

## IMPACT: BIODIVERSITY

Data extracted in May 2022  
Fiche created in December 2023

**Note to the reader:** This fiche summarises the effects of Landscape features on BIODIVERSITY. It is based on 4 synthesis papers<sup>1</sup>, including from 32 to 218 primary studies.

### 1. WEIGHT OF THE EVIDENCE

#### CONSISTENCY OF THE IMPACT

In general, landscape features have a positive effect on biodiversity, but this evidence is only statistically tested in 1 of the 4 synthesis papers retrieved.

The table below shows the number of synthesis papers with statistical tests reporting i) a significant difference between the Intervention and the Comparator, that is to say, a significant statistical effect, which can be positive or negative; or ii) a non-statistically significant difference between the Intervention and the Comparator. In addition, we include, if any, the number of synthesis papers reporting relevant results but without statistical test of the effects. Details on the quality assessment of the synthesis papers can be found in the methodology section of this WIKI.

- Landscape features in general (namely hedgerows, field margins and lands taken out of production) have a significantly positive effect on biodiversity (i.e., increase of biodiversity) compared to farmlands without remaining semi-natural habitat features, according to 1 synthesis paper. Another synthesis paper reports 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 this evidence is not statistically tested.
- Buffer strips in grasslands are studied in one synthesis paper where authors report a general positive effect on macroinvertebrate biodiversity, although with medium confidence level, but this evidence is not statistically tested.
- Flower strips in croplands are studied in one synthesis paper where authors report a positive effect on insect abundance and diversity, but this evidence is not statistically tested.
- Hedgerows in grasslands are studied in one synthesis paper where authors report increased invertebrate biodiversity, although with medium confidence level, but this evidence is not statistically tested.
- Isolated trees in grasslands are studied in one synthesis paper where authors report increased invertebrate biodiversity, although with medium confidence level, but this evidence is not statistically tested.
- Trees in group in grasslands are studied in one synthesis paper where authors report increased invertebrate biodiversity, although with medium confidence level, but this evidence is not statistically tested.

All selected synthesis papers included studies conducted in Europe (see **Table 2**).

**Table 1:** Summary of effects. Number of synthesis papers reporting positive, negative or non-statistically significant effects on environmental and climate impacts. The number of synthesis papers reporting relevant results but without statistical test of the effects are also provided. When not all the synthesis papers reporting an effect are of high quality, the number of synthesis papers with a quality score of at least 50% is indicated in parentheses. The reference numbers of the synthesis papers reporting each of the effects are provided in **Table 3**. Some synthesis papers may report effects for more than one impact or more than one effect for the same impact.

Impact	Metric	Intervention	Comparator	Statistically tested			Non-statistically tested
				Significantly positive	Significantly negative	Non-significant	
Increase biodiversity	Biodiversity	Buffer strips	No buffer strips	0	0	0	1 (0)
		Flower strips	No flower strips	0	0	0	1 (0)
		Hedgerows	No hedgerows	0	0	0	1 (0)
		Isolated trees	No isolated trees	0	0	0	1 (0)
		Landscape features in general	No semi-natural habitat features	1	0	0	1
		Trees in group	No trees in group or field copses	0	0	0	1 (0)

#### QUALITY OF THE SYNTHESIS PAPERS

The quality of each synthesis paper was assessed based on 16 criteria regarding three main aspects: 1) the literature search strategy and primary studies selection; 2) the statistical analysis conducted; and 3) the evaluation of potential bias. We assessed whether authors

<sup>1</sup> Synthesis research papers include either meta-analysis or systematic reviews with quantitative results. Details can be found in the methodology section of the WIKI.

addressed and reported these criteria. Then, a quality score was calculated as the percentage of these 16 criteria properly addressed and reported in each synthesis paper. Details on quality criteria can be found in the methodology section of this WIKI.

## 2. IMPACTS

The main characteristics and results of the 4 synthesis papers are reported in **Table 2** with the terminology used in those papers, while **Table 3** shows the reference numbers of the synthesis papers reporting for each of the results shown in **Table 1**. Comprehensive 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, are provided in the **summaries of the synthesis papers** available in this WIKI.

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

Reference number	Population	Scale	Num. papers	Intervention	Comparator	Metric	Conclusion	Quality score
Ref8	Grazed dairy systems	Global	83	1) Shelterbelts; 2) Riparian plantings; 3) Pasture trees; 4) Vegetation remnants	Grazed dairy pasture without trees	Invertebrate, stream macroinvertebrate and vertebrate biodiversity (mainly species richness, but also abundance and composition)	The effects reported are generally positive. Reviewers' note: We labelled the results as uncertain due to the lack of statistical testing.	38%
Ref9	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.	62%
Ref23	Farmlands	Europe	103	Agri-environmental schemes (hedgerows, field margins or lands taken out of production)	No semi-natural habitat features	Species richness	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).	81%
Ref31	Croplands and grasslands	Central and Northern Europe	32	Wild flowers strips	Crop (or crop edge) or grasslands	Insects 1) abundance; 2) diversity	Authors found that 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 intensively 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%

**Table 3:** Reference numbers of the synthesis papers reporting for each of the results shown in **Table 1**.

Impact	Metric	Intervention	Comparator	Statistically tested			Non-statistically tested
				Significantly positive	Significantly negative	Non-significant	
Increase biodiversity	Biodiversity	Buffer strips	No buffer strips				Ref8
		Flower strips	No flower strips				Ref31
		Hedgerows	No hedgerows				Ref8
		Isolated trees	No isolated trees				Ref8
		Landscape features in general	No semi-natural habitat features	Ref23			Ref9
		Trees in group	No trees in group or field copses				Ref8

## 3. FACTORS INFLUENCING THE EFFECTS ON BIODIVERSITY

No factors were found.

## 4. KNOWLEDGE GAPS

**Table 5:** Knowledge gap(s) reported by the authors of the synthesis papers included in this review.

Ref Num	Gap
Ref8	There were a small number of studies that considered habitat quality and function, particularly in riparian systems.
Ref9	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).

Ref Num	Gap
Ref23	There is a strong geographic bias of study areas towards Northern and Western Europe.

## 5. SYNTHESIS PAPERS INCLUDED IN THE REVIEW

**Table 6:** List of synthesis papers included in this review. More details can be found in the summaries of the meta-analyses.

Ref Num	Author(s)	Year	Title	Journal	DOI
Ref8	England, JR; OGrady, AP; Fleming, A; Marais, Z; Mendham, D	2020	Trees on farms to support natural capital: An evidence-based review for grazed dairy systems	SCIENCE OF THE TOTAL ENVIRONMENT, 704, 135345.	10.1016/j.scitotenv.2019.135345
Ref9	Paiola, A; Assandri, G; Brambilla, M; Zottini, M; Pedrini, P; Nascimbene, J	2020	Exploring the potential of vineyards for biodiversity conservation and delivery of biodiversity-mediated ecosystem services: A global-scale systematic review	SCIENCE OF THE TOTAL ENVIRONMENT, 706, 135839.	10.1016/j.scitotenv.2019.135839
Ref23	Batáry, P; Dicks, LV; Kleijn, D; Sutherland, WJ	2015	The role of agri-environment schemes in conservation and environmental management	CONSERVATION BIOLOGY, 29(4), 1006-1016.	10.1111/cobi.12536
Ref31	Haaland, C; Naisbit, RE; Bersier, LF	2011	Sown wildflower strips for insect conservation: A review	INSECT CONSERVATION AND DIVERSITY, 4, 60-80.	10.1111/j.1752-4598.2010.00098.x

---

**Disclaimer:** These fiches present a large amount of scientific knowledge synthesised to assess farming practices impacts on the environment, climate and productivity. The European Commission maintains this WIKI to enhance public access to information about its initiatives. Our goal is to keep this information timely and accurate. If errors are brought to our attention, we will try to correct them. However, the Commission accepts no responsibility or liability whatsoever with regard to the information on these fiches and WIKI.

---