HAL
open science

Evidence of the effect of the climate of year 2003 on Douglas-fir and larch wood formation in France

Philippe P. Rozenberg, Luc Pâques

To cite this version:

Philippe P. Rozenberg, Luc Pâques. Evidence of the effect of the climate of year 2003 on Douglas-fir and larch wood formation in France. Impacts of the Drought and Heat in 2003 on Forests, Nov 2004, Freiburg, Germany. hal-02761085

HAL Id: hal-02761085

https://hal.inrae.fr/hal-02761085v1

Submitted on 4 Jun 2020

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

Scientific Conference

Impacts of the Drought and Heat in 2003 on Forests

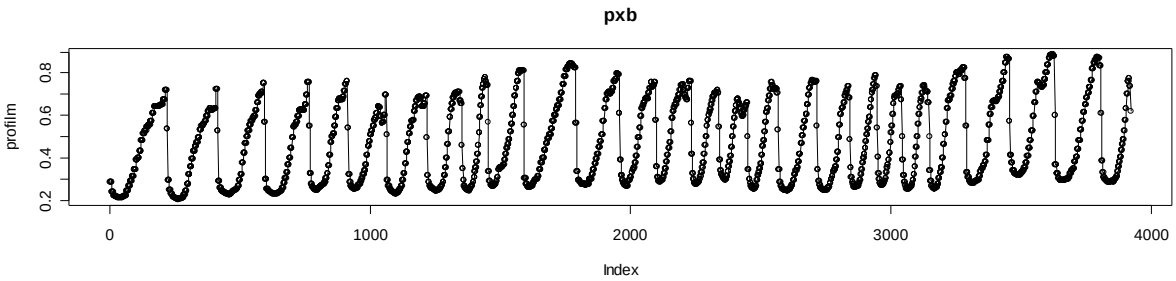
17th – 19th November 2004
Freiburg, Germany

Evidence of the effect of the climate of year 2003 on Douglas-fir and larch wood formation in France

Philippe Rozenberg and Luc Pâques
INRA Orléans, France
Correspondence: rozenberg@orleans.inra.fr

In different regions of France, Douglas-fir and larch were visibly affected by the 2003 drought and heat wave: in many trees, variable parts of the foliage turned red in a few days by mid August 2003.
At the end of winter 2003-2004, wood samples were collected in 2 forest stands:
-a Douglas-fir plantation located in Marcilly en Villette, Loiret (10 increment cores on 10 trees);
-a hybrid larch experimental plantation located in Beaume-les-Dames, Jura (160 increment cores on 160 trees).
The increment cores were analysed using indirect X-ray microdensitometry and radial (from pith to bark) microdensity profiles were produced. Figure 1 shows the average Douglas-fir microdensity profile.

Figure 1. Average microdensity profile of the 10 Douglas-fir trees



A comparison of the density profile of ring 2003 with the density profiles of the 4 previous rings (from 1999 to 2002) was conducted on both samples using analysis of variance. The results demonstrated that:
-in both species, there is a highly significant year effect on wood microdensity,
-this year effect is completely (in Douglas-fir) and essentially (in larch) accounted by ring 2003,
-the part of the ring concerned is mainly the transition zone between earlywood and latewood and the latewood itself.
Hence ring 2003 is significantly different of rings 1999 to 2002: as an average, the ring 2003 is narrower with a thinner and lower density latewood.
Our preliminary interpretation is that latewood formation stopped earlier in 2003 than during the 4 previous years in both species. Large between-tree variation for the features of ring 2003 was observed in both species. From our point of view, this variation is an illustration of the genetic variation of tree reaction to the unusual climate characteristics of year 2003. Such information is very important for all aspects related with the management and the utilisation of the adaptive diversity of these forest species.