Gello Revival Project: Flora and Pollinator monitoring

Introduction

The decline of pollinators is now a topic of discussion in various places and there is strong pressure, both from the competent authorities and from ordinary citizens, towards the adoption of conservation and support strategies for their populations. This support can be activated thanks to a series of interventions aimed at promoting the presence of feeding and nesting sites.

In a restoration project with the aim of promoting the presence of pollinating insects, the evaluation of the characteristics of the botanical and entomological component of the area is an essential step, to assure a future spontaneous recolonization and adequate insertion into the surrounding landscape-naturalistic context. The botanical component is strictly associated with pollinating insects that depend on it for foraging and which, in turn, greatly influence the reproduction capacity of the plant species and therefore the plant diversity of the landscape. The main pollinators in temperate areas are bees (about 1000 species in Italy), some groups of flies, especially hoverflies, butterflies and hawkmoths, as well as numerous beetles.

Different pollinators have in common the need to find adequate feeding and nesting sites where they can reproduce undisturbed. However, depending on the type of pollinator, the trophic and reproductive needs can change. While in the case of Diptera and Lepidoptera only adults depend on the melliferous flora, as the main nourishment of the individual, for bees it is essential also the provisioning of food for their brood and of nesting sites.

Pollinators are distinguished on the basis of their food requirements in generalist and specialist species. The former visit numerous plant species, foraging both in search of pollen and nectar; the latter show marked preference for one or a few plant species, on which they depend exclusively. Moreover, the distance of the flower resources to the nesting site can represent a limiting factor, even invalidating the interventions aimed at increasing the melliferous flora.

Therefore, during the ex-ante monitoring, in addition to the species of plants and pollinators present, it will be necessary to analyse the specialization of pollinators in relation to certain plant species, their flight capacity, i.e. the distance travelled from the nest to the flora to be foraged, and the type of resource offered by the plants, pollen or nectar. Pollen and nectar are both important resources and not always present in the same plants; hence the need to evaluate the type of entomophilous flora (especially herbaceous and shrubby) and species' flowering periods.

It is known that poli-floral flower strips sustain also the presence of beneficial insects, such as predators and parasites of crop pests, with benefits for biological control in the areas of intervention (Balzan et al., 2014; Kowalska et al., 2022). Therefore, in defining the flower strips to be used, the suitability for beneficial auxiliaries will also be evaluated.

In epitome, undertaking a restoration project will necessitate extensive monitoring of the area regarding the existing melliferous flora, the most important groups of pollinators, the nectar & pollen potential, as well as plant–pollinator interactions.

This research will be held in collaboration with CREA (Research centre for agriculture and Environment; established in Bologna).

Research Plan

Objective: collect local biodiversity data on plant and pollinator diversity to plan the best solutions for site restoration and management at Gello area (Tuscany, Italy): species selection for symbiotic strips that will act as "mock up" that will then be used throughout the area, plant-rich sites identification.

Research phases:

Field study during the flowering season (May – October) to monitor the flora and pollinating insects along the season, with the aim of identifying the native plant and pollinator species present in the area. Following this monitoring it will be possible to precisely define which plants to use for the rehabilitation of the concerned areas (previously defined), aiming at sustaining the pollinating insects in these areas.

A) Field monitoring of flora and pollinators

Since different insects are active different times of the year, in order to capture all biodiversity present on site this phase will last from April/May to October, corresponding to the main period of vegetation flowering and flight of pollinators. During this period one visit per month will be carried out (for a total of min. 8 visits), during which the plants and pollinators will be observed or/and collected, following a standard monitoring protocol. The protocol consists in transects with capture and possible release of pollinators, to reduce the sacrifice of specimens to a minimum. Plants and pollinators for which a determination in the field is possible will be identified on site and released, while those for which a field determination is not possible will be collected and brought to the laboratory.

The survey on plant and insect species will be done through a general scanning of the area that takes into account all the different environments. For this reason, each field visit will last two days and will involve at least two people. The transect method will be used for the ex-ante and ex-post (in the possible continuation of the project) evaluation of the symbiotic strips.

B) Taxonomic identification of plant and pollinators

The plants and pollinators collected during the monitoring will be determined (in collaboration with specialist taxonomists, if necessary) throughout the monitoring period. Pollinator specimens will be identified to species level at the taxonomy lab of CREA-AA and here will be conserved in the apidology collection. Plant samples will be brought to the Laboratory of Plant reproductive ecology for identification and preparation of reference specimens to be deposited at the Herbarium of the University of Bologna.

C) Reporting

Two reports are foreseen: MID-TERM (Jul-Aug 2025) where findings and proposals will be detailed to facilitate design commencement and planting of the test strips in the fall of 2025, and FINAL (Nov-Dec 2025).

The final report consist of: 1. the biodiversity status of local pollinators and associated flora vis-à-vis the interactions among them; 2. Proposal of the most suitable plant species to be used for the flower strips or flower patches, as well as advices for the management (foraging, nesting) of the different groups of pollinators; 3. Proposals for other land uses within the area concerned (grazing, establishment of energy panels etc.). The design and the methodologies suggested for the mock up areas could be also extended to the other similar areas in the surrounding environment.

Specific plant-rich areas identified by the consultants will be proposed as “pollinator-friendly local hotspots” to be preserved.

Timeline

2025 - Month	May	June	July	Aug	Sept	Oct	Nov	Dec
Field surveys								
Taxonomic analyses								
Reporting								

References cited

Balzan, M.V., Bocci, G. & Moonen, AC. Augmenting flower trait diversity in wildflower strips to optimise the conservation of arthropod functional groups for multiple agroecosystem services. J Insect Conserv 18, 713–728 (2014). https://doi.org/10.1007/s10841-014-9680-2

Kowalska, J.; Antkowiak, M.; Sienkiewicz, P. Flower Strips and Their Ecological Multifunctionality in Agricultural Fields. Agriculture 2022, 12, 1470. https://doi.org/10.3390/agriculture12091470.