

Plant-insect interactions in mountain areas: insights for an analysis of pollen loads comparing light microscopy and ITS2 metabarcoding

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Plants and arthropods interact with each other creating complex networks such as those related to pollination which play a fundamental role ecosystem functioning. Nowadays, these interactions are still little known, especially in high-mountain ecosystems. For a fine reconstruction of plant-pollinator networks, it is necessary to identify and count pollen grains carried by flower-visiting arthropods. Traditionally, pollen grains are subjected to acetolysis for a morphological identification by light microscope, but a possible alternative is to use molecular analysis, such as metabarcoding, for the simultaneous identification of many pollen taxa within the same sample. Here, we aim to compare light microscope and ITS2 metabarcoding (Illumina MiSeq technique) analysis to evaluate pollen loads of insects collected in mountain agroecosystems. In particular, we analyzed pollen loads carried by bees (Hymenoptera Apoidea Anthophila) sampled along an altitudinal gradient (from 900 to 2700 m asl), and among different agroecosystems (orchards, hay-meadows, pastures, high-altitude grasslands) within the Stelvio National Park (Val Martello, Bolzano - Italy). Even though both strategies are reliable to detect plant species at least to family level, light microscope method is more accurate for a quantitative analysis while metabarcoding is less time consuming and easily identifies plant families present in the sample. These two different techniques can be used to achieve different purposes: light microscope can be used for a fine resolution analysis of pollen load by pollinators taking into account both the qualitative and quantitative aspects, while molecular analysis can be used only for a faster qualitative pollen evaluation.