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Van Vooren, L; Reubens, B; Broekx, S; De Frenne, P; Nelissen, V; Pardon, P; Verheyen, K 2017 Ecosystem service delivery of agri-environment measures: A synthesis for hedgerows and grass strips on arable land AGRICULTURE ECOSYSTEMS AND ENVIRONMENT, 244 32-51. 10.1016/j.agee.2017.04.015

Background and objective

Despite the existing knowledge on the delivery of individual ecosystem services of non-crop habitats, there is an urgent need for an integrated evaluation of the simultaneous changes in multiple ecosystem services. The main objective was to quantitatively assess the impact of hedgerows and grass strips bordering parcels with annual arable crops on the simultaneous delivery of a set of ecosystem services and from there we identified synergies and trade-offs on virtual parcels.

Search strategy and selection criteria

The systematic literature search is performed conform the PRISMA guidelines. Studies were searched on the Web of Science. 1) The study region is situated within the temperate regions of the globe; 2) empirical data of the indicator of interest are available (modelling studies are thus excluded); 3) true controls are present allowing indicator comparison with and without hedgerows or grass strips and 4) interaction of hedgerows and grass strips with arable crops.

Data and analysis

The authors applied mixed-effect models to define an effect relationship for each hedgerow or grass strip and ecosystem service indicator combination. In this relationship, the dependent variable was the natural logarithm of the ratios ($\ln(R)$). The authors did not perform a traditional, weighted meta-analysis because most studies did not report variances. When enough data with the required statistics were available, a mixed model as well as the traditional, weighted meta-analysis method was applied and compared.

Number of papers	Population	Intervention	Comparator	Outcome	Quality score
60	Arable crops	1) Grass strips; 2) Hedgerows	1) No grass strips; 2) No hedgerows	Metric: 1) Predator density; 2) Predator diversity; 3) Aphid density; Effect size: Logarithm of ratio of the considered metrics in the intervention to the considered metrics in the control	75

Results

- The model indicated that predator diversity is significantly higher in the grass strip and hedgerows systems. Predator density is significantly higher in the grass strip systems but not significantly higher in hedgerows systems.
- Aphid density was significantly reduced, indicating that less aphids are found on parcels with grass strips.
- Predator density and diversity in hedgerow systems are linked to landscape complexity. Both are significantly correlated, but a stronger effect was found for predator diversity.

Factors influencing effect sizes

- No factors influencing effect sizes to report

Conclusion

Predator diversity and density are significantly higher and aphid density was reduced in the grass strips systems. Hedgerows increased predator diversity.