

## **Effect of water deficit on tree growth, leaf discolouration and litter fall in Swiss ICP-Forests level II plots**

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On 15 out of 17 Swiss ICP-Forests level II-plots stem diameter radial growth had been measured on 10 stratified randomly selected trees of each main tree species in the years 2002 and 2003. For several years on 8 plots, litterfall has been measured in four week intervals and on all plots tree transparency and leaf colour of the tree foliage has been observed recorded in the summer near to the on-line meteorological station for several years. In September 2003 crown transparency and discoloration was reassessed on 6 plots with deciduous tree species. The precipitation amounts were extraordinary low on some of the plots during summer 2003 ranging between 50% and 80% of the long-term average. Furthermore we observed that tree radial growth was reduced compared to other years on some of the plots.

We used the meteorological data to determine the water deficit by a) simply subtracting potential evaporation and transpiration from these precipitation amounts for the months March to August and b) by using a soil water balance model that incorporated the soil water holding capacity and modelled actual evaporation and transpiration. Both water deficit measures were compared with the stem growth and litter fall data. We found a close relationship between the obtained water deficit values in 2003 and the ratio between the radial growth in 2003 and the average of the radial growth in the moist year 2002. This relationship was applicable for all tree species and plots. On plots with high water deficit in 2003 tree growth was significantly reduced in comparison to growth in 2002, while on plots with no or little water deficit tree growth was in most cases not significantly reduced or even increased. By mid-summer tree transparency had not increased. Results from the Level-II site Vordemwald show that summer litterfall of *Abies alba* was higher than in previous summers, which might be an exception.