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Towers of Flowers

Quantifying the importance of tree floral resources for pollinators in urban landscapes.

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Background

- Land-use change is a major driver of pollinator declines, and urbanization is regarded as one of the main threats to biodiversity[1].

- Studies have shown that flowering plants in urban habitats provide important resources for pollinating insects[2,3].

- However, to our knowledge these studies have not fully considered flowering trees, despite the thousands of flowers that a single tree can provide[4].

- We are investigating the importance of tree floral resources for pollinating insects in urban areas, by sampling the nectar and pollen they produce, and observing plant-pollinator interactions with trees.

Research Questions

Q1. How do floral nectar and pollen volume, and macronutrient content, differ among different urban tree species?

Q2. How does the inclusion of urban trees in plant-pollinator networks affect current knowledge on the robustness of urban plant-pollinator communities?

Q3. What is the relationship between the macronutrient composition of floral rewards for individual plant species and which pollinator species visit flowers?

Methods

- Study sites: Heaton Park, Armstrong Park, Jesmond Dene, Newcastle Upon Tyne, UK.
- Focus species: 22 of the most commonly occurring, entomophilous, tree species in Newcastle Upon Tyne[5].
- Nectar and pollen were extracted from flowers of focus species. at varying canopy heights.
- The nectar sugar production, and the number of pollen grains per flower were measured.
- The macronutrient content of the three key macronutrients (lipids, carbs, proteins) of focus species were measured.
- Plant-pollinator interactions on focus tree species. were observed using Flower Insect Timed Counts at varying canopy heights.

Next steps

FINAL SEASON OF DATA COLLECTION

- Continue data collection for nectar, pollen and plant-pollinator interaction data in spring and summer 2024.

SPECIES COMPARISONS

- Compare nectar and pollen volume and macronutrients among tree species (Q1).

PLANT-POLLINATOR NETWORKS

- Create plant-pollinator networks, which include interactions with trees (Q2).
- Use Bayesian community robustness models to test impacts of different management approaches on pollinators (Q2).
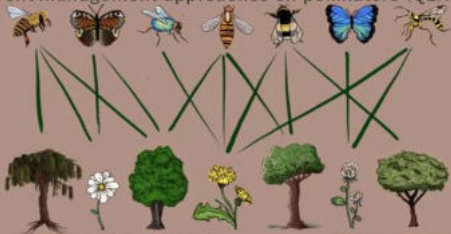
NUTRIENT NETWORKS

- Integrate nutrient information into network nodes, enabling understanding of primary sources of nutrients for pollinators[6] (Q3).

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3. Tew et al. (2021) Ecol. 109: 1747 - 1757
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