Plant-syrphid interactions in an urban farm matrix

ALMA MATER STUDIORUM UNIVERSITÀ DI BOLOGNA

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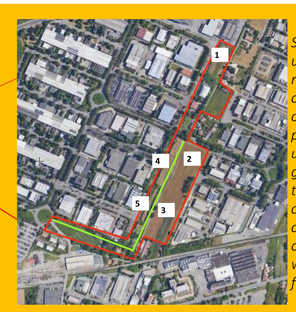
BACKGROUND

Insect biodiversity is being lost at a staggering rate. One of the largest contributors of global insects declines is urban development and expansion (Maxwell et al., 2020). This is because natural and semi-natural landscapes are converted into areas dominated by built features and impervious ground cover, leading to habitat loss and degradation and ultimately, insect and pollinator extinction or replacement (McKinney, 2006). Urban agricultural sites are a growing component of cities to improve food security and reintroduce 'green spaces' that could potentially revitalise dull city centres that are otherwise depauperate in vegetation and biodiversity. However, it is still unclear how urban agriculture contributes to biodiversity and whether it beneficially impacts pollinator communities.

WHAT and WHERE?

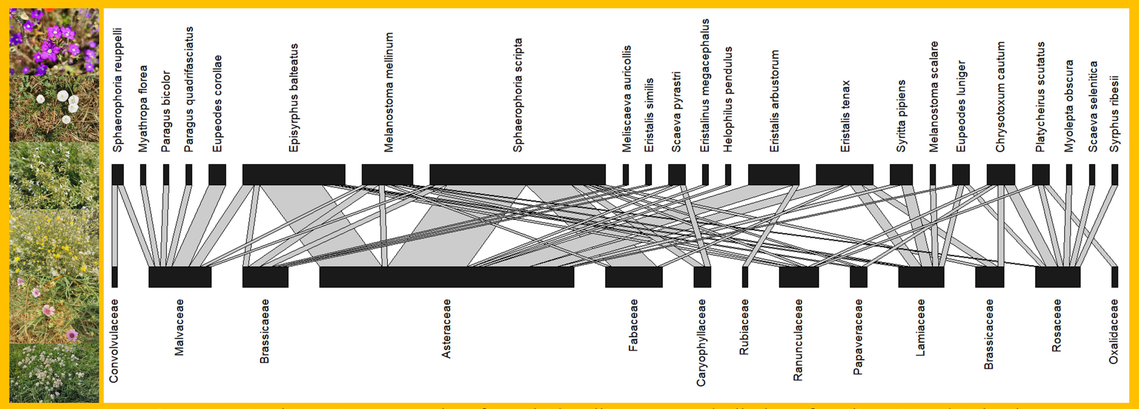
- Urban farm in "Zona Roveri", Bologna, Italy
- AIM: To determine whether urban agriculture positively impacts syrphid communities
- Sampling via pan traps and observational plots from March to October 2020 and 2021



Site of the Roveri urban farm with respect to Bologna city centre. The red outline indicates the perimeter of the urban farm, the green line represents the ecological corridor. Numbers correspond to each cultivated field within the urban farm.

OBJECTIVE 1: GENERATE PLANT-HOVERFLY NETWORKS

- Syrphids were found on 40 of the 43 flowering plants sampled across the farm.
- Plants belonging to the families Asteraceae, Malvaceae and Fabaceae attracted the most syrphids.
- Knowing which plants attract hoverflies can help lead conservation efforts in cities to incorporate specific vegetative structures to enrich urban biodiversity.



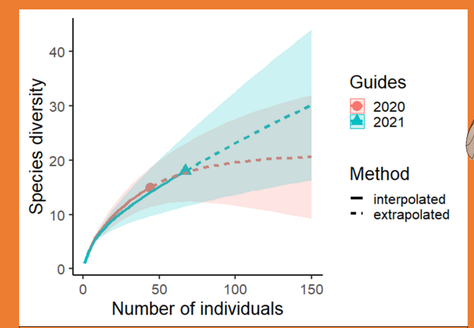
Quantitative bipartite networks of syrphid pollinators and all plant families visited in both years across the urban fam. Hoverflies are represented at the top, plants along the bottom. Rectangle width indicates the relative frequency at which that particular species interacts with a member of the opposite trophic level.

OBJECTIVE 2: DETERMINE HOVERFLY DIVERSITY

- 111 Individuals pertaining to 23 different hoverfly species were captured.
- No differences in diversity between the two years of sampling.
- According to the individual-based rarefaction curves, sampling was not indicative of the diversity present at the farm, thus further sampling is required.
- The most abundant species were *Sphaerophoria scripta, Eristalis tenax, Episyrphus balteatus,* which are all common species in European urban environments.
- Two rare species were found: *Myolepta obscura* (Becher) and *Eristalinus megacephalus* (Rossi), denoting that the farm offers niche resources that support infrequent species.

SO, DOES URBAN FARMING POSITIVELY IMPACT HOVERFLY DIVERSITY?

- More research is required.
- Syrphids contributed many flower visits to plants that are often avoided by bees, thus providing essential pollination services where bee declines are evident.
- Rare species were found, indicating niche microhabitats present at the farm.



Individual-based rarefaction curves representing the number of syrphid species as a function of the number of individuals sampled. Years 2020 and 2021 were considered separately where 2020 - red and 2021 - blue. Solid line = rarefaction line; dashed line = extrapolation curve. Shaded areas represent the 95% confidence intervals obtained by a bootstrap method based on 150 replications calculated by iNEXT package on R.

REFERENCES:

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The research leading to this publication has received funding from the European Union's Horizon 2020 research and innovation program under grant agreement No. 862663