SINGLE-IMPACT FICHE
LANDSCAPE FEATURES

IMPACT: PESTS AND DISEASES

Data extracted in October 2021

Note to the reader: This fiche summarises the impact of three landscape features (field margins, flower strips, and hedgerows[1]) and landscape features in general (including hedgerows, field borders and lands taken out of production, considered together) on PESTS AND DISEASES. It is based on 4 peer-reviewed synthesis research papers[2], including from 35 to 60 individual studies.

1. WEIGHT OF THE EVIDENCE

- CONSISTENCY OF THE IMPACT:

The effect on pest control differs among landscape features (see **Table 1**):

- Landscape features in general (namely hedgerows, field borders and lands taken out of production) have a positive effect on the abundance of natural enemies and no effect on the abundance, diversity, population growth of pests or plant damage compared to agricultural lands without semi-natural habitat features, according to 1 synthesis paper reviewed.
- Field margins have a positive effect on pests and diseases (i.e. decrease of pests and diseases) compared to cropland or grassland without field margins, according to the 2 synthesis papers reviewed.
- Flower strips have a positive effect on pests and diseases compared to cropland or grassland without flower strips, according to 1 synthesis paper reviewed.
- Hedgerows have differing effects on pests and diseases compared to cropland without hedgerows. 3 synthesis papers reported no effect while 2 reported a positive effects.

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 results for two landscape features.

Impact	Intervention	Positive	Negative	No effect	Uncertain
Decrease pests and diseases	Landscape features in general	1 (1)	0	1 (1)	0
	Field margins	2 (2)	0	0	0
	Flower strips	1 (1)	0	0	0
	Hedgerows	2 (2)	0	3 (3)	0

[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.

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 papers 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 pests and diseases. The references are ordered chronologically with the most recent publication date first.

Reference	Population	Scale	Num. papers	Intervention	Comparator	Metric	Conclusion	Quality score
Albrecht, M; Kleijn, D; Williams, NM; Tschumi, M; Blaauw, BR; Bommarco, R; Campbell, AJ; Dainese, M; Drummond, FA; Entling, MH; Ganser, D 2020	Cropland	North America, Europe, New Zeland	35	1) Flower strips; 2) Hedgerows	No flower strips; 2) No Hedgerows	Natural pest control service	This synthesis demonstrates enhanced natural pest control services to crops adjacent flower strips plantings but not adjacent to hedgerows, across a broad suite of regions, cropping systems and types of flower strips studied.	62%
Van Vooren, L; Reubens, B; Broekx, S; De Frenne, P; Nelissen, V; Pardon, P; Verheyen, K 2017	Arable crops	Global (temperate climate)	60	1) Grass strips (field margins); 2) Hedgerows	1) No grass strips; 2) No hedgerows	Predator density, predator diversity	Predator diversity and density are significantly higher and aphid density was reduced in the grass strips systems. Hedgerows increased predator diversity.	75%
Shackelford, G; Steward, PR; Benton, TG; Kunin, WE; Potts, SG; Biesmeijer, JC; Sait, SM 2013	Fields, orchards, and vineyards of food crops	Global	46	High compositional complexity (proximity or diversity of non-crop plants in margins of food crops) (field margins)	Low compositional complexity	Abundance and richness of crop pest natural enemies	Some pollinators and natural enemies seem to have compatible responses to complexity, and it might be possible to manage agroecosystems for the benefit of both.	81%
Chaplin-Kramer, R; O'Rourke, ME; Blitzer, EJ; Kremen, C 2011	Farmlands	Global	46	1) % natural habitats (landscape features in general); 2) Length woody edges (hedgerows)	No natural habitats; 2) No woody edges	Natural enemies; 2) Pests	The positive response of natural enemies does not necessarily translate into pest control, since pest abundances show no significant response to landscape complexity.	81%

3. KNOWLEDGE GAPS

Van Vooren et al., 2017	To quantify and predict pest control on agricultural parcels, a very comprehensive analysis of both species' spatial distribution, mobility and lifecycle, at parcel and landscape levels is necessary.
Shackelford et al., 2013	The authors identified the interactions between pollinators and natural enemies and their interacting effects on crop productivity as knowledge gaps.