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Università degli Studi di Milano-Bicocca  
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**FORUM NAZIONALE  
DELLA BIODIVERSITÀ**  
(La biodiversità è la soluzione)

# FORUM NAZIONALE DELLA BIODIVERSITÀ

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# Presentations

## **Aerobiome and environmental DNA: a novel tool for monitoring biodiversity in an Alpine region**

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Airborne biodiversity reflects the presence of plant and fungal species across the ecosystem and records the seasonal variation in the phenological phase of flowering and sporulation. The ALPoll project explores the potential of airborne environmental DNA (eDNA) to monitor plant and fungal biodiversity in alpine areas, particularly rich in endemic species and sensitive to climate change.

In a preliminary study conducted at a rural site, airborne samples were collected using a Sigma-2 gravimetric sampler. DNA was extracted and amplified using ITS1 and ITS2 barcodes. Sequencing was performed via Illumina, and a tailored bioinformatics pipeline was developed for high-resolution taxonomic assignment.

A curated reference database was created by querying international sequence datasets with the list of species of the local flora and results were compared with the UNITE database of eukaryotic taxa. Aerobiological sample analysis by light microscopy was also applied to complement and interpret molecular data.

Results highlight seasonal dynamics in airborne pollen/plant biodiversity and confirm the effectiveness of eDNA for detecting diverse plant taxa. With UNITE and ITS1, samples included 19 genus of Viridiplantae and 250 genus of Fungi. ITS2 resulted in a deeper plant identification, with up to 45 families and 82 genera. Molecular and microscopic plant/pollen data resulted in a strong agreement, supporting the use of airborne eDNA as a scalable, non-invasive method for biodiversity monitoring.

This approach provides new insights into the aerobiome and supports the development of integrated monitoring tools, contributing to NBFC's mission of innovating biodiversity assessment and monitoring strategies across Italy.