partimentierung des Verdauungstrakts der groben Morphologie anderer Coleoptera-Arten ähnlich ist. Die Ergebnisse zeigten, dass die Nahrungspräferenz der untersuchten Käfer wahrscheinlich keinen Einfluss auf die Gesamtlänge des Verdauungstrakts hatte, während der Vorderdarm bei Pollen- und Nektarfressern im Vergleich zu Blütengewebefressern deutlich länger war. Darüber hinaus wiesen weibliche Käfer im Verhältnis zur Körpergröße längere Mitteldärme und größere Vorderdarmvolumina auf als männliche Käfer. Dies könnte auf die eher stationäre Lebensweise und den zusätzlichen Energiebedarf weiblicher Käfer zurückzuführen sein. Dieser morphometrische Ansatz, der zum ersten Mal zur Untersuchung des Darms eines blütenbesuchenden Insekts angewandt wurde, kann für zukünftige vergleichende anatomische Studien genutzt werden.

Anschrift der Verfasser

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Semi-natural landscape elements and tree flower abundance influence nesting activity of the ground-nesting bee *Lasioglossum marginatum*

Iris Eva Reichl, Alexander Bruckner & Sophie Kratschmer

Ground nesting wild bees, like all bees, are central place foragers and depend on floral resources and suitable nesting habitats within their species-specific foraging ranges. However, increasing pressure from land-use change has led to the decline and fragmentation of crucial floral and nesting resources across both urban areas and agroecosystems. This study focuses on the polylectic, eusocial, ground-nesting wild bee species *Lasioglossum marginatum* in urban and rural areas in eastern Austria. *Lasioglossum marginatum* is distinguished by its distinct perennial life cycle. Colonies frequently occur in aggregations, which can encompass up to more than a thousand nests within a single area. Each colony persists for up to six years. Above ground, each nest is represented by a characteristic funnel of excavated earth. This study explores how parameters at the landscape (250 m radius) and the nest scale (nest area) influence the nesting activity of *L. marginatum*. Nesting activity was assessed by quantifying nest entrance density and nest size. This involved counting nest entrances using a quadrat sampling design, with five samples taken within each nest area. Moreover, the boundaries of each colony aggregation were marked to determine its overall dimensions and extent. The goal of the study was to evaluate the impact of floral resource availability and landscape characteristics, such as open semi-natural elements and landscape diversity, on nest size and nest entrance density in urban and rural environments. Floral resource availability at the landscape scale was assessed by examining 30 landscape circles (250 m), each surrounding a nest site of *L. marginatum*. Therefore, field mapping of flowering plant species richness and the associated flower abundance, with a detailed inventory of trees, shrubs, and herbaceous plants, was conducted. On the nest scale, floral resources were assessed via quadrat sampling, thereby identifying species richness as well as flower unit counts as an estimation

for flower abundance. Landscape characteristics were evaluated within the same extents by analysing habitat structure (including built-up areas, agricultural land, tree cover and open semi-natural elements) and landscape diversity (SHDI), using the European Strategy for the Alpine Region land use and land cover map (EUSALP LULC). To evaluate the impact of floral resources and landscape features on nest size and nest entrance density, Conditional Random Forests were used and complemented by Partial Dependence Plots to visualise predictor influences. We found that tree flower abundance at the landscape scale positively influenced nest entrance density of *L. marginatum*. In contrast, nest size was primarily positively associated with increasing proportions of semi-natural landscape elements at the landscape and nest scale. Structural elements like solitary flowering trees and shrubs, along with flowering trees or shrubs from adjacent woody areas, had the strongest positive impact. Contrary to expectations, increased landscape diversity (SHDI) was associated with smaller nest sizes, likely reflecting a high proportion of non-habitat land uses, such as infrastructure and intensively managed fields. Furthermore, there was no significant difference between nest size and nest entrance density in rural and urban landscapes. We conclude that both floral resource availability and landscape structure are critical for increasing nest entrance density and nest size of *L. marginatum*. The study highlights that increased flower abundance of tree species can provide valuable resources and enhance nest entrance density, supporting more *L. marginatum* colonies within an area. On the other hand, open semi-natural elements within the nest area, as well as solitary flowering trees and shrubs, contribute to larger nest sizes by providing necessary resources, microhabitats and areas for colony aggregations expansion. The findings of this study emphasise the need to conserve nectar-rich flowering trees and open semi-natural elements in urban and rural landscapes, thereby improving overall habitat quality and providing vital support for these ground nesting pollinators.

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Entwicklung des Kiefernborkenkäfers *Ips acuminatus* und seiner häufigsten Bläuepilze in Abhängigkeit von der Temperatur

Eva Papek, Elisabeth Ritzer, Axel Schopf, Dorothea Pöchlauer, Thomas Kirisits, Peter Baier & Martin Schebeck

Borkenkäfer gehören weltweit zu den bedeutendsten Forstinsekten, und der Klimawandel erhöht die Prädisposition von Nadelwäldern für Borkenkäfermassenvermehrungen. Außerdem wird durch den Temperaturanstieg der Voltinismus von Borkenkäfern beeinflusst, da Insekten ektotherm sind und viele Teile ihres Lebenszyklus (z.B. die Entwicklung und die Reproduktion) direkt von der Umgebungstemperatur abhängen. Die Auswirkungen steigender Umgebungstemperaturen, extremer Wetterereignisse (z.B. Stürme, starke Schneefälle) und ungünstiger Niederschlagsverteilung auf das Auftreten von Borkenkäfern sind global zu beobachten und werden in Zukunft noch mehr an Bedeu-

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