

## IMPACT: SOIL WATER RETENTION

Data extracted in May 2021  
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**Note to the reader:** This fiche summarises the effects of Intercropping on SOIL WATER RETENTION. It is based on 1 synthesis paper<sup>1</sup> containing 180 primary studies.

### 1. WEIGHT OF THE EVIDENCE

#### CONSISTENCY OF THE IMPACT

Intercropping of multiple crop species (i.e., crop mixture cropping) has a variable effect on soil water retention, compared to monoculture. The one reviewed synthesis paper reported an increase in shallow soil moisture but a decrease in deep soil moisture in response to intercropping (see **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.

The selected synthesis paper did not include 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 soil water retention	Water retention	Crop mixture cropping	monoculture	1	1	0	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 1 synthesis paper is 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 paper reporting effects on soil water retention.

Reference number	Population	Scale	Num. papers	Intervention	Comparator	Metric	Conclusion	Quality score
Ref <sub>3</sub>	Grain legumes and cereals	Africa	180	Grain legume and cereal intercropping	Monoculture	Soil available water	Intercropping can increase shallow soil moisture but decrease deep soil moisture	62%

**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 soil water retention	Water retention	Crop mixture cropping	monoculture	Ref <sub>3</sub>	Ref <sub>3</sub>		

<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.

### 3. FACTORS INFLUENCING THE EFFECTS ON SOIL WATER RETENTION

**Table 4:** List of factors reported to significantly affect the size and/or direction of the effects on soil water retention, according to the synthesis papers reviewed.

Factor	Reference number
Soil depth	Ref3

### 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.

### 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.agsy.2019.102761

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