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BIODIVERSITY RESEARCH

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Foraging preferences of leafcutter bees in three contrasting geographical zones

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Abstract

Aim: Leafcutter bees use plants as pollen and nectar sources, but also cut leaf discs and use them to line their nests. Which plant species they choose as nesting material and why they do so have remained obscure. We asked the following: (1) How are the plant species used by leafcutter bees distributed phylogenetically? (2) Does plant choice differ across geographical regions, and if so, in what ways? (3) Are the leaf plant species natives or exotics? (4) What plant and leaf traits predict selection of plant species by leafcutter bees? And (5) Does the abundance of individuals per species in the habitat influence leafcutter bees' plant preferences?

Location: Tropical South Asia, temperate eastern Canada and US Sonoran Desert

Methods: We mapped taxa known to be used by leafcutter bees both from our own study and published literature onto the most recent angiosperm phylogeny. To determine what plant and leaf traits predict leaf selection, we monitored 6,120 individuals of 214 native and exotic plant species planted in a 3-sq. km. arboretum in Arizona and recorded leaf damage inflicted by bees.

Results: *Megachile* showed a strong preference for species in the rosid clade, particularly the phylogenetic cluster of Fabales, Fagales and Rosales. Thirty-two to forty-five percentage of the leaf plant species were exotic to a given region. Membership in the rosid clade and Fabaceae family predicted plant preference, whereas the plant species' local abundance and geographical origin did not. Leaf water content, morphotype and the presence of latex were important factors influencing plant choice, whereas leaf shape and size did not.

Main conclusion: These patterns point to plant groups whose availability should be monitored to assure persistence of leafcutter bees. Their preference for specific globally distributed plant clades, yet ability to readily adopt certain exotic plant species as nest resources, likely augments their ability to persist.

KEYWORDS

antimicrobial, biogeography, distribution, diversity, evolution, herbivory, leafcutter bee, Megachile, Megachilidae, pollinator, urban ecosystem

1 | INTRODUCTION

Megachilidae is a cosmopolitan bee family made up of 4,097 described species worldwide, making it the third largest family of bees (Ascher & Pickering, 2015). It includes the world's most extensively used managed solitary bees, *Megachile rotundata* (Pitts-Singer & Cane, 2011), and several species of economically important *Osmia* (Haider, Dorn, Sedivy, & Müller, 2014). Megachilid bees are broadly classified

