

The role of Breeding to the Portuguese Forest Research

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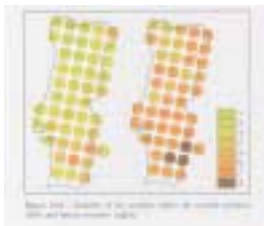
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Challenges to the forest ecosystems in the XXI Century:

- ✦ Increase of human influence over forest ecosystems
- ✦ The need to adequate forest multiple use with wood production
- ✦ Improve forest products quality to the end users
- ✦ Competitive cost against alternative products
- ✦ Increased Public awareness of environmental issues
- ✦ Need to guarantee economic, social and environmental sustainability
- ✦ Certification: Control of production conditions

Climate change scenario*:



* Had RM - Haddley Center' model downgraded to the Iberian Peninsula

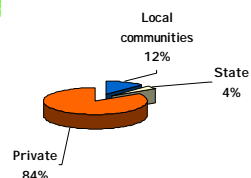
- ✦ Longer, more frequent and more intense drought periods are expected. **Water stress** will therefore be a leading constraint to primary production
- ✦ The combined effects of **drought** and **high temperatures** will bring about further decreases in carbon assimilation in some areas.
- ✦ **Species distribution** will mainly depend on stress caused by the expansion of arid and semi-arid climate throughout the country.
- ✦ In some regions winter warming with CO₂ fertilization will be beneficial (North)
- ✦ The South and interior regions may be inhospitable for some of present species

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- ✦ Increase **adaptability** (Tolerance draught and cold stresses, resistance to pests and diseases)
- ✦ Increase **productivity** (Volume ha⁻¹)
- ✦ Improve the **quality of forest products** (wood properties, stem quality and cork characteristics)
- ✦ Preservation of **genetic diversity** and Conservation of forest gene resources

Breeding constraints in Portugal

Forestland ownership



Lack of forest management
Reproductive material quality overlooked

Tree breeding is a **long term activity** wich needs **clear objectives**.

- The establishment of **breeding populations**
- The **strategy** implementation

It is not compatible with **erratic financing**

Priority Research Tools



- to develop **physiological markers** to improve the efficiency of **indirect selection** for **adaptability** and to **optimize productivity**;
- to use **molecular markers** to evaluate the **genetic diversity** and structure of domesticated populations, to understand the **genetic architecture** behind the expression of traits of economic importance and to assist in early selection.
- to improve **statistical models** for evaluation of **forest genetic trials** and estimation of genetic merit
- to apply **biotechnology** tools for cryopreservation and vegetative propagation (somatic embryogenesis) of improved material
- to use **silviculture** models (spacing, thinning and fertilization) to optimize deployment strategies

Species to be considered:



- *Pinus pinaster*
- *Quercus suber*
- *Eucalyptus globulus*

- *Pinus pinea*
- *Castanea sativa*
- *Quercus rotundifolia*
- *Cryptomeria japonica*

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