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ABSTRACT BOOK

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variables accounting for variability were related to air pollution and the concentration of *bla_{TEM}* and *intl1* genes, with the highest concentrations observed in samples collected in Pyramiden. Air pollution indicators, such as PM_{2.5} concentration, were also higher in Pyramiden (12.59 µg/m³) compared to the vicinity of the glacier and Petunia Bay (10.42 µg/m³ and 10.39 µg/m³, respectively). Those differences were statistically significant.

In conclusion, all analyzed genes were detected across the three sampling locations, which suggests the pervasiveness of antibiotic resistance genes in the Arctic atmosphere. Higher concentrations of *bla_{TEM}* and *intl1* genes in Pyramiden, coupled with elevated PM_{2.5} levels, suggest that anthropogenic activity shapes the air resistome of this remote environment.

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Historical Overview of the Presence of Common Ragweed Airborne Pollen Since 2000 in Northern Italy

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Abstract

The aim of this study is to investigate the spatial and temporal changes of Ambrosia pollen in the geographical area of Northern Italy during the last 23 years. Ambrosia sp., also referred to as ragweed, is considered an invasive alien species in Europe. Originally native to North America,

this annual plant prefers mostly anthropogenic habitats and can tolerate different climatic conditions. This geographical variety, from habitats in the Po Plain to alpine locations, characterizes the regions of Northern Italy, considered in this study. In addition to its broad ecological niche, the common ragweed causes health, environmental, and agronomical problems in many parts of the world. To evaluate the potential risk to human health due to the exposure levels to this highly allergenic pollen, investigating the change in pollen concentrations over time can be relevant. Furthermore, this study gains insight into the trend of the concentration of ragweed pollen during the new century in Italy.

Considering the time interval 2000-2023, Ambrosia pollen data were collected at 34 aerobiological monitoring sites in North Italy; all sites had at least 12 years of daily pollen concentration (μm^{-3}) data. 31 out of 34 monitoring sites belong to the Italian pollen network POLLnet. All stations performed the aerobiological monitoring using a volumetric Hirst sampler and adopting a common method consistent with UNI EN 16868:2019 EU standard procedure. The dataset has been checked for completeness. Referring to the flowering period of Ambrosia (i.e., July-October), 3% of the yearly data series were excluded since the completeness was lower than 80%.

Ambrosia pollen concentrations were analyzed to verify if changes occurred in the study area regarding pollen amounts (i.e., Seasonal Pollen Integral, SPI_n, the sum of daily concentrations in the July-October period) and seasonality. Firstly, considering the SPI_n values averaged over the entire 2000-2023 study period, results show a large spatial variability, from the lowest values in Brunico (BZ) ($9 \mu\text{m}^{-3}\text{day}$) to the highest values in Magenta (MI) site ($3667 \mu\text{m}^{-3}\text{day}$). This confirms previous results, evidencing in the Milan area mean SPI_n values above $2000 \mu\text{m}^{-3}\text{day}$, while the seven stations in the Alpine and pre-Alpine area display on average values below $100 \mu\text{m}^{-3}\text{day}$; eastern stations show intermediate values ranging from 100 to $500 \mu\text{m}^{-3}\text{day}$. Referring to the first occurrence in Italy of *Ophraella communa* verified in 2013, the comparison (Mann-Whitney U Test) of mean API_n values registered before (i.e., in 2000-2012 period) and after (i.e., 2013-2023 period) displays a significant decrease only for Legnano, Magenta, Rho, Piacenza ($p < 0.001$), Omegna, Novara ($p < 0.01$), and Bolzano ($p < 0.05$). Further analyses will include the pollen seasonality and the spatial distribution with thematic map production.

Considering the spatial and temporal variation of Ambrosia pollen amounts, it is of crucial importance to continuously monitor this invasive plant and its pollen, for human health and environment protection, in a large and inclusive One Health perspective. The findings of this study can build the base to improve the current management measures, by adding new ones, which are increasingly comprehensive and can be used as supportive information for decision-makers for future handling steps of this invasive species.