

## Abstract

Climatic changes may impact tree growth and distribution areas according to the sensitivity of species to different climatic variables. The aim of this study was to compare the growth response of three European species (*Quercus petraea*, *Fagus sylvatica* and *Pinus sylvestris*) to climatic variations and soil water deficits in the same temperate forest. Earlywood, latewood and total ring widths were measured from 1960 to 2007 in three mature stands per species. The observed between-stand growth differences were mainly due to variability in soil fertility and available soil water capacity. Our results highlighted major differences in the vulnerability of the species to climate conditions and soil water deficits. *Fagus sylvatica* was the most sensitive species to the climatic conditions of the current growing season. *Quercus petraea* was sensitive to the climatic conditions of the previous autumn. This led to long-term consequences for growth, probably due to carbon reserve depletion. *Pinus sylvestris*, an evergreen species, was positively influenced by warm winters but was also vulnerable to temperature and soil water deficits in the growing season. The climate in August influenced pine growth, in contrast to what was seen for the deciduous species, probably because the growing season of pine was the longest. Contrary to what was observed for oak, the earlywood growth of pine was sensitive to soil water deficits in the growing season. For both oak and pine, latewood was the component that was most sensitive to climatic variations and soil water deficits. These results are discussed in the context of climate change predictions and provide information for paleoclimatic studies.

**Key-words:** Sessile oak, European beech, Scots pine, tree ring, interannual growth, climate