

## IMPACT: SOIL EROSION

Data extracted in May 2021  
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**Note to the reader:** This fiche summarises the effects of Intercropping on SOIL EROSION. It is based on 2 synthesis papers<sup>1</sup>, including 121 and 180 primary studies.

### 1. WEIGHT OF THE EVIDENCE

#### CONSISTENCY OF THE IMPACT

Intercropping of multiple crop species (i.e., crop mixture cropping), as compared to monoculture, led to an overall positive effect on soil erosion (**Table 1**).

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.

- crop mixture cropping: from a total of 3 results, 2 were positive and 1 showed a non-significant effect, as compared to monoculture.

None of the 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	
Decrease soil erosion	Soil erosion	Crop mixture cropping	monoculture	2	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 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 2 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 soil erosion. The references are ordered chronologically with the most recent publication date first.

Reference number	Population	Scale	Num. papers	Intervention	Comparator	Metric	Conclusion	Quality score
Ref3	Grain legumes and cereals	Africa	180	Grain legume and cereal intercropping	Monoculture	Sediment generation, water runoff, water infiltration	Intercropping can reduce soil erosion.	62%
Ref15	Multiple crops	China	121	Strip cropping	Monoculture	Annual soil loss and runoff	Strip cropping can reduce soil loss but it doesn't influence water runoff.	69%

<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.

**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	
Decrease soil erosion	Soil erosion	Crop mixture cropping	monoculture	Ref3 and Ref15		Ref15	

### 3. FACTORS INFLUENCING THE EFFECTS ON SOIL EROSION

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
Ref3	Studies that focus on indigenous African grain legumes or cereals should be encouraged because, with the exception of cowpea and teff, most past studies have focused on non-native species.
Ref15	Future studies should focus more on identifying the factors controlling the efficiency of each soil conservation techniques (SCTs) and provide details for key factors, such as soil type and properties, vegetation cover and rainfall intensity; the effectiveness of SCTs over longer time periods should be assessed; and the differences between the effectiveness of reducing runoff and reducing soil loss and the influencing factors should be considered.

### 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
Ref3	Daryanto, S; Fu, BJ; Zhao, WW; Wang, S; Jacinthe, PA; Wang, LX	2020	Ecosystem service provision of grain legume and cereal intercropping in Africa	Agric Syst 178, 102761	10.1016/j.agry.2019.102761
Ref15	Xiong, M; Sun, R; Chen L	2018	Effects of soil conservation techniques on water erosion control: A global analysis	Sci Total Environ 645 753–760	10.1016/j.scitotenv.2018.07.124

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**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.

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