# CULTIVATION OF FAST GROWING HYBRID LARCH (LARIX X EUROLEPIS) DERIVED FROM SOMATIC EMBRYOGENESIS

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#### Background

In a joint research project, the public enterprise Sachsenforst and the Institute of Botany of the Humboldt University of Berlin are working on the propagation of hybrid larch by somatic embryogenesis for large-scale production. Hybrid larches have shown heterosis in growth, stem form and wood mechanical properties as compared to the parental plants. By using qualitatively high value plant material new efficient and robust varieties could provide additional resources for wood production and provide higher monetary return within relative short rotation periods. Difficulties in traditional seed production due to the biology of the genus Larix could make the use of biotechnological methods worthwhile. In Sachsenforst, we investigated the post vitro behaviour of hybrid larch derived from somatic embryogenesis.



#### **Material and Methods**

Selected plus trees from the long-term breeding program of Sachsenforst comprising 5 family parents were used for 20 controlled crossings. The immature seed were supplied to Humboldt University as starting material for somatic embryogenesis. The emblings were returned to Sachsenforst for acclimatisation (1) and further cultivation. For acclimatisation in a greenhouse with computer-controlled atmosphere the emblings were sorted to quality (2a, 2b) and transplanted into Jiffy peat pellets. After acclimatisation (3), the young plants were potted into Quickpot plates (QP) of different sizes and transferred to the nursery. At the end of the vegetation period (4, 5,6) the plant height was measured. The following year in spring they were planted on forest plots(7) for demonstration purposes together with zygotic seedlings as control.

1. Hybrid larch emblings in vitro



2a. First quality emblings2b. Second quality emblings













o 11 15 19 23 27 31 35 age [weeks] Figure 1 Shoot length related to age, mean values of 35 clones

Figure 2 Shoot length related to container size, mean values of 3 clones



 5. Root system of a young plant
 6. Young plants in winter in the nursery

Plant height after acclimatisation: 3 cm
 Plant height after 5 months: up to 52 cm

Young plants of hybrid larch from somatic embryogenesis: In only 1 year from the Petri dish into the forest.

# Results

- Number of acclimatised genotypes: 342
- Number of tested emblings: 12.000
- Acclimatisation success:
  First quality emblings: 98%
  Second quality emblings: 69%
  - Average: 79%
- Number of young plants: 9.900
- Plant height on average: 35 cm (24 52 cm) at the end of the vegetation period (figure 1)
- Shoot length related to container size after 20



# Conclusions

Somatic embryogenesis proved to be a suitable method for mass propagation of hybrid larch: Controlled crossings, induction of somatic embryogenesis in a broad spectrum of genotypes, production of up to several hundred plants per genotype, acclimatisation and young plant culture with hardly any losses. After one vegetation period in the nursery, young plants had reached a suitable size for being planted on a forest plot, the size being partly controlled by the container size.

weeks of cultivation, mean values of 3 clones (figure 2): 23,5 cm in QP 35 (200 cm<sup>3</sup>) 26,5 cm in QP 12 (650 cm<sup>3</sup>)

7. Young plants on a forest plot

### Open questions are:

- In which way can fertilisation be used to influence plant height and stability?
- Will the further performance of the plants in the field be better than that of seedlings?

It is very likely that new fast growing varieties are at the doorstep.

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