# SINGLE-IMPACT FICHE
## LANDSCAPE FEATURES

## IMPACT: BIODIVERSITY

Data extracted in October 2021

**Note to the reader**: This fiche summarises the impact of four landscape features (buffer strips; flower strips; hedgerows; isolated trees; and trees in group[1]) and landscape features in general (including hedgerows, field margins, lands taken out of production, isolated trees or bushes, ponds, trees in line, stone walls or terraces, considered together in different combinations) on BIODIVERSITY. It is based on 4 peer-reviewed synthesis research papers[2], including from 32 to 218 individual studies. The impacts of landscape features on biodiversity of pollinators and natural enemies are analysed separately in other single-impact fiches (see Pollination and Pests and diseases single-impact fiches, respectively).

## 1. WEIGHT OF THE EVIDENCE

- CONSISTENCY OF THE IMPACT:
  One meta-analysis reports a positive effect of landscape features in general on biodiversity (i.e, increase of biodiversity) and other 3 synthesis papers report positive effects on some biodiversity metrics with various degrees of confidence. However, despite these relevant results reported in these three latter synthesis papers, as they lack statistical test of the effects, here they are labelled as uncertain. Details are provided below in Table 2 and in the summary reports. Table 2 shows the number of synthesis papers reporting positive, negative or no effect, based on the statistical comparison of the intervention and the control. The systematic reviews reporting relevant results, but without statistical test of the effects are labelled as "uncertain".
  - Landscape features in general (namely hedgerows, field margins and lands taken out of production) increase biodiversity (statistically significant effect) compared to farmlands without remaining semi-natural habitat features, according to the only meta-analysis reviewed. In another systematic review authors report positive effects of different combinations of landscape features (namely isolated trees or bushes, ponds, hedgerows, trees in line, herbaceous field margins, dry-stone walls, terraces, and buffer strips) on biodiversity of birds, arthropods and plants in vineyards, but without statistical test of the effects and it is labelled as uncertain. Details are provided below in Table 2 and in the summary reports.
  - Buffer strips in grasslands are studied in one systematic review where authors report a general positive effect on macroinvertebrate biodiversity, although with medium confidence level. This systematic review reported relevant results, but without statistical test of the effects and it is labelled as uncertain. Details are provided below in Table 2 and in the summary reports.
  - Flower strips in croplands are studied in one systematic review where authors report a positive effect on insect abundance and diversity. This systematic review reported relevant results, but without

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[1] Described in the General Fiche.

[2] Research synthesis papers include a formal meta-analysis or systematic reviews with some quantitative results. Details can be found in the methodology section of the WIKI.

statistical test of the effects and it is labelled as uncertain. Details are provided below in Table 2 and in the summary reports.

- Hedgerows in grasslands are studied in one systematic review where authors report increased invertebrate biodiversity, although with medium confidence level. This systematic review reported relevant results, but without statistical test of the effects and it is labelled as uncertain. Details are provided below in Table 2 and in the summary reports.
- Isolated trees in grasslands are studied in one systematic review where authors report increased invertebrate biodiversity, although with medium confidence level. This systematic review reported relevant results, but without statistical test of the effects and it is labelled as uncertain. Details are provided below in Table 2 and in the summary reports.
- Trees in group in grasslands are studied in one systematic review where authors report increased invertebrate biodiversity, although with medium confidence level. This systematic review reported relevant results, but without statistical test of the effects and it is labelled as uncertain. Details are provided below in Table 2 and in the summary reports.

The 4 reviewed synthesis papers include data collected in Europe (see **Table 2**).

**Table 1.** Summary of effects. The numbers between parentheses indicate the number of synthesis papers with a quality score of at least 50%. Details on quality criteria can be found in the next section. One synthesis paper reported effects for more than one landscape feature.

| Impact | Intervention | Positive | Negative | No effect | Uncertain* |
|---|---|---|---|---|---|
| Increase biodiversity | Landscape features in general | 1 (1) | 0 | 0 | 1 (1) |
| | Buffer strips | 0 | 0 | 0 | 1 (0) |
| | Flower strips | 0 | 0 | 0 | 1 (0) |
| | Hedgerows | 0 | 0 | 0 | 1 (0) |
| | Isolated trees | 0 | 0 | 0 | 1 (0) |
| | Trees in group | 0 | 0 | 0 | 1 (0) |

* Number of synthesis papers that report relevant results but without statistical test comparison of the intervention and the control.

QUALITY OF THE SYNTHESIS PAPERS: *The quality score summarises 16 criteria assessing the quality of three main aspects of the synthesis papers: 1) the literature search strategy and studies selection; 2) the statistical analysis; 3) the potential bias. Details on quality criteria can be found in the methodology section of this WIKI.*

## 2. IMPACTS

The main characteristics and results of the synthesis paper are summarised in **Table 2**. Summaries of the meta-analyses provide fuller information about the results reported in each synthesis paper, in particular about the modulation of effects by factors related to soil, climate and management practices.

**Table 2.** Main characteristics of the synthesis papers reporting impacts of landscape features on biodiversity. The references are ordered chronologically with the most recent publication date first.

| Reference | Population | Scale | Num. papers | Intervention | Comparator | Metric | Conclusion | Quality score |
|---|---|---|---|---|---|---|---|---|
| England, JR; OGrady, AP; Fleming, A; Marais, Z; Mendham, D 2020 | Grazed dairy systems | Global | 83 | 1) Shelterbelts (hedgerows); 2) Riparian plantings (buffer strips); 3) Pasture trees (isolated trees); 4) Vegetation remants (trees in group) | Grazed dairy pasture without trees | Invertebrate, stream macroinvertebrate and vertebrate biodiversity, habitat quality and function | The only relationship with high confidence was the provision of habitat by remnant native vegetation resulting in increased vertebrate biodiversity. Relationships for the provision of habitat resulting in increased invertebrate biodiversity had medium confidence for shelterbelts and pasture trees, and only low confidence for remnant native vegetation. *Reviewers' note: We labelled the results as uncertain due to the lack of statistical testing.* | 38% |
| Paiola, A; Assandri, G; Brambilla, M; Zottini, M; Pedrini, P; Nascimbene, J 2020 | Vineyards | Global | 218 | 1) Punctual and 2) linear structural elements in the surrounding agricultural landscape; 2) Linear structural elements in the farm | 1) No landscape features in the surrounding agricultural landscape; 2) No landscape features in the farm | 1) Aves, Arthropoda and Plantae abundance; 2) Aves and Arthropoda and Plantae richness; 2) Arthropoda abundance | The results of the studies are often contrasting and taxon- and scale-dependent, thus hindering conclusions at the global scale. However, habitat heterogeneity at the landscape and local scales is a key element for biodiversity. *Reviewers' note: We labelled the results for grassed buffer strips as uncertain due to the lack of statistical testing.* | 63% |
| Batáry, P; Dicks, LV; Kleijn, D; Sutherland, WJ 2015 | Farmlands | Europe | 103 | Agri-environmental schemes :hedgerows, field margins or lands taken out of production (landscape features in general) | No semi-natural habitat features | Species diversity | Schemes aimed at areas out of production (such as field margins and hedgerows) are more effective at enhancing species richness than those aimed at productive areas (such as arable crops or grasslands). | 88% |

| Haaland, C; Naisbit, RE; Bersier, LF 2011 | Croplands and grasslands | Central and Northern Europe | 32 | Wild flowers strips | Crop (or crop edge) or grasslands | Abundance and diversity of insects | Sown wildflower strips support higher insect abundances and diversity than cropped habitats, and sown wildflower strips have comparable insect numbers and diversity to that in extensively used grasslands, despite the fact that they are recently established habitats. *Reviewers' note: We labelled the results as uncertain due to the lack of statistical testing.* | 38% |

## 3. KNOWLEDGE GAPS

**Batáry et al., 2015**   There is a strong geographic bias of study areas towards Northern and Western Europe.

**England et al., 2020**   There were a small number of studies that considered habitat quality and function, particularly in riparian systems.

**Paiola et al., 2020**   Important geographical areas for wine production, as well as several organism groups, have been completely neglected. Studies at the landscape level are still scarce (specifically those addressing landscape configuration).