Breeding of Fast-Growing Tree Species for Changing Environments

STAATSBETRIEB SACHSENFORST







Agenda

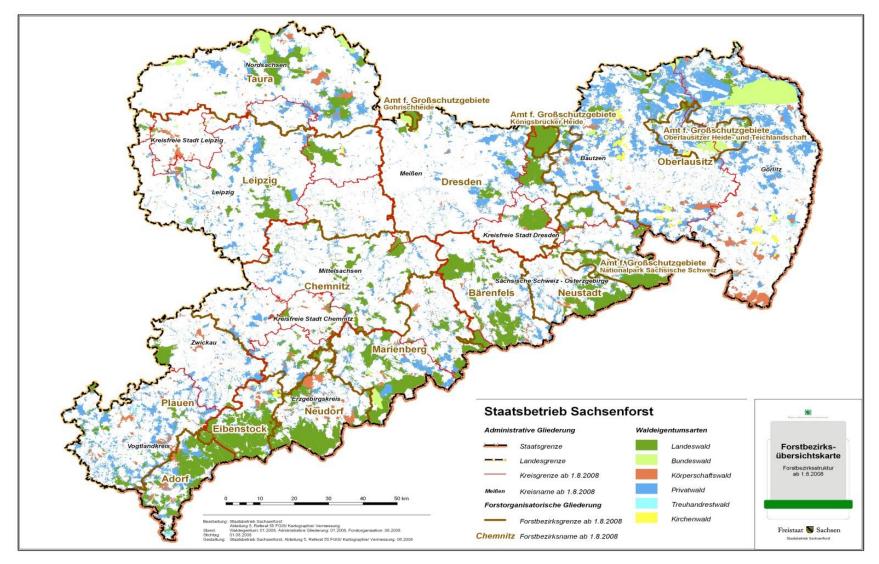


- Forestry in Saxony
- Forest tree breeding in Saxony
 - The first decades after establishment
 - The last decades in the 20th century
 - The first decades in the 21st century
- Conclusions

Forests in Saxony







Forests in Saxony



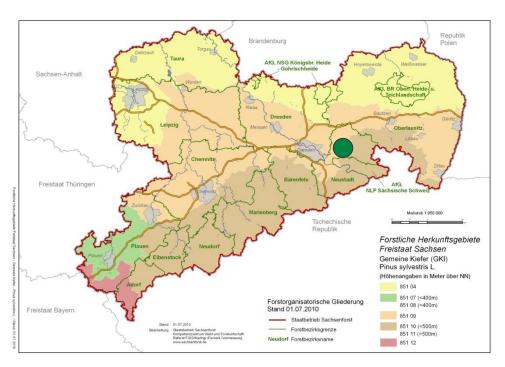


Parameter	Germany	Saxony
Area of forests	11.419 million ha	0.533 million ha
Forest area/person	0.139 ha/person	0.129 ha/person
Percentage on total area	32 %	29 %
Percentage of conifer species	54 %	66 %
Percentage of broadleaved sp.	43 %	32 %
Growing stock	3.663 billion m ³	0.157 billion m ³
Cuttings/year (2002-2012)	76 million m ³	2.3 million m ³
Reforestation area/year	n.a.	1,300 ha

Forest tree breeding in Saxony



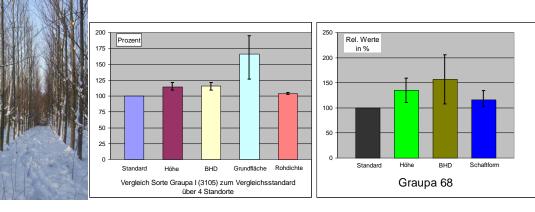
- Established 1946, in Tharandt
- Since 1951, in Graupa near Pirna
- Today, one of 4 major tree breeding institutions in Germany





Tree breeding – the first decades

- Improvement of wild fruit species to cope with vitamin deficiency of population
- Improvement of fast growing species to cope with increasing wood demand for post-war reconstruction







RHD Schaftform

Vergleich Sorte Tharandt V (2003: 24 x 68) zu Vergleichsnachkommenschaften über 3 Standorte



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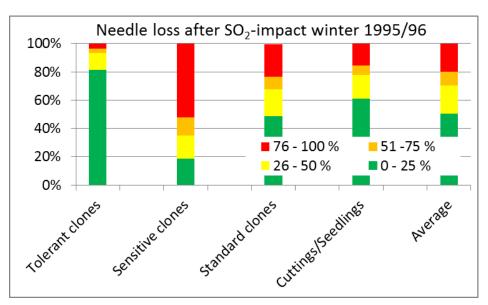


- Conservation of forest genetic resources esp. Norway spruce
- Improvement of SO₂-resistance esp. Norway spruce
- Breeding of new varieties
- Testing of introduced species as replacement for a certain length of time
- Procurement of FRM descending from approved varieties by vegetative and generative propagation

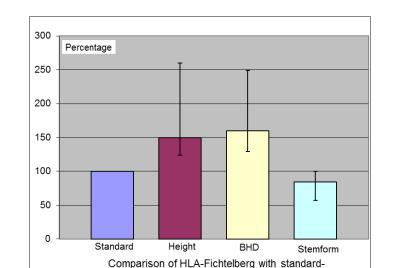




SO₂-resistant Norway spruce







provenances European larch (4 trial plots)

Hybrid larch for highly polluted areas

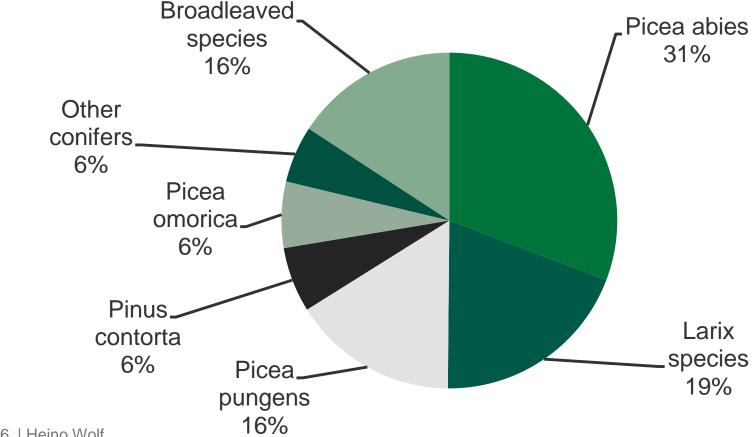
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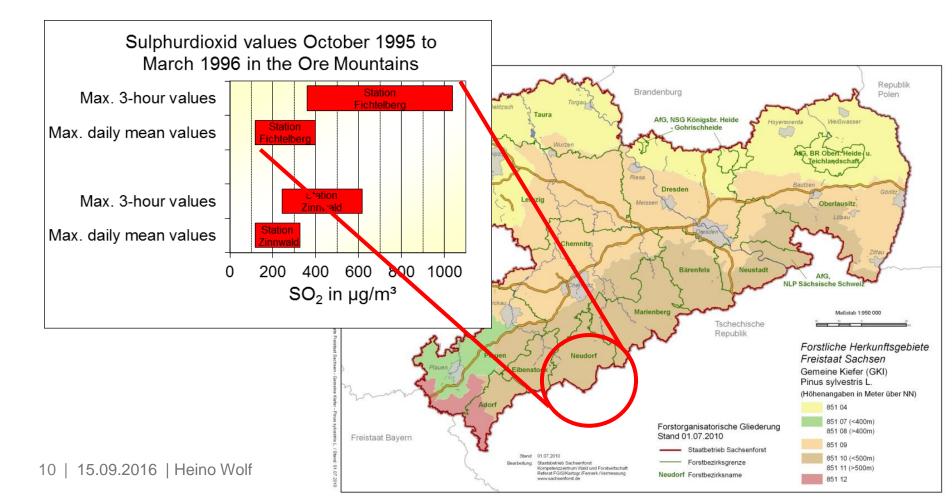


Reforestation of 8.775 ha totally damaged by SO₂ - pollution from 1962 to 1991





FoB Neudorf, Ore mountains, highly SO₂-polluted area from 1962 to until 1996



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FoB Neudorf Ore mountains, highly polluted area until 1996



Abies procera age 50a, height 25m, bhd 45cm

Pinus contorta Pinus peuce age 28a, height 13,5m, age 27a, height 12m, bhd 25cm bhd 26cm

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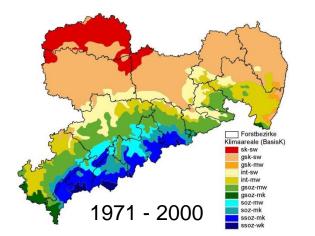
FoB Neudorf Ore mountains, highly polluted area until 1996

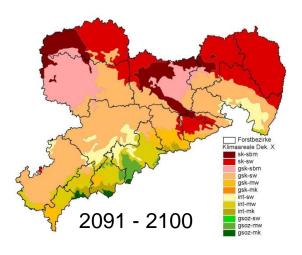
Larix x eurolepis/Larix kaempferi 920–990m asl, age 30a

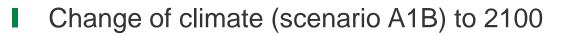


Larix decidua 730-750m asl, age 30a









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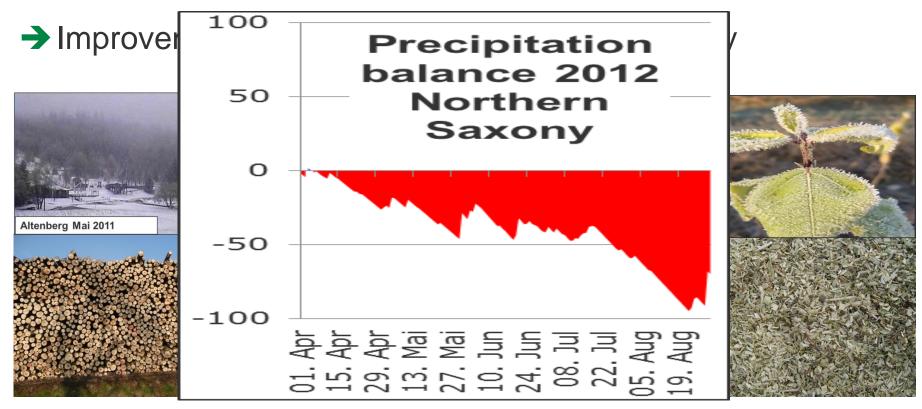
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- Increase of mean annual temperature (2 to 2,5 K)
- Impact on early frosts, no impact on late frosts
- ➔ Impact on evaporation
- Drecrease of precipitation during vegetation period by 20 to 50 %
- ➔ Increase of drought periods
- Interest and role of SBS
 - Management of state owned forests (165.000 ha, 80 % artificial regeneration)
 - Consultant for private forest owners
 - Research & Development



- Increasing impacts of climate change
- Increasing wood demand for energy and industrial purposes
- → Conservation of forest genetic resources





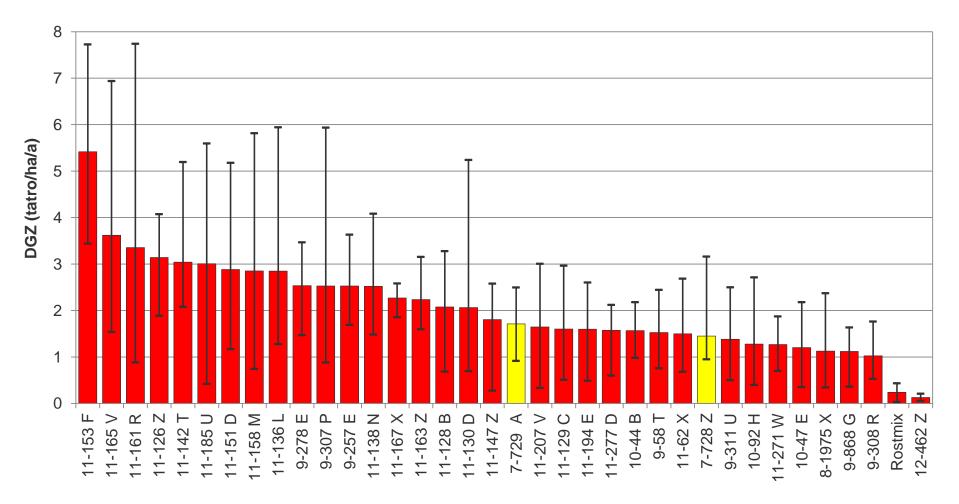
Assessment of properties related to drought resistance

Trial plots	Greenhouse	Laboratory

Assessment of properties related to frost resistance

Trial plots	Climate chamber	
	6 4 2 0 0 2 4 6 8 10 12 14 16 8 20 22 24 Zeit [n] -2 -2 -2 -2 -2 -2 -2 -2 -2 -2	





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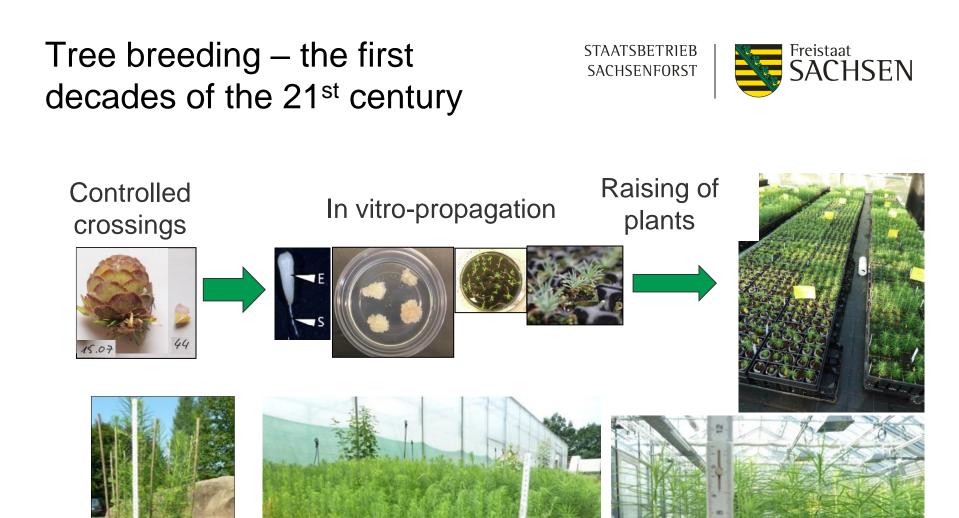








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Use for establishment of shelter wood, admixtures for a certain length of time, midterm rotation plantations etc.



Conclusions



- Conservation of forest genetic resources → no problem
- Improvement of genetic resources under changing environments → no problem
- Sustainable procurement and use of improved material
 Significant challenge in Germany to cope with
- There is still a lot of work to be done in the field, in the green house, in the laboratories, but also in the mind of people



Gefördert durch:



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Projektträger Bundesanstalt für Landwirtschaft und Ernährung





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Thank you very much for your attention

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