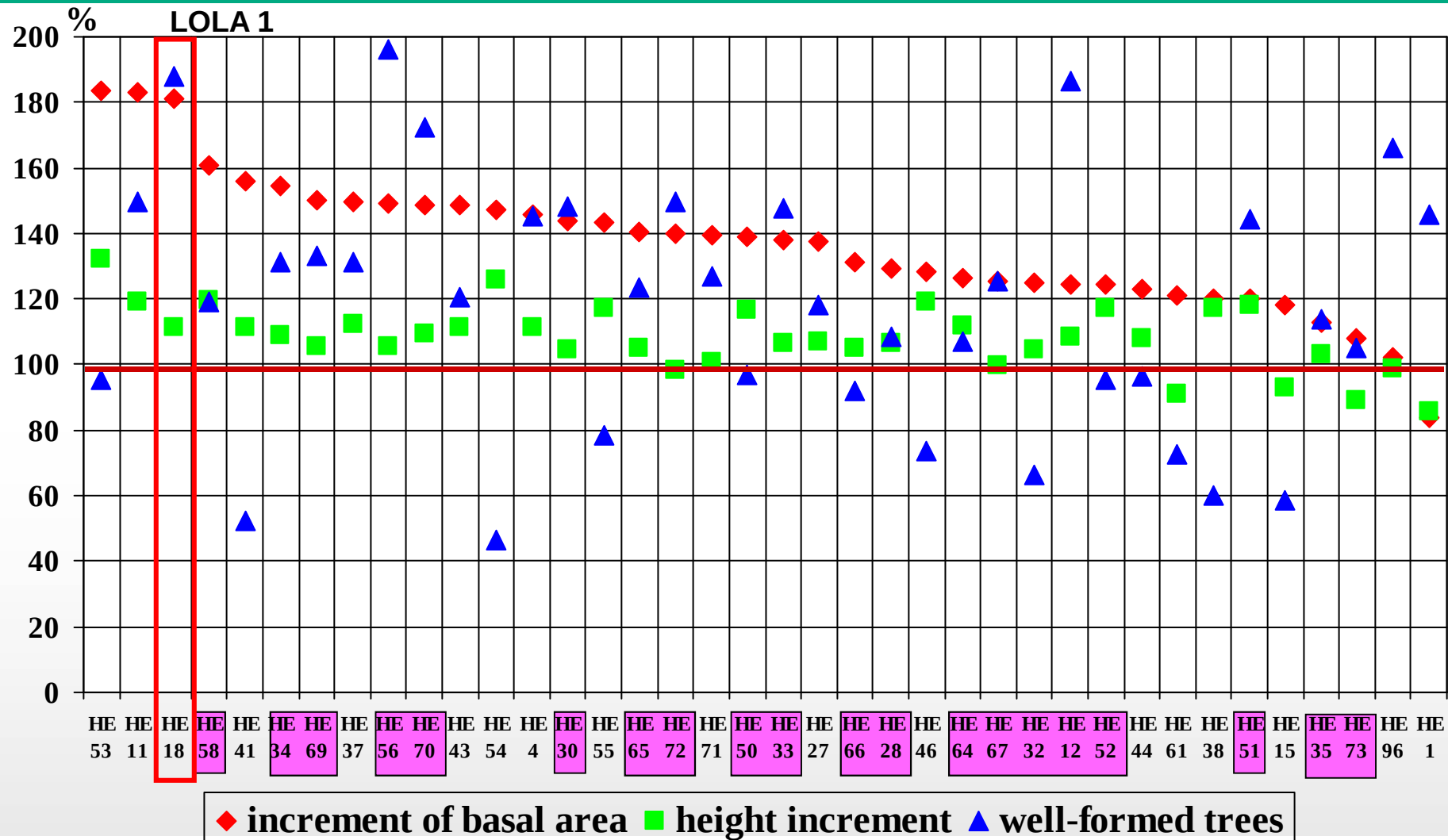
Hybrid larch – example I

Discription:

- 1955/56 selection of plus trees of *Larix decidua* in natural stands in the Alps and in secondary stands
- establishing of a clonal archive with 435 different plus tree clones of *Larix decidua*
- 1965-1986 production of hybrid seeds without isolation of female flowers and artificial pollination
- 81 progenies (*L. decidua* x *L. kaempferi*), 8 mixed stands, 21 stands pure *L. decidua* or *L. kaempferi*
- 1972-1989 planting of 30 progeny tests



Means of relative performance of selected progenies in comparison to a control





Hybrid larch – example I

Description:

- 1950-1965 selection of plus trees and establishing of two clone archives with 970 different plus tree clones (780 *L. decidua* and 190 *L. kaempferi*)
- 1968-1989 three series of controlled crossings mostly between *L. decidua* and *L. kaempferi* (250 combinations – incomplete dialles)
- 1974 three trials with 81 progenies
- 1986 two trials with 49 progenies
- 1992 five trials with 42 progenies

Progeny test hybrid larch 1974 – height 2005

