

100521 | Airborne fungal spores of *Alternaria* across Bavaria, Germany: Spatiotemporal distribution patterns, and the influence of latitude, altitude and local meteorology

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Background: *Alternaria* sp. spores are one of the most relevant aeroallergens with high allergenic potential and known to be responsible for numerous cases of chronic rhinitis, rhinoconjunctivitis and severe asthma. However, larger-scale spatial and temporal studies on *Alternaria* are insufficient and this paucity of information on fungal spores leaves an important gap with respect to biodiversity and health. This study provides a regional assessment of *Alternaria* fungal spore abundance across Bavaria, South Germany, at multi-resolution temporal and spatial scales.

Method: Airborne *Alternaria* spore concentration has been examined in a dense pollen monitoring network of 23 manual volumetric samplers across Bavaria, Germany, during 2015 on a 2-hourly basis. Differences among bioclimatic zones across Bavaria were investigated.

Results: The total seasonal fungal index (SFI) of *Alternaria* spores varied significantly between sites. It oscillated from 16646 in Bamberg to 279 in Viechtach. The maximum daily spore concentrations show a gradient from south to north that is positively correlated with latitude, maximum wind speed and average temperature. The mean diurnal pattern of *Alternaria* spore concentrations showed a peak from 10:00 to 16:00, however, the average changed significantly during the day in different sites. While in most sites, e.g. Munich and Viechtach, the peak occurred in the afternoon, in Augsburg, Bamberg and Gaissach there is a clear peak during the evening, and likewise at stations at higher elevations, near the Alps. This pattern was persistent regardless of the bioclimatic zone or land used involved.

Fungal spores of *Alternaria* seem to be more abundant when temperature is lower at higher latitudes and lower longitudes. The combination of all factors influences the fungal spore abundance in a complex way.

Conclusion: The biological pollution by *Alternaria* spores in Bavaria, Germany, was high and correlated with temperature. Daily concentrations of *Alternaria* exceeding 100 spores m⁻³ – which is considered as a health relevant threshold for respiratory allergy risk – were detected up to nearly 30 days in the season. The random differences in *Alternaria* spore production highlight the importance of having a

sampling and information network that includes allergenic spores to warn of high-risk exposure.

Conflicts of interest: The authors did not specify any links of interest.