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Phenological phases of pollination related to climate change

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Knowledge:

Rising CO₂ levels and climate change may be resulting in some shift in the geographical range of certain plant species, as well as in increased rate of photosynthesis. Many plants respond accordingly with increased growth and reproduction and possibly greater pollen yields, that could affect allergic diseases among other things.

The aim of this study is the evolution of aerobiological measurements in France for 25-30 years. This allows to follow the main phenological parameters in connection with the pollination and the ensuing allergy risk.

Material and method:

The RNSA (French Aerobiology Network) has pollen background-traps located in more than 60 towns throughout France. These traps are volumetric Hirst models making it possible to obtain impacted strips for microscopic analysis by trained operators. The main taxa studied here are birch, grasses and ragweed for a long period of more than 25 years over some cities of France.

Results:

Concerning birch but also other catkins or buds' trees pollinating in late winter or spring, it can be seen an overall advance of the pollen season start date until 2004 and then a progressive delay, the current date being nearly the same as it was 20 years ago, and an increasing trend in the quantities of pollen emitted.

For grasses and ragweed, we only found a few minor changes in the start date but a longer duration of the pollen season.

Discussion:

As regards the trees, the start date of the new production of catkins or buds is never the 1st of January but depends on the species. For example, it is early July for birch. For breaking dormancy, flowering, and pollinating, the trees and other perennial species need a period of accumulation of cold degrees (Chilling) and later an accumulation of warm degrees (Forcing). With climate change these periods may be shorter or longer depending of the autumn and winter temperature. Therefore, a change in the annual temperature may have a direct effect on the vegetal physiology

and hence on pollen release. It may also explain why the quantities of pollen produced are increasing.

The Poaceae reserve, from one place to another and without any spatial structuring, very contrasted patterns which make it impossible to identify a general tendency. This is probably due to the great diversity of taxa grouped under the generic term Poaceae, which are clearly not equally sensitive to climate change.

Conclusion:

Trees with allergenic pollen blowing late winter or early spring pollinate since 2004 later and produce amounts of pollen constantly increasing. Grasses and ragweed have longer periods of pollination with either slightly higher or most often lower pollen production.