

# Timing and duration of autumn leaf development in Sweden, a 4-year citizen science study



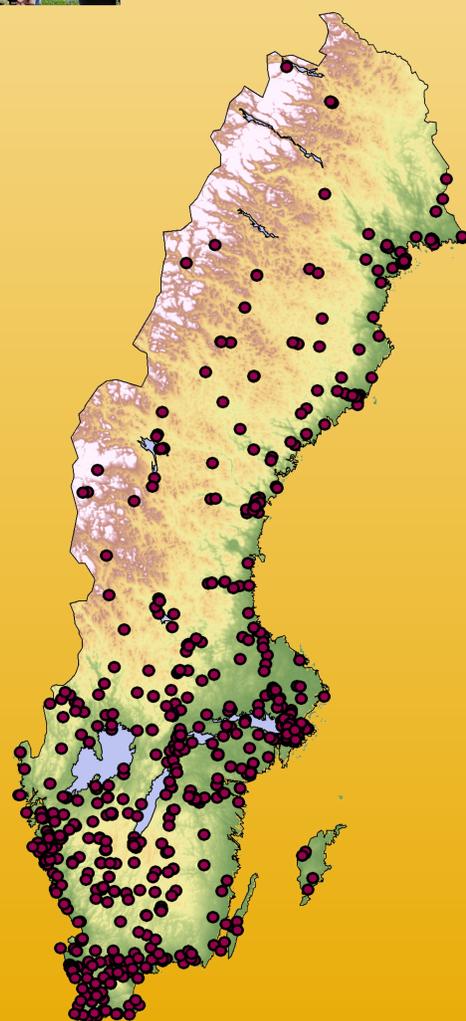
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**Thousands of pupils ...**  
 We want to acknowledge and say thank you to the thousands and thousands of pupils who, together with their teachers, made all the observations and kindly shared the data used in this study.



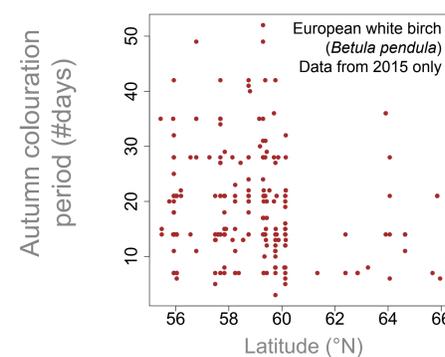
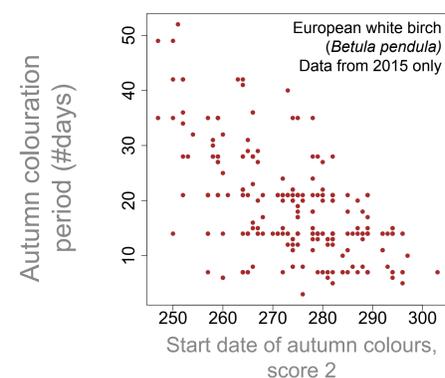
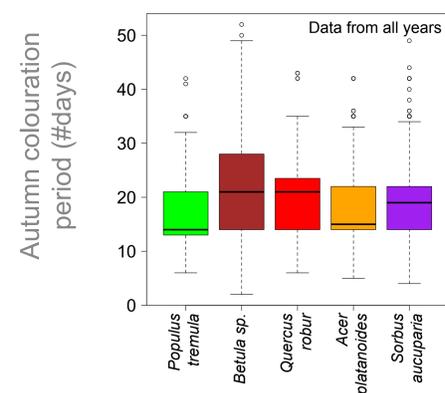
*In the context of climate change, adaptation of the end of the growing season may be as important as adaptation of spring phases. Autumn phases seem to respond in more diverse ways than spring phases, but we lack both data and understanding of autumn phenological patterns and processes to be able to predict climate change responses.*

*Here, we analyse how (i) the length of the autumn colouration period varies among species and years and how the length of the autumn colouration period (ii) correlates with the start date of autumn colours and (iii) how it correlates with latitude.*



Data

- The Swedish National Phenology Network has organized a mass experiment for schools every autumn since 2013. Thousands of pupils and their teachers have participated, submitting almost 30 000 observations of 4 771 trees from 782 sites (55-68°N).
- Autumn leaf colouration was scored at the tree level from (0) still summer green to (4.) >95% autumn leaf colored tree, using pictures above.
- In the analyses here, we used a subset of five species scored weekly, and calculated the autumn colouration period as the period between score (2.) and (4.).



## Results

- Species differed in the length of the autumn colouration period and the species varied in different ways between years. For example, European aspen (*P. tremula*) had a short (2-3 week) and interannually more stable colouration period as opposed to European white birch (*B. pendula*) whose period was longer (2-5 weeks) and interannually more variable.
- We found a general correlation between the start date of the autumn colouration and the length of the autumn colouration period. A full linear model including all species and all years estimated the colouration period to decrease with half a day for each day the start of the colouration was delayed.
- No consistent correlation was found between latitude and the length of the autumn colouration period.

Data from all four years: □ 2013, × 2014, ▲ 2015, ● 2016

