OP-268 [Pollination and Bee Flora]
Are Latvian apple orchards a good habitat for wild bee species?

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Wild bees (Hymenoptera: Anthophila) are important pollinators of apple trees. Previous studies have shown that a rich species community of bees can be found in flowering apple orchards in Latvia. However, it was unclear whether the bees inhabit these biotopes permanently or only visit them when flowering apple trees provide abundant foraging resources. Therefore, we set the goal of studying the phenology of bee species communities. The study was conducted in 2023 in eight orchards. Bees were sampled in April (before apple flowering), May (during the flowering), June and July (after the flowering) using yellow, white and blue pan traps and Malaise traps. The total number of observed species increased from 69 in April to 80 in July. On average, 32 species were found in each apple orchard in April and 25...26 species in the other months. Species diversity (Hill number corresponding to Shannon-Wiener index) was 9.41 in April, but in the other months it varied in the interval 12.6...13.7. According to ANOVA, neither species richness nor diversity differed significantly between months. Throughout the season, small-sized species (e.g. Lasioglossum pauxillum, L. morio etc.) with a small dispersal radius had a relatively large proportion in the species community. Kleptoparasites also were abundant; in April, Nomada and Sphecodes individuals accounted for 4% of all bees we observed. We also analysed the dependence of bee species community on landscape diversity and evenness within 1km and 3km radius around the orchards. The bee abundance and species richness was not significantly related to landscape parameters in any month. Species diversity strongly positively correlated with landscape evenness within a 1km radius in May ($r=0.753$; $p=0.031$) and landscape evenness within a 3km radius in May ($r=0.720$; $p=0.044$) and June ($r=0.875$; $p=0.004$). We conclude that bee species communities in apple orchards depend on the resources and the processes occurring within them, but not on the surrounding landscape. Latvian apple orchards are good habitats for wild bees, as they contain a relatively rich and diverse species community both during apple flowering and the rest of the vegetation period.

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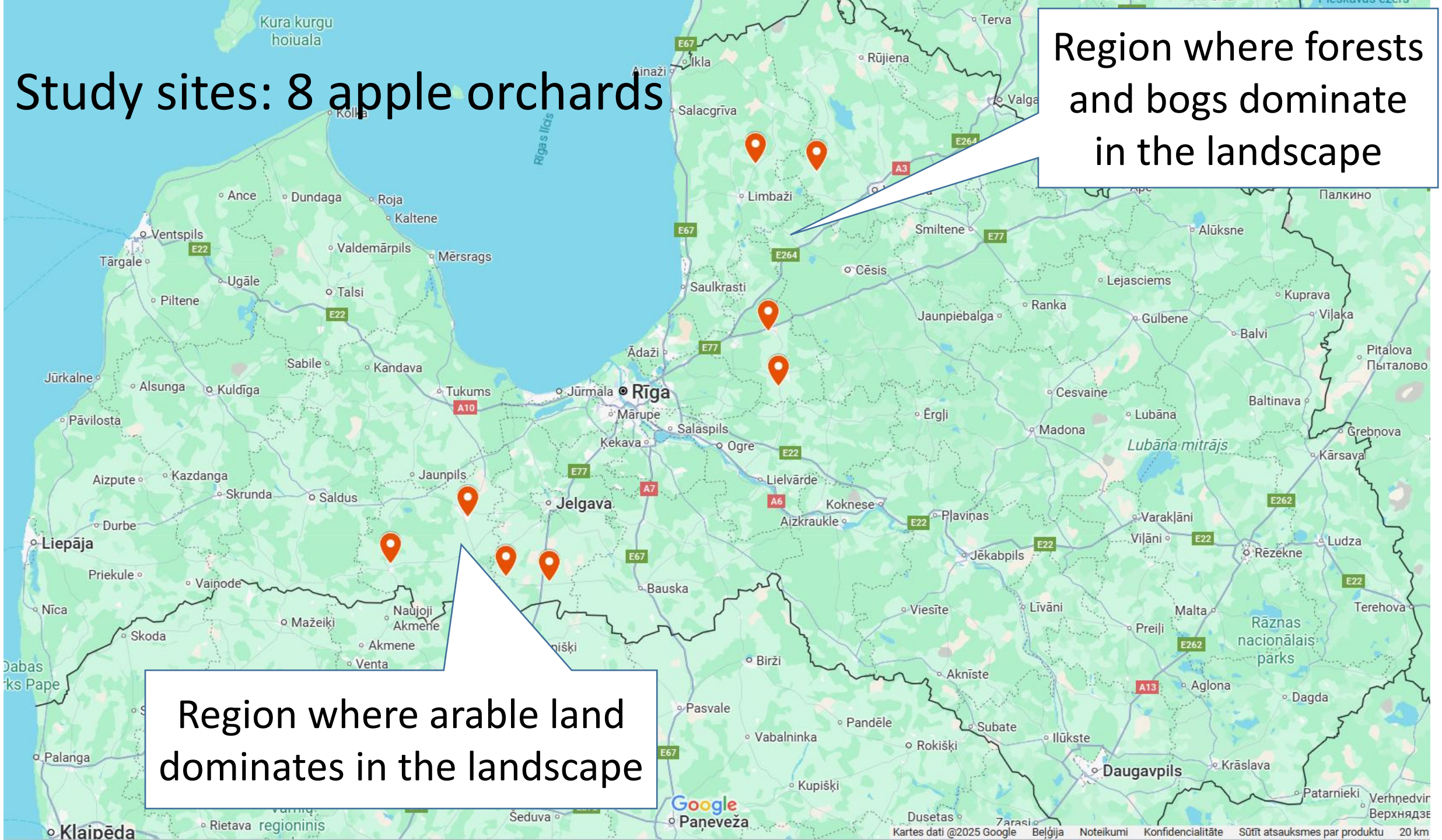
Intro

- Previous studies: 92 bee species have been found in apple orchards during flowering (~1/3 of all bees known in Latvia);

- Question: Do bees live in apple orchards permanently, or do they visit them only to forage?

Let's check it out!

Renature.Brussels


Study sites: 8 apple orchards
Region where forests and bogs dominate in the landscape
Region where arable land dominates in the landscape
Rīga
Jelgava
Liepāja
Daugavpils
Klaipėda
Paņeveža
Limbaži
Saulkrasti
Ādaži
Tukums
Jūrmala
Mārupe
Ķekava
Salaspils
Ogre
Jaunpils
Aizkraukle
Koknese
Bauska
Ventspils
Kuldīga
Sabile
Kandava
Talsi
Valdemārpils
Mērsrags
Ugāle
Piltene
Tārgale
Ance
Dundaga
Roja
Kaltene
Saldus
Skrunda
Aizpute
Kazdanga
Durbe
Priekule
Vaiņode
Nīca
Skoda
Mažeiki
Naujoji Akmene
Akmene
Venta
Palanga
Rietava
Šeduva
Birži
Pasvale
Vabalninka
Pandēle
Rokiški
Kupiški
Subate
Aknīste
Jēkabpils
Viesīte
Līvāni
Preiļi
Aglona
Dagda
Krāslava
Ilūkste
Dusetas
Zarasai
Patarnieki
Malta
Rēzekne
Ludza
Terehova
Viļāni
Varakļāni
Madona
Lubāna
Lubāna mitrājs
Cesvaine
Ērgļi
Gulbene
Balvi
Alūksne
Smiltene
Cēsis
Lejasciems
Ranka
Jaunpiebalga
Kuprava
Viļaka
Pitalova
Baltinava
Grebņova
Kārsava
Rāznas nacionālais parks
Terva
Rūjiena
Ainaži
Salacgrīva
Ikla
Valga
Kolka
Kura kurgu hoiuala
Rīga's līcis
Dabas parks Pape
Google
Kartes dati @2025 Google
Beļģija
Noteikumi
Konfidencialitāte
Sūtīt atsauksmes par produktu
20 km

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Methods

Sampling of bees during April, May (flowering of apple trees), June and July of 2023

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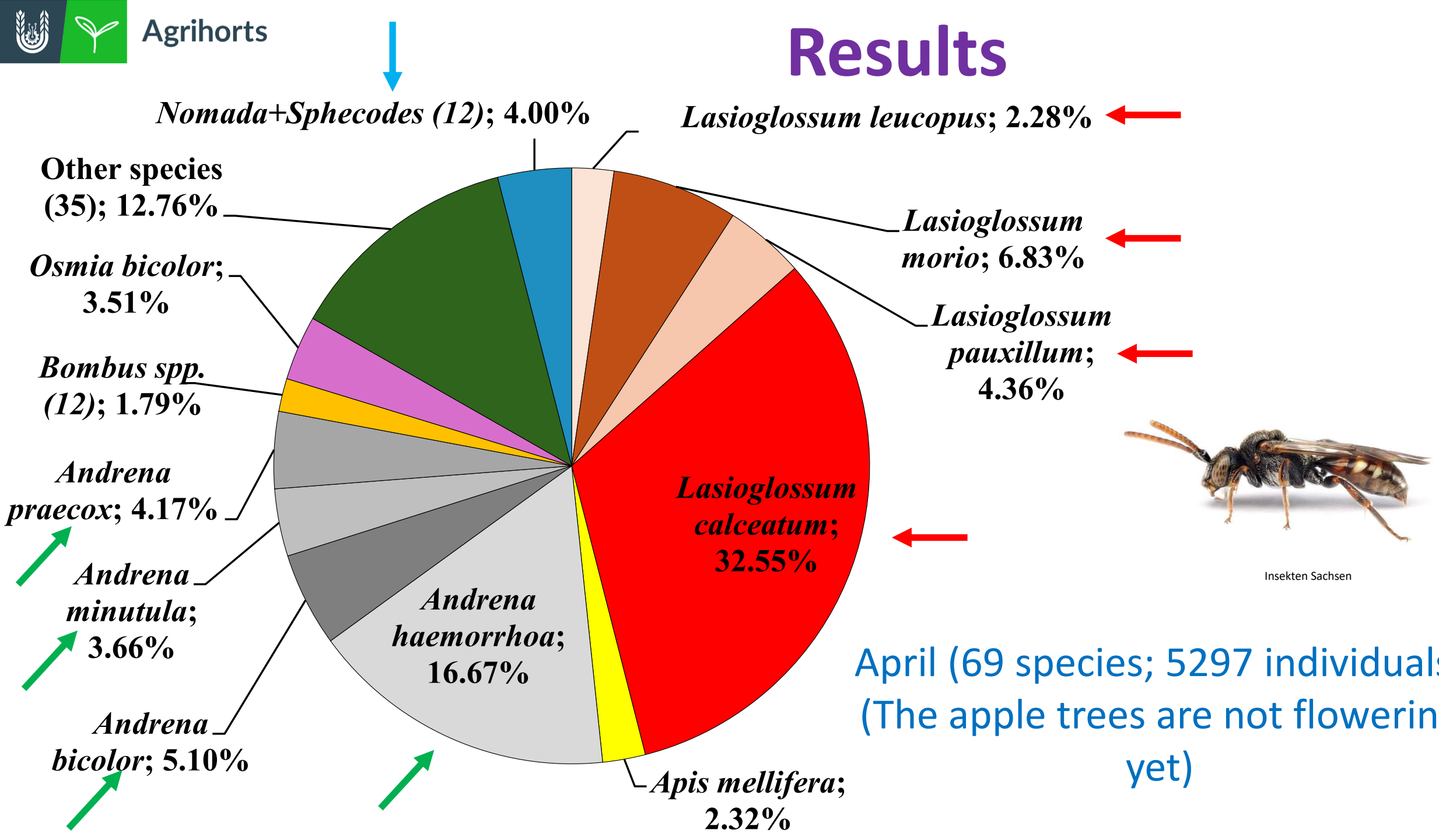
Results



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April (69 species; 5297 individuals)
(The apple trees are not flowering yet)

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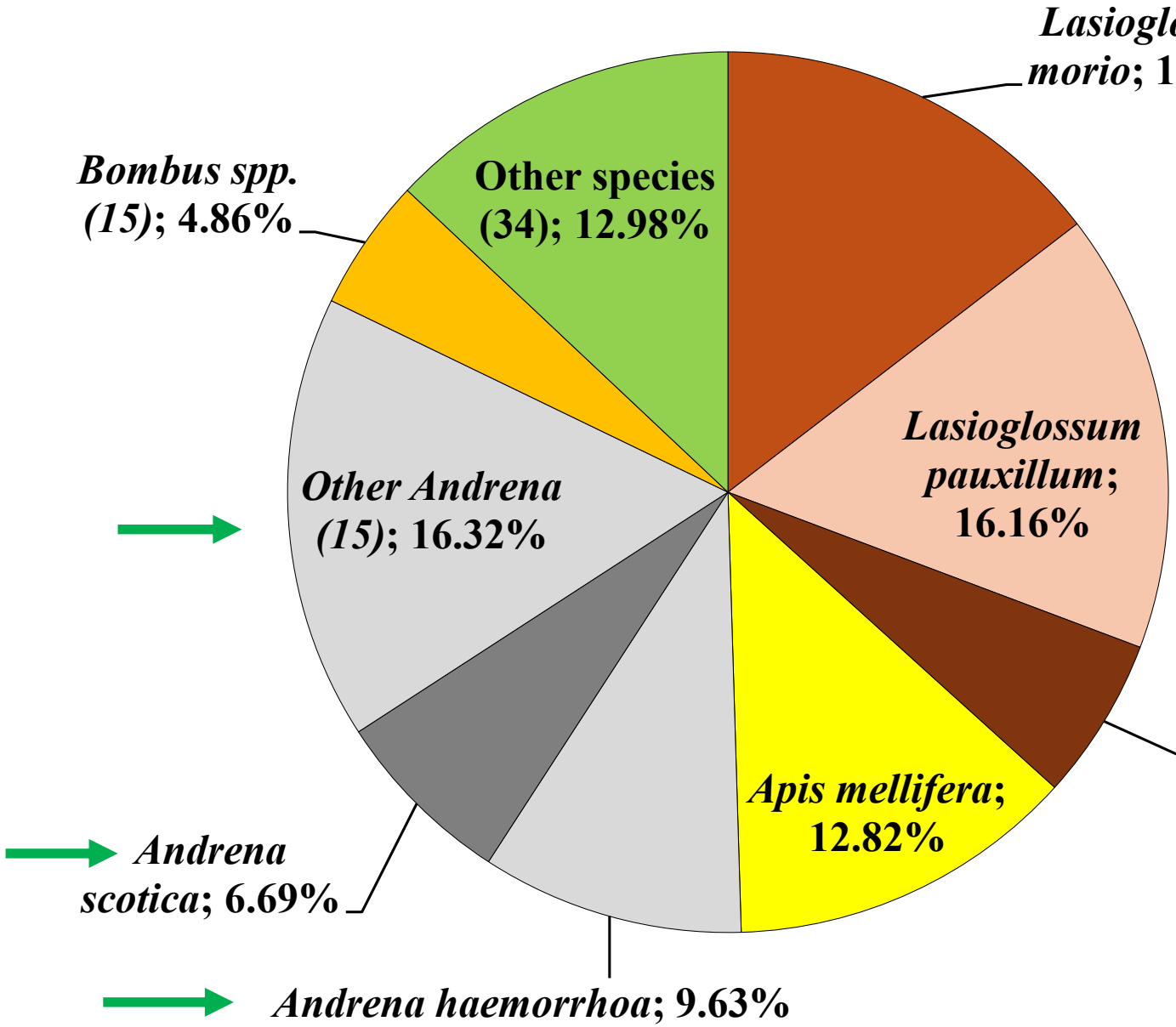
Results



May (70 species; 1256 individuals)
(The apple trees are flowering)

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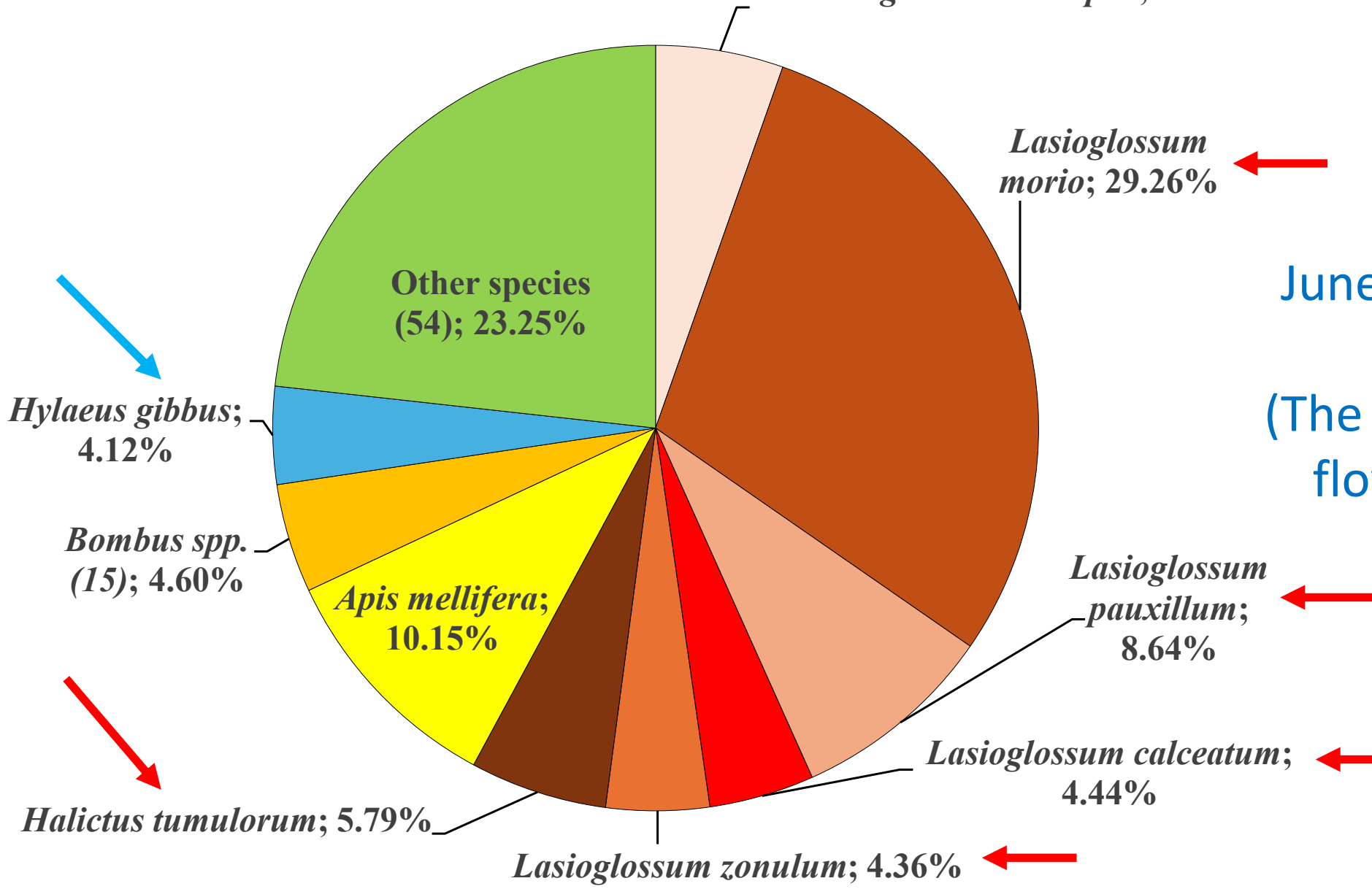
Results



June (77 species; 1262 individuals)
(The apple trees are not flowering anymore)

iNaturalist Ecuador

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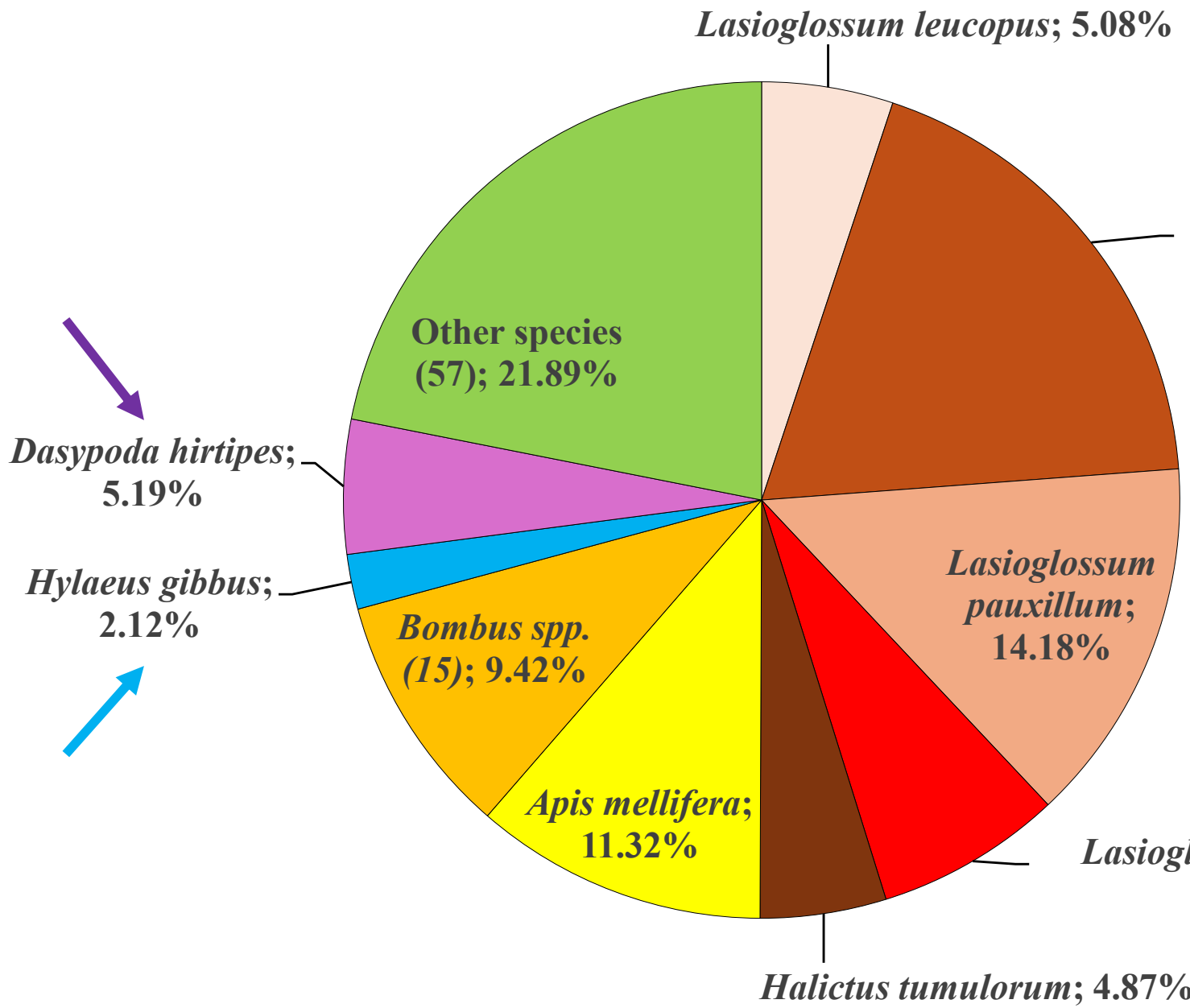
Results



July (80 species; 945 individuals)
(The apple trees have long since stopped flowering)

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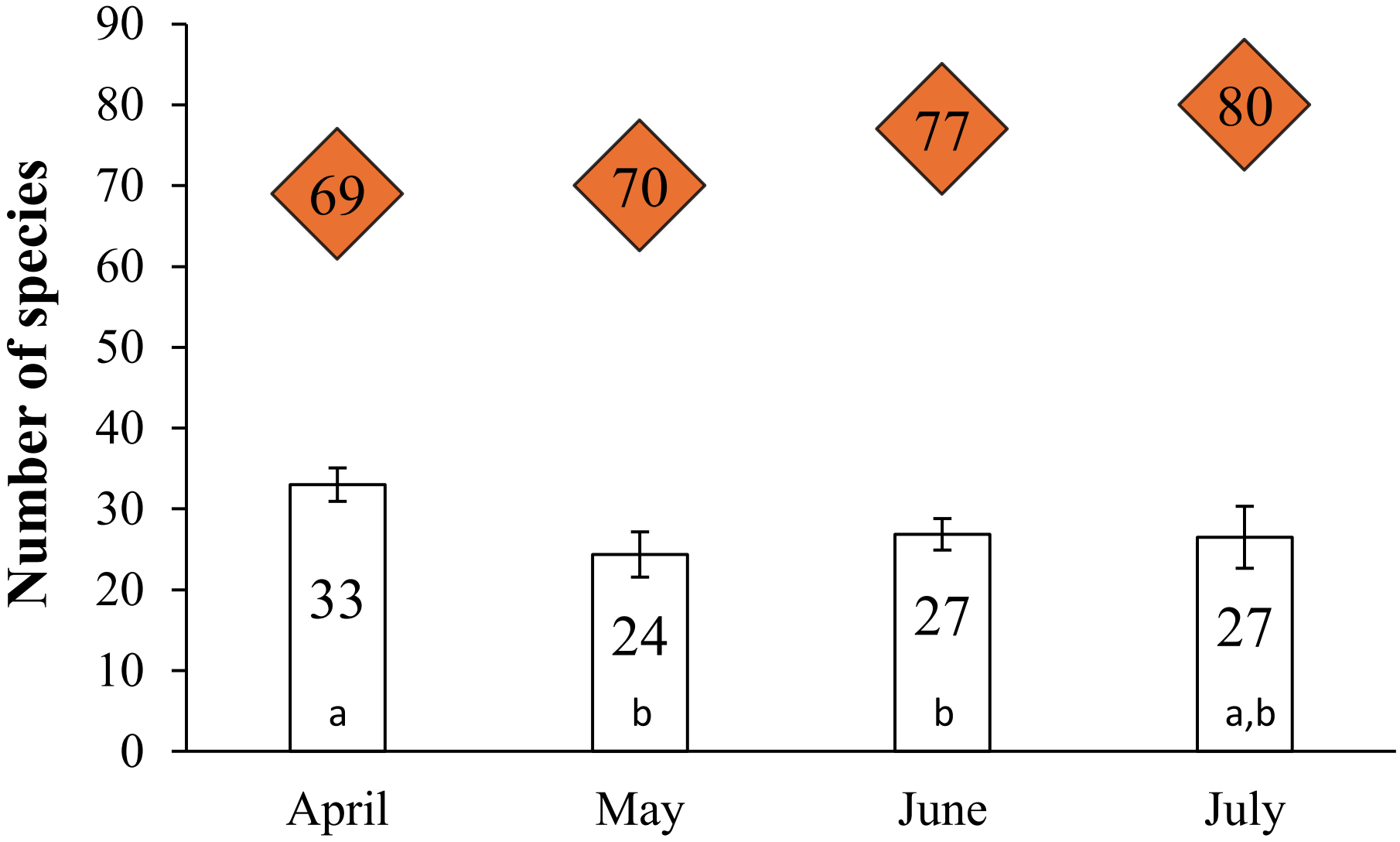
Results



a, b – significantly different ($p<0.05$) values

Average (□) and total (◆) number of bee species observed in apple orchards

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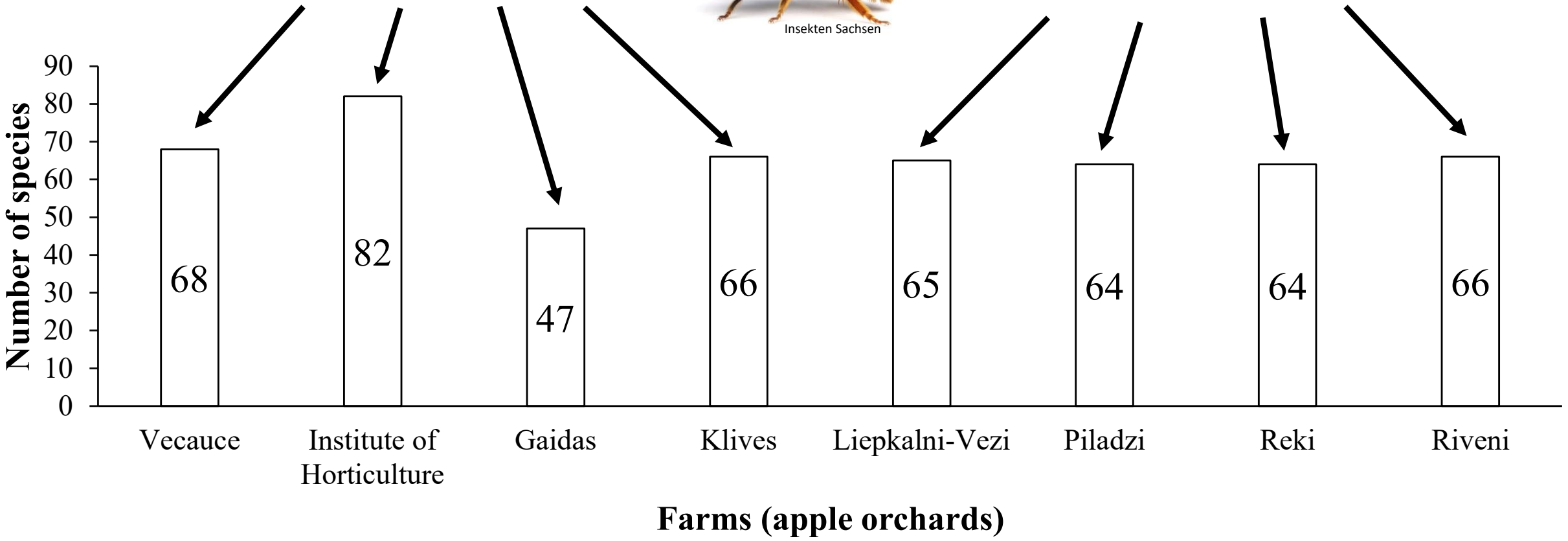
Results

Arable land dominates in the landscape

Forests and bogs dominate in the landscape



Total number of bee species observed in each apple orchard in 2023

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Results

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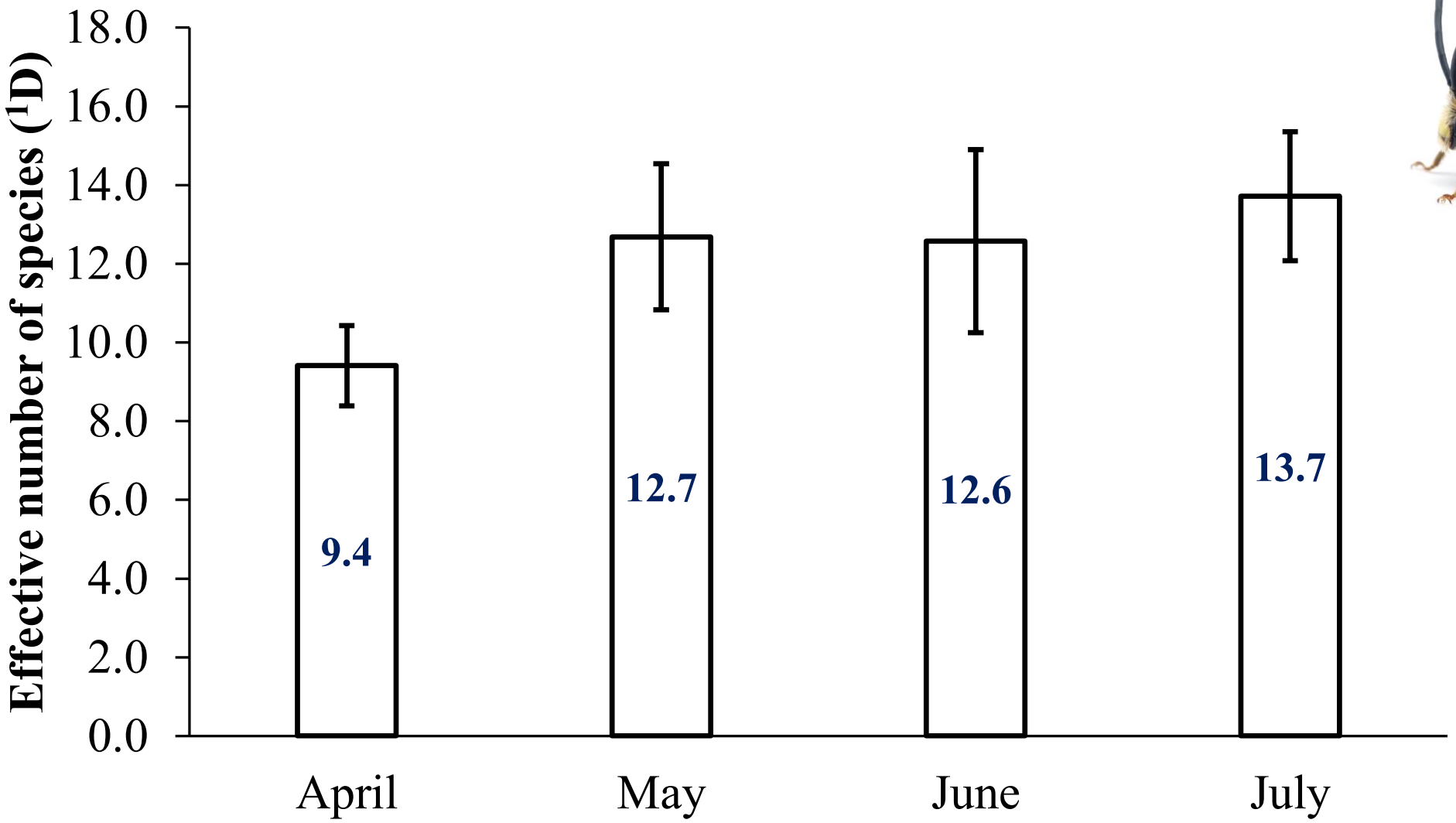

Average bee species diversity in apple orchards

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Results

		Landscape diversity, H' (1 km radius)	Landscape evenness, $E_{H'}$ (1 km radius)	Landscape diversity, H' (3 km radius)	Landscape evenness, $E_{H'}$ (3 km radius)
April	Species richness	–0.165 (p=0.696)	–0.041 (p=0.923)	0.259 (p=0.535)	0.235 (p=0.575)
	Species diversity, ^1D	–0.249 (p=0.551)	–0.432 (p=0.285)	0.050 (p=0.907)	–0.179 (p=0.671)
	Abundance of individuals	–0.460 (p=0.252)	–0.361 (p=0.379)	0.158 (p=0.708)	0.034 (p=0.936)
May	Species richness	0.317 (p=0.445)	0.375 (p=0.360)	0.631 (p=0.093)	0.521 (p=0.186)
	Species diversity, ^1D	0.437 (p=0.279)	0.753 (p=0.031)	0.452 (p=0.260)	0.720 (p=0.044)
	Abundance of individuals	–0.127 (p=0.764)	–0.433 (p=0.284)	0.313 (p=0.451)	–0.234 (p=0.577)
June	Species richness	0.178 (p=0.673)	0.432 (p=0.286)	0.616 (p=0.104)	0.667 (p=0.071)
	Species diversity, ^1D	0.261 (p=0.532)	0.535 (p=0.172)	0.590 (p=0.124)	0.875 (p=0.004)
	Abundance of individuals	–0.348 (p=0.398)	–0.322 (p=0.436)	–0.155 (p=0.715)	–0.367 (p=0.371)
July	Species richness	0.342 (p=0.406)	–0.082 (p=0.847)	0.310 (p=0.455)	–0.219 (p=0.603)
	Species diversity, ^1D	0.388 (p=0.342)	0.089 (p=0.835)	0.414 (p=0.308)	0.115 (p=0.786)
	Abundance of individuals	–0.115 (p=0.786)	–0.544 (p=0.164)	0.045 (p=0.916)	0.594 (p=0.120)

Correlations (r) between bee species diversity parameters and landscape diversity surrounding apple orchards

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Conclusions

NatureSpot

- On average, 65 bee species were observed in each apple orchard.
- The bee community was dominated by various wild species throughout the vegetation period (most of which have a small foraging range); kleptoparasites had a relatively large proportion.
- Bee species richness and diversity did not differ significantly during the growing season.
- The diversity of the landscape surrounding the apple orchards did not significantly affect the bee species richness and diversity, and abundance of individuals.

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Conclusions

Do bees live in apple orchards permanently, or do they visit them only to forage?

Yes, they do live permanently in the apple orchards.

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Are Latvian apple orchards a good habitat for wild bee species?

Yes, Latvian apple orchards can be considered good habitats for wild bees, providing them with both foraging and shelter resources.

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Acknowledgments

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Nederlands Soortenregister

Ministry of Agriculture
Republic of Latvia

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Questions and answers

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