




Data extracted in June 2020

This fiche summarises the impact of Agroforestry on PEST- AND DISEASE- CONTROL. It is based on a review of 3 peer-reviewed synthesis research papers, each involving 17 to 42 individual papers.

This fiche is part of a set of similar fiches synthesising all the impacts of agroforestry presented in the general fiche .

### 1. WEIGHT OF THE EVIDENCE

- **CONSISTENCY OF THE IMPACT:** Out of the 3 synthesis papers dealing with this type of impact, 2 show positive effect of agroforestry on pest- and disease-control 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 the tables below for details.


Impact	Comparator	Effects (all studies)				Effects (only studies including EU)			
		Positive	Negative	No effect	Uncertain	Positive	Negative	No effect	Uncertain
Pest- and disease- control	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. The scores can be found in the Excel database with all the data extracted from the synthesis papers]

As shown in the “Quality score” of the table in section 2, the quality level is high and ranges from 75% to 94%. The least frequently satisfied quality criteria were those related to the dataset availability (0 out of 3), the number of studies selected at each step of the selection procedure (1 out of 3) and weighting of individual studies (1 out of 3).

- **NUMBER OF SCIENTIFIC PAPERS:** The number of papers included in each synthesis paper ranges from 17 to 42.

### 2. IMPACTS

The main characteristics and results of the 3 synthesis papers are summarized in the two tables presented below. For details follow this link .

Reference	Population	Geographical scale	Intervention	Control	Conclusion	Quality score	Global effect
1 Staton, T; Walters, R.J; Smith, J; Girling, R.D. 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, G.W; Gripenberg, S; Kaartinen, R; Barrios, E; Muchane, M.N; 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, T.J; Simonetti, J.A. 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

[They are extracted from each meta-analysis, synthesized and consolidated]

- 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.

### 4. SYSTEMATIC REVIEW SEARCH STRATEGY

Keywords	TOPIC: (agroforestry OR "agro-forestry") AND TOPIC: (meta-analy*)
Search dates	No time restrictions
Databases	Web of Science and Scopus, run on 15 May 2020
Selection criteria	Three main criteria led to the exclusion of a study: (1) the study does not deal with agroforestry; (2) the study does not assess the environmental and climate impacts of the farming practice on pest- and disease-control; (3) the study is neither a meta-analysis nor a systematic review. Studies that passed the relevance criteria were subject to critical appraisal carried out on article by article basis. We finally selected 3 meta-analysis.