Forest Condition Monitoring in Finland – National report

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Photo: Metla/Erkki Oksanen

Phenology

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Summary

Environmental changes such as climate change may cause changes in phenology. This may affect forest growth, as well the risk for biotic or abiotic damages. For this reason phenology is part of the ICP Forests Level II program since 1998. The results so far show for Finland clear geographic North – South trends in the timing of phenological events, but due to the large annual variation no trends of changes over time could be assessed yet. For this longer time series are needed.

Background

Phenological events are mainly driven climatically (temperature and precipitation), but also by other environmental parameters such as seasonal changes in day length and soil conditions. Changes in the timing of life events (phenology), such as bud burst, flowering, leaf coloring or leaf fall, may be caused by changes in climate or other environmental impacts such as air pollution.

Changes in the timing of phenological events may result in a change in the length of the growing season, and thus also in changes in forest growth. On the other hand, it may also increase the risk for abiotical damage, such as late night frost during spring, but also for biotical damage, as the synchrony in phenology between the host on one side and the pest or disease on the other side is disturbed.

Phenology was added to the ICP Forests Level II program in 1998, as an optional parameter. In Finland phenology observations were started in 1999 at two Norway spruce plots in Solböle (nr. 28) and Kivalo (nr. 5), and in 2000 two Norway spruce plots were added in Pallasjärvi (nr. 3) and Punkaharju

(nr. 17). Phenology observations on Scots pine plots started in 2003 in Punkaharju (nr. 16) and later (2006) in Kivalo (nr. 6) and Juupajoki (nr. 10).

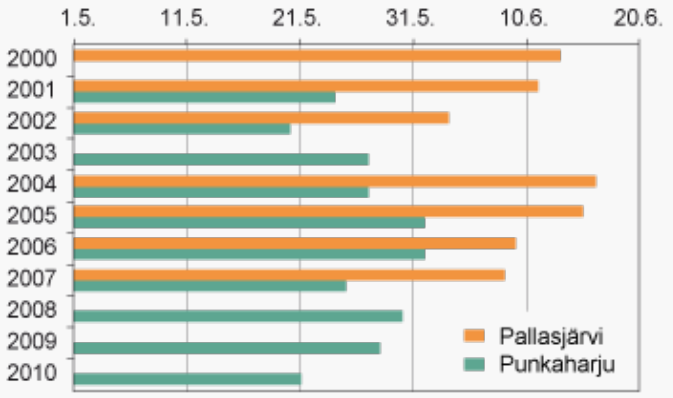

Figure 1. Dates of start of budburst on two Norway spruce Level II plots, Punkaharju and Pallasjärvi.

Results

The timing of budburst in spring is determined mainly by the temperature. Because of this, it is expected that especially in the boreal areas, including Finland, climate warming will result in an advanced flushing of trees during spring. However, the weather conditions vary much between years resulting in a considerable natural annual variation in timing of phenological events as shown in Figures 1, 2 and 3.

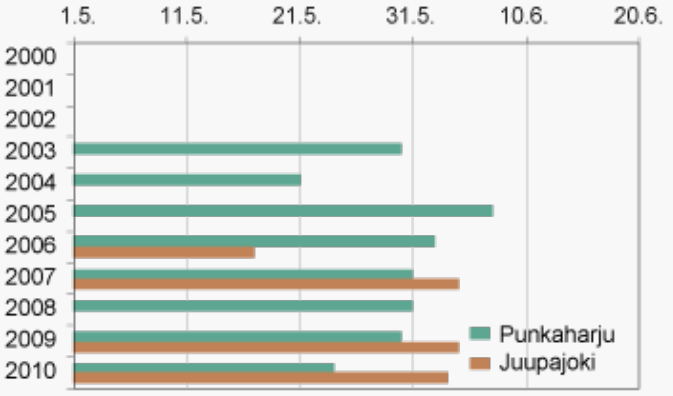

Figure 2. Dates of start of budburst on two Scots pine Level II plots, Punkaharju and Juupajoki.

The bars in the figures give the average start date for a number of observed individual trees. Because of this large annual variation, trends of changes in timing are difficult to assess. This would need longer series of observations than available now.

The end of the growing season has not been assessed in ever green conifers, because there are no easy to observe events. In broadleaved species, such as birch in Finland the end of the growing season is characterized by leaf coloring and leaf fall (Fig. 3).

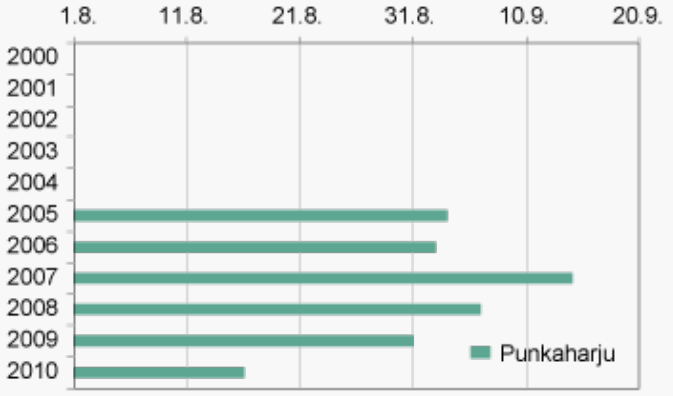

Figure 3. Dates of start of leaf coloring on a silver birch Level II plot in Punkaharju.

Trees growing in the northernmost regions of Finland are adapted to a colder climate than those growing in the south. Although they often flush at lower temperatures than those in the south, they still flush later in time that the southern trees. This is shown in Fig. 1 where the start of flushing is compared between two Norway spruce plots in Pallasjärvi (nr. 3, North) and Punkaharju (nr. 17, South).

Difference in the timing of flushing between two plots at about the same latitude is usually smaller as can be seen in Fig. 2 in which the flushing of two Scots pine plots (Punkaharju and Juupajoki) in Southern Finland is compared. However, due to variation in local weather conditions also here larger differences may occur like in the year 2006.

Material and Methods

In a number of Level II plots 10 trees of which the crown could be seen from below were selected for phenology assessments. During the critical periods the phenological phases of the trees were observed three times a week in spring (budburst and flowering) and autumn (leaf coloring and leaf fall in birch). Table 1 shows the scoring system.

Score	Description
1	Less than 1% of the buds/leaves affected
2	Between 1% and 33% of the buds/leaves affected
3	Between 33% and 66% of the buds/leaves affected
4	Between 66% and 99% of the buds/leaves affected
5	More than 99% of the buds/leaves affected

Table 1. The scoring system.

References

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