

Impact of the heat and drought 2003 on ecological parameters and growth in Austrian forests

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In Austria the weather conditions in summer 2003 were extreme as well as in many parts of Europe. It was the hottest summer since the beginning of regular measurements. The average temperatures of the summer months, especially in June and August, were above the long-term values. In June the temperature was between 4 and 6°C and in August about 4 to 5°C higher than the long-term value.

The situation was aggravated by a lack of precipitation. In June and August many regions in Austria received precipitation amounts only between 25 and 75 percent of the long-term value. In some regions in the eastern part of Austria even less than 25 percent were reached. Only in July most part of the country received normal precipitation. Such extreme conditions influenced nearly all ecological factors within a forest stand. Here we show results of our measurements on permanent observation plots of the Austrian Federal Office and Research Centre for Forests (BFW).

The extreme air temperatures in June and August caused high temperatures in the soil. The extent of this warming differed according to soil type and the forest stand. High temperatures together with low amounts of precipitation let the soil moisture drop to a very low level and in some cases the wilting point of the soil was reached. For this reason it became very difficult for the trees to get enough water from the soil and the water consumption was strongly restricted by the closure of the stomata. This is shown by results of our sap flow measurements.

As a general consequence of these stress-factors the growth of the trees was restricted. The consequences on growth were observed on some trees equipped with permanent girth bands. Three tree species at three sites were assessed and a distinct pattern of growth was found. While a marked reduction was found on spruce at lower sites, the effects were by far less on beech nearby at the same altitude. Spruce and larch at higher elevation showed only small growth reduction in 2003 in comparison to the year 2002.