
European wild flora and climate change: are the carrots cooked?

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Résumé

Climate change, which has accelerated considerably in recent decades, is recognized as a major driver of biodiversity change. Previous studies have identified several species response to climate change, such as (1) a shift in the range of species towards mountain peaks or higher latitudes, implying local extinctions of populations in the southern part of the species' range (for the northern hemisphere), or (2) local adaptations to new climatic conditions. However, most literature focuses on animal species, especially birds and insects. In contrast, little large-scale work exists on the ability of plant species to track temperatures in the context of climate change. This lack of knowledge is related to heterogeneous datasets and limited spatial sampling, with often undersampling of regions where changes are likely to be greatest. Here, we aimed to document plant responses to climate change across Europe, using 70 years of opportunistic occurrence data from the Global Biodiversity Information Facility (GBIF). We worked with the species temperature index, the average temperature across a species' range over a given period, a proxy often used to document the response, or absence thereof, of species to temperature changes. We calculated the temperature index of common plant species in Europe over time from 141,000,000 observations grouped into 25,340 taxa collected between 1951 and 2021. We then identified the species for which thermal preference had changed over time and tried to determine their common characteristics in terms of: (i) 68 life history traits (TRY), (ii) their position in the phylogeny (Daphne) and (iii) environmental parameters (Chelsa and E-Obs) that could influence the ability of plants to track climatic conditions. The first results indicate a significant effect of latitude on the temporal variation of the specific temperature index, with greater and positive variation at higher latitudes, *i.e.* the thermal preference of northern species increases more rapidly over time than that of southern species, with consequences for conservation. Furthermore, responses are variable across families, with *e.g.* *Martyniaceae* exhibiting the fastest response. Further analyses of plant traits, phylogeny and environmental parameters are presented to help us better understand the response of Europe's wild flora to climate change.

Mots-Clés: GBIF, species temperature index, climatic species responses, plants traits and phylogeny, Europe

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