

Beeing healthy: the impact of urbanization on floral resources nutritional quality and diet of pollinator insects

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Abstract:

Pollination represents a pivotal ecosystem service involved in the conservation of biodiversity and in the global food production, with an estimated 75% of the world's crop depending, at least to some extent, on animal pollination. In the last decades, we have witnessed a decline of pollinator insects, and land-use intensification has been recognized as one of the main drivers of this crisis.

Nevertheless, many knowledge gaps about this topic still persist and few studies have focused on the consequences of human activity on pollination and specifically on the role of landscape anthropization in shaping pollinator insect diets.

The aim of this study is to investigate the possible variation of pollinators diet quality in highly disturbed environments, focusing both on the macro and micronutrients composition of nectar and pollen. For this purpose, we set up two experimental workflows. In the first one, we collected pollen and nectar directly from nine wild plant species (*Potentilla reptans*, *Hypochaeris radicata*, *Bellis perennis*, *Erigeron annuus*, *Malva sylvestris*, *Lotus corniculatus*, *Prunella vulgaris*, *Salvia pratensis*, *Trifolium pratense*) from 12 sites scattered within the metropolitan area of Milan, following a gradient of growing urbanization, for a total of 125 samples. In the second experiment, the pollen was directly collected from the corbiculae of *Bombus terrestris* specimens, belonging to 15 commercial colonies placed in 14 sites characterized by different degrees of impervious cover in the city of Milan, for a total number of 1562 samples.

The phytochemical characterization of these floral resources will allow us to perform a qualitative and quantitative comparative analysis of their macronutrients (proteins, lipids, sugars) and micronutrients (free amino acids and secondary metabolites) composition by exploiting multiple analytical approaches (e.g. HPLC-UV-MSⁿ) and therefore to evaluate to which extent landscape alterations, and consequently anthropogenic stressors, may impact on the chemical composition of floral resources and on the nutritional value of pollen collected by bumblebee foragers.

The output of these investigations will provide new insights in the field of nutritional ecology in anthropized environments that could help inform mitigating measures for safeguarding pollinators' health status.