

Scientists map the worst times of day for people allergic to grass pollen

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There is plenty of pollen in the air around this Cock's-foot. New Danish studies show that the amount of pollen peaks at different times of the day through the pollen season. Cock's-foot is an example of a species which emits most pollen in the morning. Credit: Carsten Ambelas Skjøth

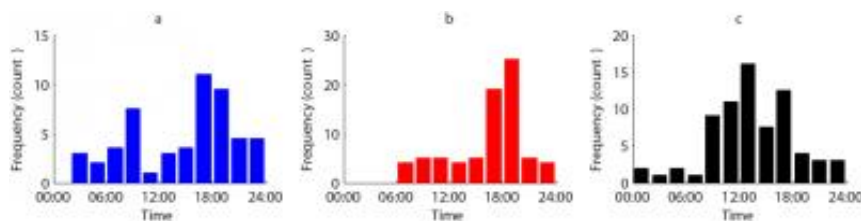
Atishoo! Help, there are flowering grasses around, please stay indoors – while your friends enjoy the nice summer weather! Traditionally, people allergic to grass pollen are advised to be aware of high pollen concentrations during the day, and to reduce their outdoor activities during this period.

A new study led by researchers from Aarhus University shows that it is considerably more complicated to avoid grass pollen. Based on a three-year study with intensive measurements at three different locations in Aarhus, they divide the grass pollen [season](#) into three periods, as shown in the graph below: a twin peak profile during the early season, a single evening profile in the middle season and a single midday profile during the late season.

How should people react to these complicated patterns? Dr. Robert Peel, Aarhus University, explains:

"People should avoid being outdoors during the peak hours in periods one and two, especially between 16 and 20. Later in the summer, allergy sufferers should avoid being outdoor in the middle of the day."

Different species have different patterns



Diurnal concentration of grass pollen for periods one-three is shown. The graph shows peak-time distributions for (a) Period 1 (early season), (b) Period 2 (mid-season) and (c) Period 3 (late season). Please note the different scales: Period two has the highest concentrations of pollen. These ideal profiles are based on 37, 58 and 62 basic profiles, respectively. Credit: Robert G. Peel

Concentrations of grass pollen are influenced by many factors, the most important being the weather and the emissions, which again depends on

the grass species. In Denmark alone, 230 species of grass (atishoo!) have been recorded, of which around 20 species are likely to be particularly common in urban environments. The emission of pollen from the individual species is driven by different weather parameters, e.g. the temperature on the previous day or on the current day, some emissions stop when it is raining, others release their pollen in response to rain. Each species flowers intensively for approximately one-two weeks, and the total season is around two months. So no wonder, the patterns of grass pollen are complicated. But in general, people react more or less in the same manner to the pollen of all grasses growing in Denmark – and you cannot distinguish the species when counting pollen under a microscope.



Here are examples of grass species likely to be particularly common in Aarhus with different diurnal flowering patterns. The scientists conclude that the best way to explain the three diurnal concentration patterns is to look at the succession of different grass species with different diurnal flowering patterns throughout the season. From left to right: Cock's-foot (*Dactylis glomerata*), false oat-grass, (*Arrhenatherum elatius*) and perennial ryegrass (*Lolium perenne*)
 Credit: Pia Ørby and Jens C. Pedersen (*A. elatius*)

Even though the information of the exact species present in the

monitored area and pollen release patterns of the individual [species](#) are far from complete, Peel and his colleagues conclude that the best way to explain the three concentration patterns is to look at the succession of different [grass species](#) with different diurnal flowering [patterns](#) which dominate the atmospheric pollen loads as the season progresses.

More information: Seasonal variation in diurnal atmospheric grass pollen concentration profiles. R.G. Peel et al., *Biogeosciences* 11 (2014), 821-832. [DOI: 10.5194/bg-11-821/2014](https://doi.org/10.5194/bg-11-821/2014)

Provided by Aarhus University

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