

Reference 20

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: Carbon stock; Effect size: Logarithm of ratio of the considered metrics in the intervention to the considered metrics in the control	75

Results

- Within the grass strips, average soil carbon stock was increased by 25%.
- Close to the hedgerows, the soil organic carbon (SOC) stock increased and the magnitude of this positive effect decreased when the ratio distance to the hedgerow by height of the hedgerow (D/H) increased.
- Neither hedgerow type nor age or sampling depth significantly affected the result of the analysis.

Factors influencing effect sizes

- Distance to field edge : Close to the hedgerows, the SOC stock increased and the magnitude of this positive effect decreased when D/H increased.

Conclusion

Grass strips and hedgerows showed positive effect on the increase of soil carbon stock.