

Climate warming causes increased within-species variability in the timing of leaf unfolding in *Fagus sylvatica*

Constantin Zohner and Susanne Renner

Munich University (LMU), Systematic Botany and Mycology, Munich, Germany (constantin.zohner@t-online.de)

The spring phenology of *Fagus sylvatica* is known to be under strong photoperiodic control. The heritability of this trait, and its variation within and among populations, however, have not been studied. We have conducted twig-cutting experiments on 13 individuals of *F. sylvatica* to study their leaf-out behavior under different day length treatments and simulated climate warming. Results show that there is marked variation in day-length sensitivity among individuals. Individual differences explained 40% of the variation in leaf-out dates observed in the field. Growth chamber experiments showed that, under short winter conditions (SWC), individuals without day-length limitation were far better able to advance leaf unfolding than individuals strongly responding to day length. Under SWC, individual variation in the timing of leaf unfolding was twice as high as under long winter conditions. These results emphasize the importance of day-length sensitivity as a source of within-species phenological variation and suggest that climate warming will lead to increased local variation in the timing of leaf unfolding within *F. sylvatica*. Our finding that day-length-sensitive individuals are less able to track climate warming raises the question if day-length-sensitive or day-length-independent individuals will be favored under future climates, which are expected to lead to earlier, but less predictable spring conditions.