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Ecological and allergenic significance of atmospheric pollen in North-West Province (South Africa) over a one-year period

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Background:

This study conducted pollen monitoring in the North-West Province of South Africa from December 2022 to 2024, in Potchefstroom within the temperate Grassland Biome. Aligned with SAPNET (South African Pollenmonitoring Network), the project aimed to comprehensively monitor allergenic pollens and fungal spores across South Africa (Ajikah et al. 2020). The primary objective in Potchefstroom was to analyze monthly fluctuations of prominent pollen types, seeking patterns indicative of seasonal changes and allergenic pollen peaks. The study addressed the challenges of deciphering plant phenology in southern Africa and emphasized the role of pollen monitoring in understanding urban ecosystems and green infrastructure use.

Methods:

Pollen monitoring in Potchefstroom was executed as part of the SAPNET effort. The study involved monthly measurements and recording of the most prevalent pollen types with a Lanzoni 7-day volumetric spore trap. The methodology considered urban ecology and green space utilization, contributing to decision-making processes for planting suitable trees in an urban context. A pollen atlas was developed, providing next to microphotos detailed information on identified pollen types, including pollen morphology, ecology, pollination mode, and allergenicity.

Results:

The findings, despite the brief monitoring period, unveiled a distinctive pollen calendar in Potchefstroom. Tree pollen, dominated by Northern Hemisphere neophytic species as in other major South African cities (Gharbi et al. 2023), particularly Cupressus, Platanus, Betula, Morus, Pinus, and Quercus, exhibited a major release during August to September. Notably, indigenous Searsia species contributed significantly, while exotic Ulmus pollen, more abundant than in other South African cities (Esterhuizen et al. 2023), raised concerns in summer. The grass pollen season extended from November to April, with additional contributions from herbs like Plantago observed between February and April. The study identified Potchefstroom as hosting the highest levels of Ambrosia pollen in the country, peaking in March and April, highlighting its significance as a potent allergen.

Conclusion:

The implications extend beyond phenological insights, emphasizing the importance of understanding pollen dynamics for urban ecology. The findings aid in formulating informed strategies for the planning, design, and management of sustainable and resilient cities. This research contributes significantly to regional pollen patterns in the North-West province of South Africa. Comparisons with Bloemfontein, Pretoria, and Johannesburg (see Esterhuizen et al. 2023) show similar seasonal pollen distribution patterns, with Potchefstroom exhibiting lower pollen levels, attributed partly to its smaller size. The study also notes variations in a second pollen peak from February to April for tree taxa across these locations, highlighting the unique ecological dynamics of Potchefstroom and Pretoria in comparison to Bloemfontein and Johannesburg.

References:

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