

# SINGLE-IMPACT FICHE – AGROFORESTRY

## IMPACT: PESTS AND DISEASES

Data extracted in June 2020

**Note to the reader:** This fiche summarises the impact of Agroforestry on PESTS AND DISEASES. It is based on a review of 3 peer-reviewed synthesis research papers, each involving 17 to 42 primary research studies.

### 1. WEIGHT OF THE EVIDENCE

- CONSISTENCY OF THE IMPACT:**  
 Out of the 3 synthesis papers dealing with this type of impact (**Table 1**), 2 show positive effect of agroforestry (i.e. decrease pests and diseases) compared to cropland at the global scale and Temperate region (Canada, France, Turkey, UK and USA). One synthesis paper reports an uncertain effect at the global scale. See **Table 2** for details.

**Table 1.** Summary of effects. The numbers between parenthesis 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.

Impact	Comparator	Effects (all studies)				Effects (only studies including EU)			
		Positive	Negative	No effect	Uncertain	Positive	Negative	No effect	Uncertain
Decrease pest and disease	Croplands without trees	2	0	0	1	2	0	0	1

- 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 3 synthesis papers are summarized 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 agroforestry systems on pests and diseases.

Reference	Population	Geographical scale	Intervention	Control	Conclusion	Quality score	Global effect
1 Staton, T; Walters, RJ; Smith, J; Girling, RD. 2019	Temperate arable systems.	Temperate region, defined as latitude > 40° north or south (Canada, France, Turkey, UK and USA).	Silvoarable agroforestry systems.	Crop monocultures	Evidence was found for significantly enhanced natural enemy populations and significantly suppressed arthropod herbivore populations in silvoarable systems, but molluscan pests were more numerous in the two available studies, compared with arable.	94%	Positive, compared to cropland.
2 Pumarino, L; Sileshi, GW; Gripenberg, S; Kaartinen, R; Barrios, E; Muchane, MN; Midega, C; Jonsson, M. 2015	Agroforestry systems (sequential or simultaneous) applied to cropland.	Global	Same crop grown in agroforestry or higher shade levels. Simultaneous agroforestry: scattered trees in crop land, often known as "parkland agroforestry", alley cropping, cereal-tree intercropping and multi-strata agroforestry. Sequential agroforestry: improved fallows, relay cropping with trees and rotational woodlot systems where a piece of land is deliberately planted with fast-growing nitrogen-fixing trees.	Crop grown without the agroforestry intervention or under low levels of shade.	This meta-analysis indicates that agroforestry generally benefits most aspects of natural pest control.	75%	Positive, compared to cropland.
3 Poch, TJ; Simonetti, JA. 2013	Agroforestry (productive plantations, as well as non-commercial plantations and city parks or gardens) and natural systems (native forests, shrublands or grasslands).	Global	Presence of insectivores (birds, lizards, ants and predatory arthropods in general, the latter including ants, spiders and others).	Absence of insectivores.	Insectivorous species reduced arthropod abundance and plant herbivory, and increased plant productivity in both natural and agroforestry systems.	75%	Uncertain

### 3. KNOWLEDGE GAPS

- Most of the studies testing how agroforestry practices affect pest control were done in either coffee or maize agroforestry plantations, as well as for few pests and diseases. Thus, it is possible that the results are partly dependent on the crop types studied. The impact on a large number of important invertebrate pests and natural enemies remain unknown. The trials had been done mainly in Western and Eastern Africa and in Central and South America. Only one synthesis paper reported data for Europe.