

IMPACT: PLANT NUTRIENT UPTAKE

Data extracted in January 2022
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Note to the reader: This fiche summarises the effects of Cover and catch crops on PLANT NUTRIENT UPTAKE. It is based on 1 synthesis paper¹ containing 44 primary studies.

1. WEIGHT OF THE EVIDENCE

CONSISTENCY OF THE IMPACT

The effect of cover/catch crops, as compared to bare soil, on PLANT NUTRIENT UPTAKE (namely nitrogen utilization efficiency of the subsequent cash crop) is reported in **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 effect of cover/catch crops, as compared to bare soil, on PLANT NUTRIENT UPTAKE is positive for leguminous species, while non-significant effect resulted for non-legume species.
- However, these results were supported by a limited number of primary studies.

The selected synthesis paper 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	
Increase plant nutrient uptake	Nutrient use efficiency	Legume cover crops	Bare soil	1	0	0	0
		Non-legume cover crops	Bare soil	0	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 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 plant nutrient uptake.

Reference number	Population	Scale	Num. papers	Intervention	Comparator	Metric	Conclusion	Quality score
Ref39	Irrigated agricultural cropping system	Global. Irrigated land is present in many regions of the world, and the scientific literature selected represented a global data-set. The geographical distribution of the selected articles was as follows: North America (44%), Europe (38%), Asia (14%) and South America (4%). Most data came from the European Mediterranean basin (35%) and from the Midwest of the United States (30%).	44	Replacing winter fallow by 1) a non-legume cover crop; 2) a legume cover crop	No cover crops	Nitrogen utilisation efficiency	Not many data were available to analyze the effect of cover crops (CC) on NUE but the trend was similar to yield (increase); while a legume CC had a positive mean effect the non-legume had no effect.	69%

¹ 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	
Increase plant nutrient uptake	Nutrient use efficiency	Legume cover crops	Bare soil	Ref39			
		Non-legume cover crops	Bare soil			Ref39	

3. FACTORS INFLUENCING THE EFFECTS ON PLANT NUTRIENT UPTAKE

No factors were found.

4. KNOWLEDGE GAPS

The authors did not report knowledge gaps in the reviewed synthesis papers.

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
Ref39	Quemada, M.; Baranski, M.; Nobel-de Lange, M. N. J.; Vallejo, A.; Cooper, J. M.	2013	Meta-analysis of strategies to control nitrate leaching in irrigated agricultural systems and their effects on crop yield	AGRICULTURE ECOSYSTEMS & ENVIRONMENT	10.1016/j.agee.2013.04.018

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.
