FARMING PRACTICE
LANDSCAPE FEATURES

IMPACT: POLLINATION

Reference 15

Coutinho, JGD; Garibaldi, LA; Viana, BF 2018 The influence of local and landscape scale on single response traits in bees: A meta-analysis AGRICULTURE, ECOSYSTEMS AND ENVIRONMENT, 256, 61-73. 10.1016/j.agee.2017.12.025

Background and objective

Assessments of environmental drivers that regulate the functional composition of various organisms have become more frequent in the ecological literature, as this approach establishes a more direct connection between community structure and ecosystem functions. Bee response traits have been reported in empirical studies that examine the role of land use intensity in functional diversity. However, empirical studies include different descriptors measured at different spatial scales, producing poor generalizations. To provide a quantitative assessment of the role that the structural complexity of habitats at local and landscape scales plays in the richness and abundance patterns of bees, considering different response traits. Here, results on the role of structural complexity at the landscape scale are reported.

Search strategy and selection criteria

To conduct this meta-analysis, authors followed the PRISMA protocol. To identify studies in the literature that address the influence of land use for agricultural and/or the context the surrounding landscape on the functional diversity of bees in agroecosystems, they conducted a search in the database Scopus and Web of Science. 1) Papers presented a variable response to functional diversity of bees in agroecosystems or some functional trait measure not synthesized by an index; 2) included replication; 3) reported the sample size; 4) presented the mean and standard deviation for the type of habitat used for data collection (for studies using categorical predictor variables), or presented some statistics such as correlation and regression coefficients (for continuous predictor variables); 5) only studies that considered individual response traits were used in this meta-analysis.

Data and analysis

To calculate the effect size of different predictors , authors fitted the data set with generalized linear mixed models (GLMM). They evaluated the influence of landscape structure (crop and non-crop area) as the fixed effect. The 'study' was used as the random effect. Authors used the exact p-value or a statistical value such as F, t, r or r2, with degrees of freedom, to perform the conversion Fisher's Z. Effect sizes weighted by the inverse of its variance were combined and modelled using mixed effect models in R, version 3.3.0, and using the metafor package through the rma.mv function. The evaluation of possible bias in the publications was visually performed through a funnel plot.

Number of papers	Population	Intervention	Comparator	Outcome	Quality score
43	Agroecosystems	High landscape complexity (proportion of non-crop area)	Low landscape complexity (proportion of non-crop area)	Metric: Abundance of 1) solitary bees; 2) above-ground nesting bees; 3) below-ground nesting bees; 4) large bees; 5) small bees; Richness of: 6) solitary bees; 7) above-ground nesting bees; 8) small bees; Effect size: Fisher's Z-transformed r	81

Results

- The proportion of non-crop area was positively associated with the abundance (Fisher's Z-transformed=1.05, p-val=0.01) and richness of solitary bees (Fisher's Z-transformed=1.54, p-val=0.0029) and was no related with the other traits.
- NULL
- NULL
- NULL
- NULL

Factors influencing effect sizes

- No factors influencing effect sizes to report

Conclusion

The proportion of non-crop area was positively associated with the abundance and richness of solitary bees and was no related with the other traits.