OP-272 [Pollination and Bee Flora]
Smaller Bees in the City? Understanding the Influence of Urbanization in an orchid bee species

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Euglossini is a tribe of neotropical bees commonly associated with orchid flowers. Some species are found in urban areas and serve as bioindicators of environmental health. However, one of the consequences of urbanization is the fragmentation of habitats and a reduction in floral resources, which can lead to smaller body sizes in these bees. In particular, the species Euglossa cordata, which have been reported to show changes in body size based on the level of urbanization. This study evaluated body size changes in E. cordata collected from 11 urban parks in São Paulo, the largest metropolis in South America. Bees were sampled using eucalyptol. Intertegular distance was used as a measure of body size, while the degree of urbanization was estimated by assessing the proportion of impermeable surfaces in 2 km radius buffers around the urban parks. Here we show a negative correlation between the collection period and intertegular distance, suggesting that smaller bees were collected closer to winter. The proximity to winter appears to play a significant role in determining the body size of E. cordata, likely due to the lower availability of floral resources during this season. While there were statistically significant differences in the body size of bees collected from various parks, no correlation was found between their intertegular distance and the proportion of impermeable surfaces in the parks. One possible explanation for this result is that local factors may be more influential in altering the functional traits of these bees. Overall, urbanization likely impacts the development of bees through the uneven distribution of floral resources in urban green areas. The limited availability of food, especially close to winter, can hinder larval development, resulting in smaller adult bees. The reduced body size of adults can impair their reproduction and movement, leading to decreased species distribution, gene flow and pollination. To address these issues, it would be recommended to ensure winter floral resources, improve local habitat quality, and promote green corridors for better connectivity.

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Smaller bees in the city? Understanding the influence of urbanization on an orchid bee species

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We can find bees in cities

Orchid bees - Euglossini

Image from Biodiversity4all

Eufriesea sp.
Length: approx 16 mm

Image from Carlos E. Pereira Nunes

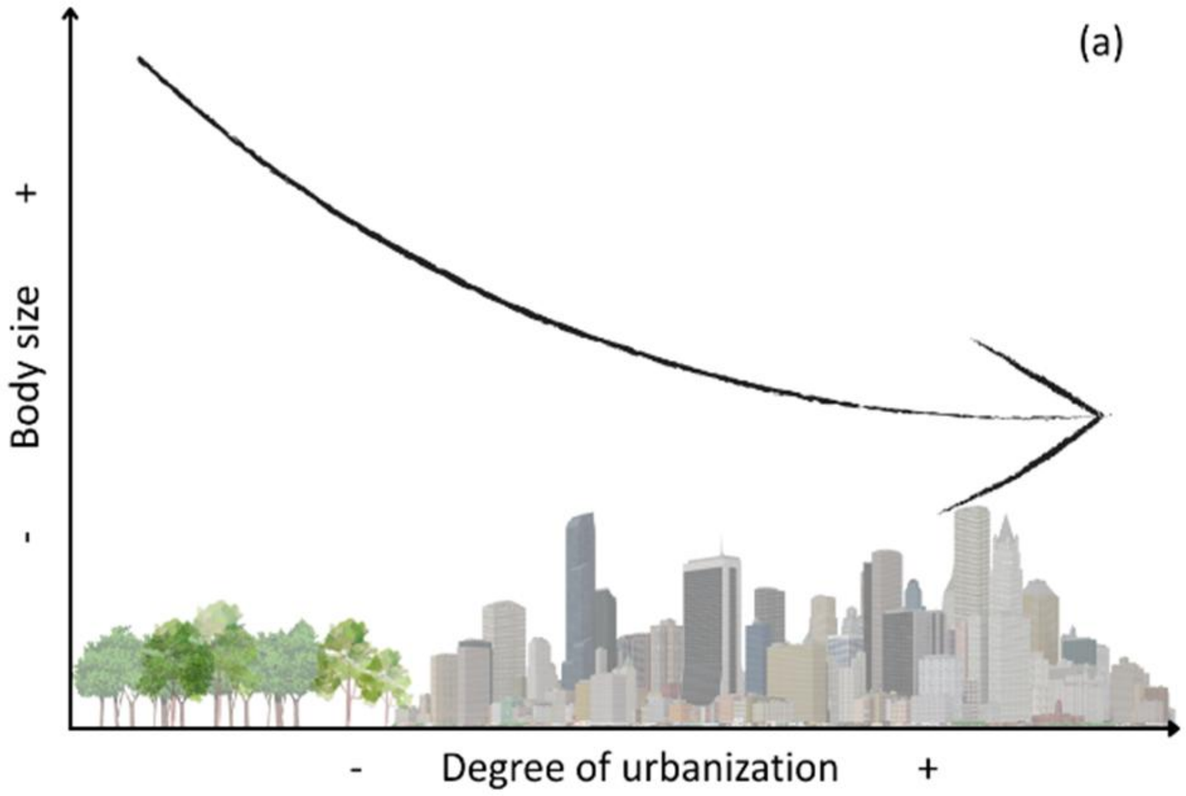
Euglossa sp.
Length: approx 9 mm

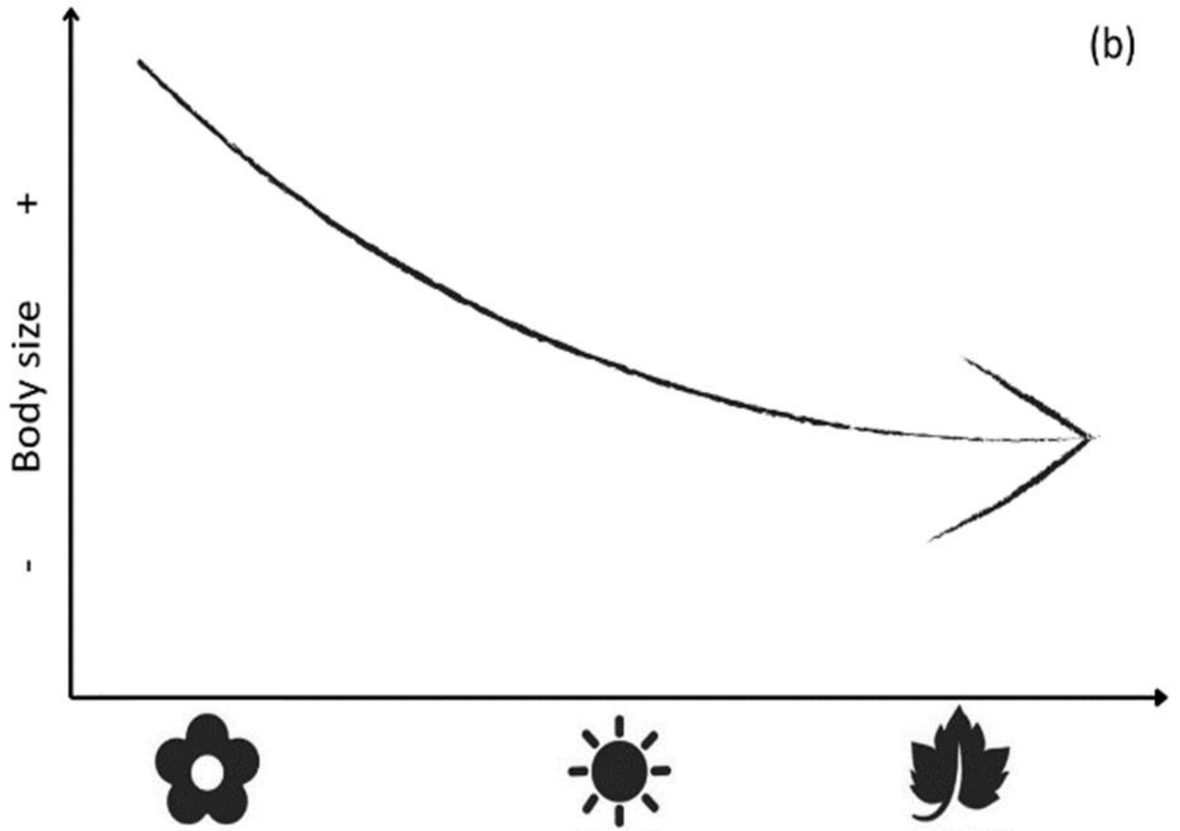
Image from Carlos E. Pereira Nunes

Eulaema sp.
Length: approx 20 mm

Is there any response to urbanization on the size of these bees?

Hypothesis

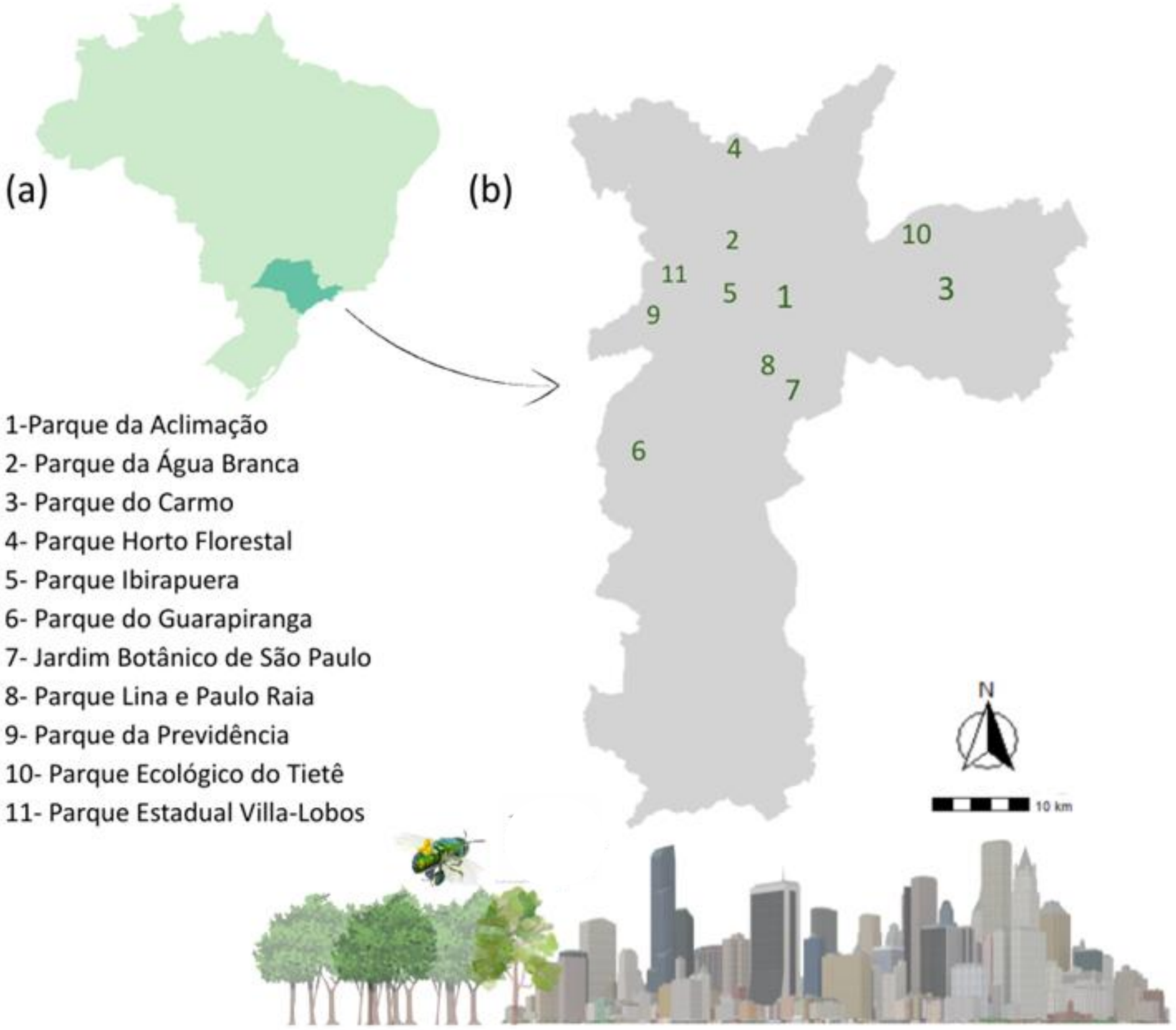




This study evaluated body size changes in *Euglossa cordata* collected from 11 urban parks in the largest metropolis in South America: São Paulo

Ibirapuera Park

Carmo's Park



São Paulo city

Area

1.521,202 km²

Total Population

11.451.999 people

Biome

Atlantic Forest domain

Euglossa cordata

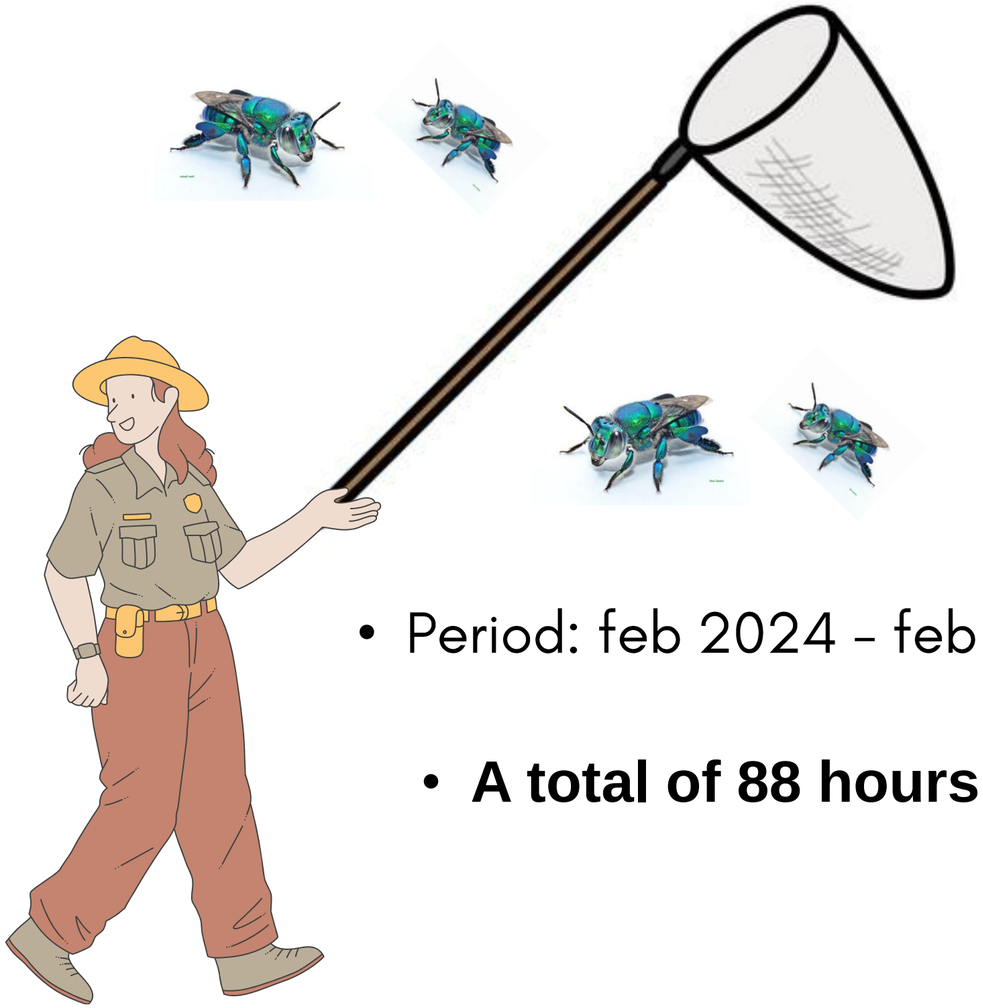
Estimating body size using intertegular distance (ITD)

"In bees, body size is highly correlated with the amount of foraging capacity and pollination success"

Baltz, L. M., de Vastey, J., Gardein, H., Klaus, F., Greil, H., Paxton, R. J., & Theodorou, P. (2025). Local floral resources and edge density within the urban ecosystem promote larger and less variable body size in the great banded furrow bee, Halictus scabiosae. BMC Ecology and Evolution, 25(1), 75.

How we did?

Bee Sampling



Eucalyptol

- Period: feb 2024 - feb 2025 (09h - 12h)
  - **A total of 88 hours sampling**

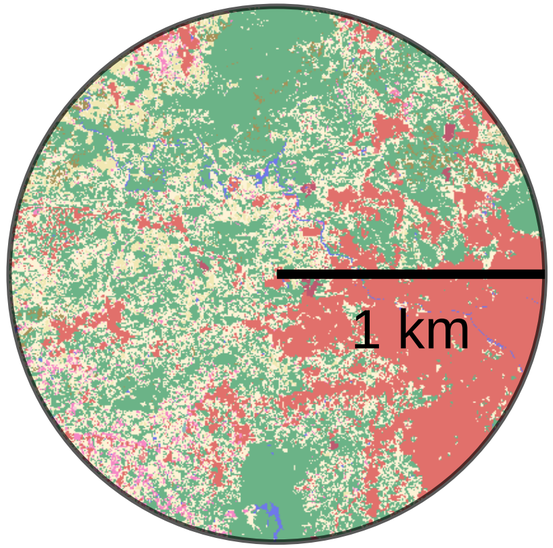
Taxonomic identification according to Rebelo & Moure (1995) and Nemésio (2009) and after that, measure of the males

How we did?

Landscape and statistical analysis

MAPBIOMAS
10 METROS

2022 Collection



Proportion of areas with significant density of buildings and roads, including infrastructure and open spaces without constructions.

Mixed model, to evaluate how urbanization (proportion of impervious surface) and season affect intertegular distance (ITD), used here as a proxy for body size.

MMQGIS plugin.

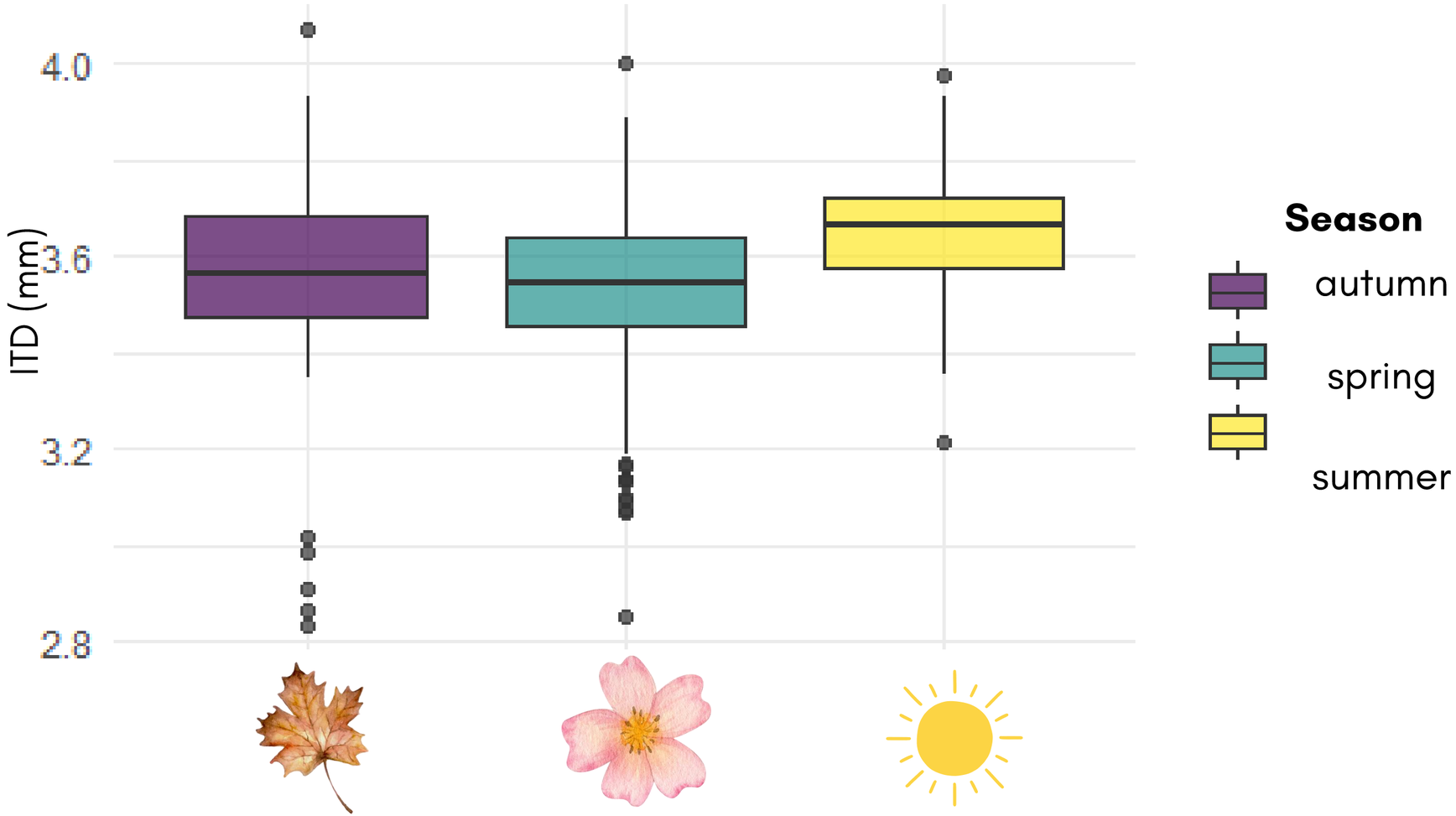
LecoS plugin.

QGIS

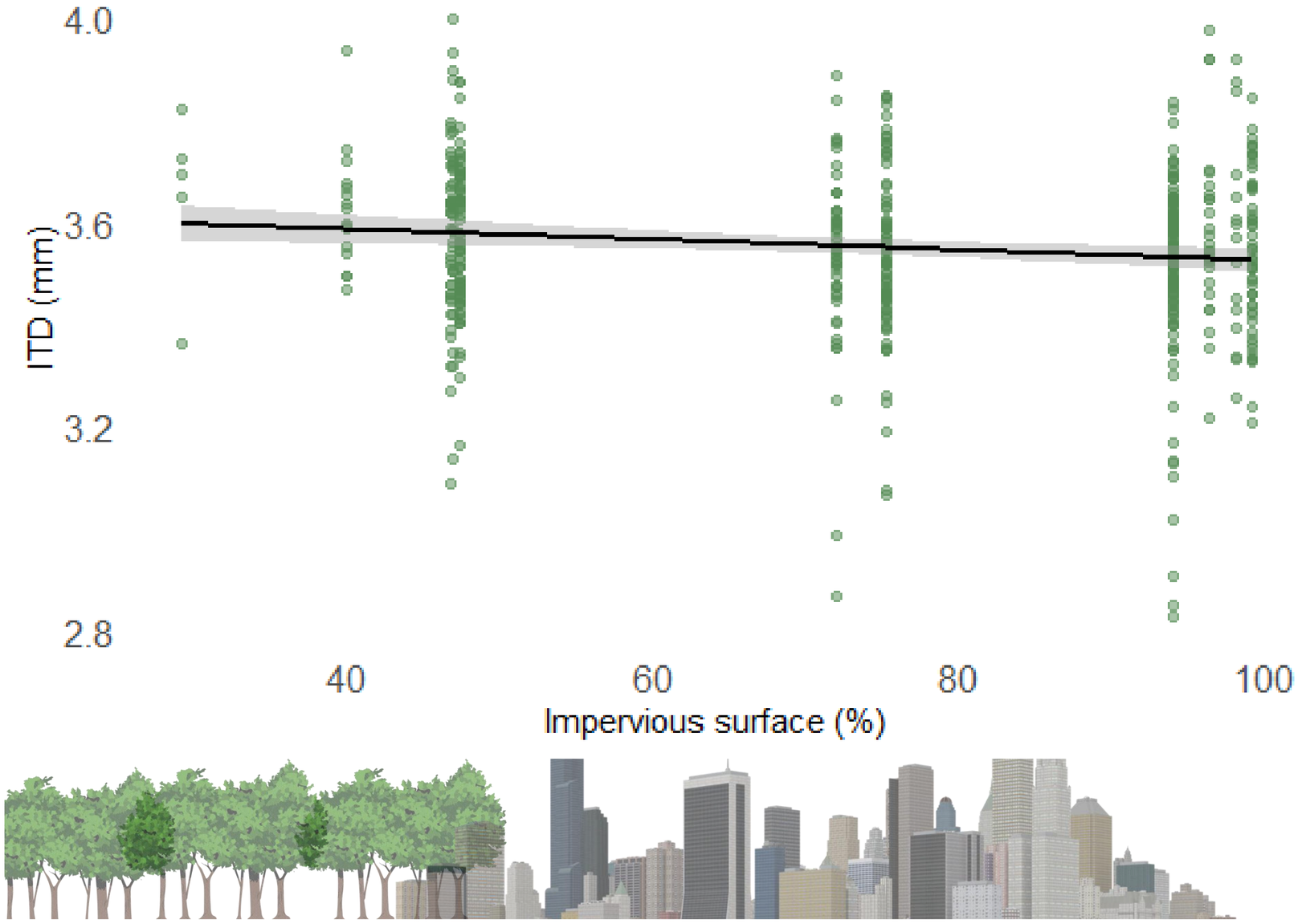
R

Our findings

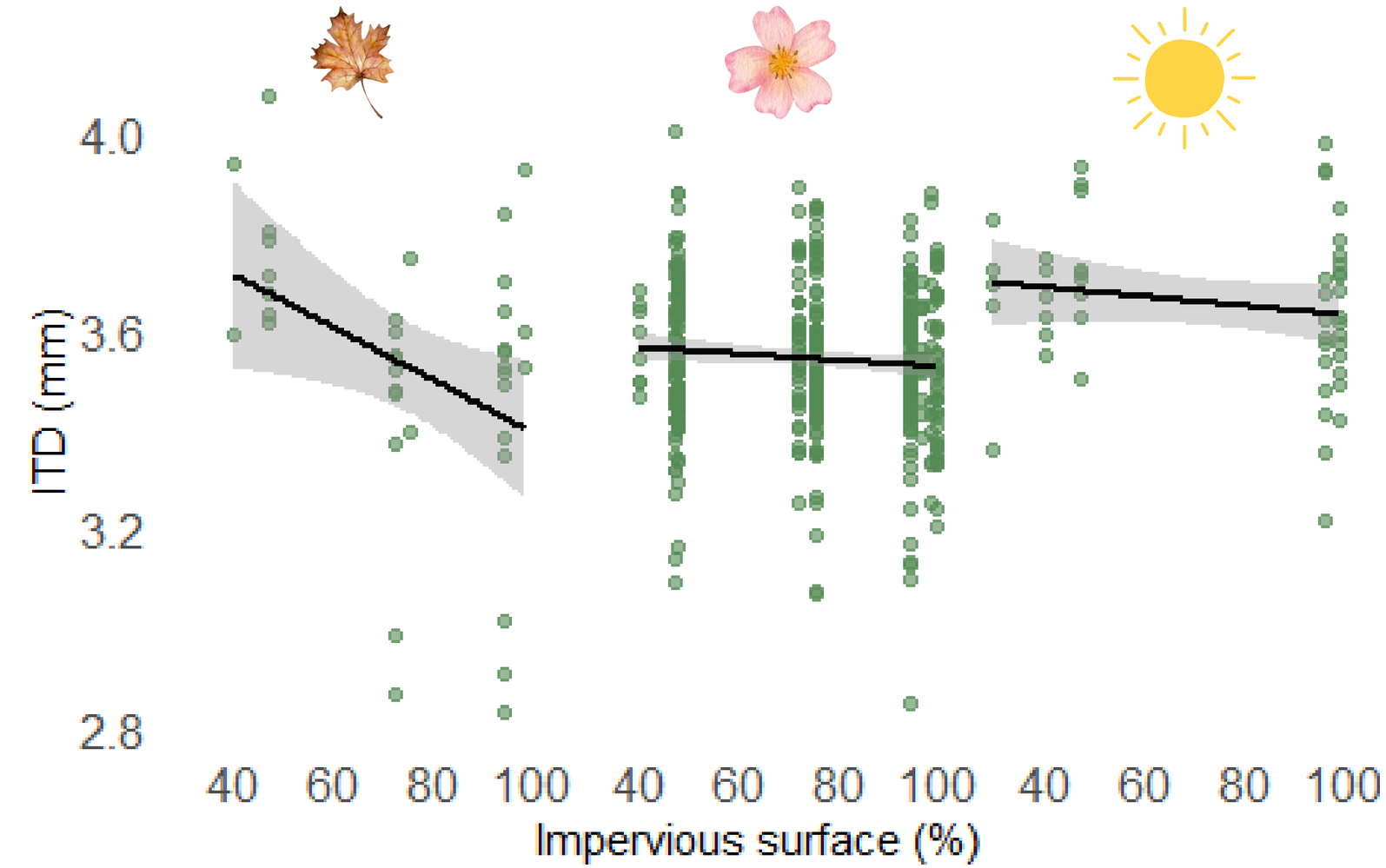
N = 839 bees



Our findings



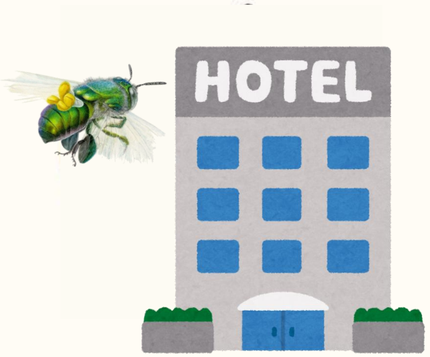
Our findings



How to support urban orchid bees

Plant diverse, year-round flowers

Ensures food for bees, especially in autumn



Provide nesting sites

Lowers stress and increases survival

Preserve and connect green spaces

Larger, connected habitats support bigger and healthier bees

Target seasonal gaps

Focus management in autumn

Acknowledgments

Thank you!

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