

Evaluation of insects' attraction to garden plants in a semi-arid region of Spain

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Introduction and objectives

The value of urban greenspaces depends on various factors, including vegetation type [1]. Many published lists recommend plants for pollinators. However, few studies have assessed plant attractiveness using a standardised method [2]. To our knowledge, no published studies have evaluated insect or pollinator attraction to garden plants in the Iberian Peninsula. **This study therefore aimed to identify the garden plants and shrubs most suitable for supporting insects in Murcia, a city located in the semi-arid region of southeastern Spain.**

Materials and methods

In four gardens, two botanical in the city centre and two parks in the suburbs, insects were surveyed once per week between mid-April and mid-May (Figs. 1, 2). In each plant, visitors were observed and photographed for two minutes in two ~0.22 m² patches, and assigned to one of five groups: "honey bees", "wild bees", "syrphids", "non-syrphid flies" or "others" (Fig. 3). Attractiveness was assessed using a barplot, and the effects of plant origin and garden type were analysed using generalised linear mixed models (GLMMs).



Fig. 1. Botanical garden Floridablanca. Fig. 2. Suburban garden Cuatro Piedras. Fig. 3. Insect photos were deposited in iNaturalist (project "Plants for Insects").

Results and discussion

Insect visitors per observation by plant species

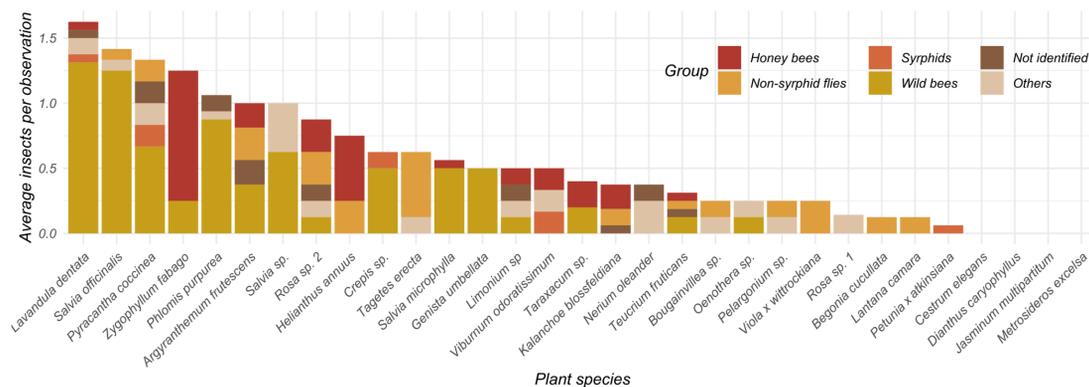


Fig. 4. Average insect visitors per 2-minutes observations by plant species. Plants were identified using the PlantNet tool. Genus-level identifications were used when species-level identification probabilities were under 70%. "Rosa sp. 1" and "Rosa sp. 2" refer to Rosa spp. patches from two gardens where plants were identified as different species but with probabilities under 70%.

Effects of plant origin and garden type

Table 1. Effects of plant origin and garden type on the number of insect visitors per observation. A GLMM was fitted with plant origin and garden type as fixed effects, and date of observation and plant species as random effects. The interaction term between plant origin and garden type, as well as garden identity, were excluded because they did not improve model fit and garden variance was negligible. Lack of overdispersion was confirmed.

Variable	Estimate	Standard error	Z-value	p-value
Plant origin	-0.075	0.385	-0.195	0.846
Garden type	1.132	0.366	3.094	0.002**

- ❖ Only 22.6 % of plants were visited by at least one insect on average per observation. These species were previously identified as suitable for pollinators [3, 4, 5, 6, 7, 8]. The majority of species in botanical gardens (66.7 %) received fewer than 0.5 insect visitors on average [Fig. 4].
- ❖ There was no significant difference in the number of visits to native versus exotic plants, consistent with findings from previous studies [2, Table 1].
- ❖ Garden type had a significant effect on the number of insect visitors recorded per observation, with higher visitation in suburban gardens designed to recreate natural gardens and forests with a greater proportion of native vegetation [Table 1]. This difference may be explained by the negative effects of urbanisation, such as the alteration in foraging resources and the type and availability of nesting substrates [9].

Conclusions

- ❖ Most plants in botanical city-centre gardens showed low attractiveness to insects.
- ❖ Plants in suburban gardens designed to recreate natural habitats received more insect visitors.

References

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