Organic farming systems_GENERAL

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Note to the reader: This general fiche summarises all the environmental and climate impacts of ORGANIC FARMING SYSTEMS found in a review of 31 synthesis papers[1]. These papers were selected from an initial number of 223 obtained through a systematic literature search strategy, according to the inclusion criteria reported in section 4. The impacts reported here are those for which there is scientific evidence available in published synthesis papers, what does not preclude the farming practice to have other impacts on the environment and climate still not covered by primary studies or by synthesis papers.

The synthesis papers review a number of primary studies ranging from 7 to 164. Therefore, the assessment of impacts relies on a large number of results from the primary studies, obtained mainly in field conditions, or sometimes in lab experiments or from model simulations.

1. DESCRIPTION OF THE FARMING PRACTICE

- Description:
  - Organic production is an overall system of farm management and food production that combines best environmental and climate action practices, a high level of biodiversity, the preservation of natural resources and the application of high animal welfare standards and high production standards in line with the demand of a growing number of consumers for products produced using natural substances and processes[2]
- Key descriptors:
  - Organic farming systems are production systems which avoid or largely exclude the use of synthetically compounded fertilizers, pesticides, growth regulators and livestock feed additives 3.Unlike the other farming practices, discussed in the other fiches, organic systems do not consist of a single practice, but of a combination of several “elementary” farming practices, which need to be respected together. Organic systems are defined by the REGULATION (EU) 2018/848[3]
  - To the maximum extent feasible, organic systems (significantly more frequently than conventional farming according to a recent meta-analysis by Alvarez, 2021 5) rely on crop rotations, multicropping, crop residues retention, no/minimum tillage, animal manures, green manures, off-farm organic wastes and aspects of biological pest control to maintain soil productivity and tilth, to supply plant nutrients and to control insects, weeds and other pests[4]
  - This review compares the impacts of organic and conventional farming systems. The following types of results are included:
  - Results of field experiments designed by researchers, comparing plots under organic and conventional management.
  - Results of field data or farm-scale surveys on organic and conventional systems, designed and managed by farmers.
  - Results of life-cycle assessments, typically considering a cradle-to-farmgate model.
  - Results were grouped into two categories:
  - “Organic cropping systems” includes field-scale experiments on organically-managed crops or systems of crops, while excluding results reported specifically on livestock production.
  - “Organic livestock products” reports specific results (either modelling or empirical) regarding in-farm livestock production.
  - “Organic mixed farming systems”, where the experiments or observations regards the integration of crops and livestock in the same farm.
  - “Organic systems” regards results obtained from different and unspecified categories of organic (cropping/farming/livestock) systems.
  - In all reviewed synthesis papers, results are expressed in two different units:
  - per unit of cultivated area (e.g., per ha)
  - per unit of product (e.g., per kg of grain).
  - Since organic systems generally result in lower yields than conventional systems, the effects per unit of product may be different to those per unit of area. Consequently, where available, both types of results are reported in this review
  - NA

2. EFFECTS OF THE FARMING PRACTICE ON CLIMATE AND ENVIRONMENTAL IMPACTS

(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.

Out of the 31 selected synthesis papers, 29 included studies conducted in Europe, and 27 have a quality score higher than 50%.

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. Some synthesis papers may report effects for more than one impact, or more than one effect for the same impact.

				Statistically tested			Non-statistically tested
Impact	Metric	Intervention	Comparator	Significantly positive	Significantly negative	Non-significant	
Decrease Acidification (LCA)	Acidification	Organic cropping systems	Conventional	0	0	1	1
		Organic livestock products	Conventional	0	1	1	1
		Organic systems	Conventional	0	0	2	0
Decrease Air pollutants emissions	Ammonia emission per unit of area	Organic systems	Conventional	0	0	1	0

Decrease Air pollutants emissions	Ammonia emission per unit of product	Organic systems	Conventional	0	0	1	0
Increase Biodiversity	Biodiversity per unit of area	Organic cropping systems	Conventional	6	0	2	1 (0)
		Organic systems	Conventional	3	0	0	0
Increase Carbon sequestration	Carbon sequestration per unit of area	Organic cropping systems	Conventional	5 (4)	1	0	1 (0)
		Organic livestock products	Conventional	1	0	0	0
		Organic mixed farming systems	Conventional	1	0	1	0
		Organic systems	Conventional	3	0	0	0
Decrease Energy use (LCA)	Energy use per unit of product	Organic cropping systems	Conventional	2	2 (1)	2 (1)	1
		Organic livestock products	Conventional	1	0	2 (1)	1
		Organic systems	Conventional	1	0	0	0
Decrease Eutrophication (LCA)	Eutrophication potential per unit of product	Organic cropping systems	Conventional	0	1	1	1
		Organic livestock products	Conventional	0	1	1	1
		Organic systems	Conventional	0	0	1	0
Decrease GHG emissions	CH4 emission per unit of area	Organic cropping systems	Conventional	1	0	0	1
Decrease GHG emissions	CH4 emission per unit of product	Organic cropping systems	Conventional	1	0	0	1
Decrease GHG emissions	N2O emission per unit of area	Organic cropping systems	Conventional	1	0	0	1
		Organic systems	Conventional	1	0	0	0
Decrease GHG emissions	N2O emission per unit of product	Organic cropping systems	Conventional	0	1	0	1
		Organic systems	Conventional	0	0	1	0
Decrease Global warming potential (LCA)	GWP CH4 emission area based	Organic mixed farming systems	Conventional	1	0	0	0
Decrease Global warming potential (LCA)	GWP N2O emission area based	Organic mixed farming systems	Conventional	1	0	0	0
Decrease Global warming potential (LCA)	GWP area based	Organic mixed farming systems	Conventional	1	0	0	0
Decrease Global warming potential (LCA)	GWP product based	Organic cropping systems	Conventional	1	0	2 (1)	1
		Organic livestock products	Conventional	0	1 (0)	2 (1)	1
		Organic mixed farming systems	Conventional	0	0	1	0
		Organic systems	Conventional	0	0	2	0
Decrease Land use (LCA)	Agricultural land use per unit of product	Organic cropping systems	Conventional	0	2	0	1
		Organic livestock products	Conventional	0	1	0	1
Increase Land use (LCA)	Agricultural land use per unit of product	Organic systems	Conventional	0	2	0	0
Decrease Nutrient leaching and run-off	N losses per unit of area	Organic mixed farming systems	Conventional	0	0	1	0
		Organic systems	Conventional	2	0	0	0
Decrease Nutrient leaching and run-off	N losses per unit of product	Organic systems	Conventional	0	1	1	0
Decrease Nutrient leaching and run-off	P losses per unit of area	Organic systems	Conventional	0	0	2	0
Decrease Pests and diseases	Natural enemies of pests per unit of area	Organic cropping systems	Conventional	3	0	1	0
Decrease Pests and diseases	Pests per unit of area	Organic cropping systems	Conventional	0	2	0	0
Increase Pollination	Pollination	Organic cropping systems	Conventional	1	0	0	0
Increase Soil biological quality	Soil biological quality	Organic systems	Conventional	1	1	1	1 (0)

Increase Soil nutrients	Soil nutrients per unit of area	Organic cropping systems	Conventional	0	0	0	1 (0)
Increase Crop yield	Crop yield	Organic cropping systems	Conventional	0	9	2	0
		Organic systems	Conventional	0	0	0	1
Increase Crop yield	Crop yield stability	Organic cropping systems	Conventional	0	1	2	0

3. FACTORS INFLUENCING THE EFFECTS ON CLIMATE AND ENVIRONMENTAL IMPACTS

The factors significantly influencing the size and/or direction of the effects on the impacts, according to the synthesis papers included in this review, are reported below. Details about the factors can be found in the **summaries of the meta-analyses** available in this WIKI.

Table 2: List of factors reported to significantly affect the size and/or direction of the effects on environmental and climate impacts, according to the synthesis papers reviewed. The reference number of the synthesis papers where those factors are explored is given in parentheses.

Impact	Factors
Biodiversity	Addition of compost (Ref5), Crop field size (Ref4), Crop type (Ref19), Diversity of cover crops (Ref5), Experiment scale (Ref17), Herbicide application (Ref5), Landscape structure and heterogeneity (Ref31), Organism group (Ref19), Pest management strategies (Ref5), Proportion of arable land in the surrounding landscape (Ref19) and Taxon (Ref23)
Carbon sequestration	C input (Ref21), Clay concentrations in soils (Ref25), Climate (Ref8), Crop residues incorporation (Ref30), Crop rotation (Ref25), Crop type (Ref7), External C input (Ref25), External C inputs (Ref25), External N input (Ref25), Fertilisation intensity (Ref8), Input of organic matter (Ref27), Land use type (Ref30), Legume forages (Ref25), Mean annual precipitation (Ref25), Mean annual temperature (Ref25), Organic input (Ref30), Plough depth (Ref30), Presence of leys in the rotation (Ref27), Region (or certification guidelines) (Ref7) and Soil disturbance (Ref21)
Energy use (LCA)	Cropping pattern (Ref15), Data sample size (Ref15), Production of mineral fertilisers (Ref27) and Type of product (Ref15)
GHG emissions	Per unit of field area: Positive; Per unit of product: Negative. (Ref18)
Global warming potential (LCA)	Product/area unit (Ref15)
Nutrient leaching and run-off	C/N ratio of fertilisers (Ref30), Crop diversification strategies (Ref30), Fertilisation regime (Ref30), Livestock density (Ref30) and Nitrogen input (Ref27)
Pests and diseases	Crop field size (Ref4), Crop type (Ref28, Ref10), Experiment scale (Ref28), Pests type (Ref28), Presence of pest management (Ref28) and Study type (Ref10)
Pollination	Crop field size (Ref4)
Soil biological quality	Diversification strategies (Ref3), Fertilisation (Ref3), Pesticides use (Ref3) and Tillage (Ref3)
Crop yield	Best practices (Ref26), Crop diversification strategies (Ref16), Fertilisation (Ref1), Fertilisation regime (Ref9), Negative effect (Ref4), Nitrogen input (Ref26), Soil pH (Ref26), Type of crop (Ref26) and Water management (Ref26)

4. SYSTEMATIC REVIEW SEARCH STRATEGY

Table 3: Systematic review search strategy - methodology and search parameters.

Parameter	Details

Keywords	WOS: 1) TOPIC: ("organic farm*" OR "organic agriculture" OR "organic system*" OR "organic product*") AND TOPIC: (meta-analy* OR "systematic* review*" OR "evidence map" OR "global synthesis" OR "evidence synthesis" OR "research synthesis") 2) TOPIC: ((organic near/4 farm*) OR (organic near/4 agric*) OR (organic near/4 produc*) OR (organic near/3 livestock) OR (organic near /3 animal)) AND TOPIC: ("animal*" OR "livestock" OR "ruminant*" OR "small ruminant*" OR "cattle" OR "dairy cattle" OR "dairy" OR "beef cattle" OR "sheep" OR "ewe*" OR "lamb*" OR "swine" OR "pig*" OR "porcine*" OR "goat*" OR "rabbit*" OR "poultry" OR "chicken*" OR "broiler*" OR "turkey*" OR "hen*" OR "horse*" OR "mule*" OR "milk" OR "egg" OR "beef" OR "cheese" OR "meat" OR (animal near/2 protein*) OR "yogurt" OR "bacon" OR "pork") AND TOPIC: ("meta-analy*" OR "systematic* review*" OR "evidence map" OR "global synthesis" OR "evidence synthesis" OR "research synthesis") 3) TOPIC: ("organic farm*" OR "organic agriculture" OR "organic system*" OR "organic product*") AND TOPIC: (meta-analy* OR "systematic* review*" OR "evidence map" OR "global synthesis" OR "evidence synthesis" OR "research synthesis") and SCOPUS: 1) TITLE-ABS-KEY: ("organic farm*" OR "organic agriculture" OR "organic system*" OR "organic product*") AND TITLE-ABS-KEY: (meta-analy* OR "systematic* review*" OR "evidence map" OR "global synthesis" OR "evidence synthesis" OR "research synthesis") 2) (TITLE-ABS-KEY ((organic W/4 farm*) OR (organic W/4 agric*) OR (organic W/4 produc*) OR (organic W/3 livestock) OR (organic W/3 animal)) AND TITLE-ABS-KEY (("animal*" OR "livestock" OR "ruminant*" OR "small ruminant*" OR "cattle" OR "dairy cattle" OR "dairy" OR "beef cattle" OR "sheep" OR "ewe*" OR "lamb*" OR "swine" OR "pig*" OR "porcine*" OR "goat*" OR "rabbit*" OR "poultry" OR "chicken*" OR "broiler*" OR "turkey*" OR "hen*" OR "horse*" OR "mule*" OR "milk" OR "egg" OR "beef" OR "cheese" OR "meat" OR (animal W /2 protein*) OR "yogurt" OR "bacon" OR "pork")) AND TITLE-ABS-KEY (("meta-analy*" OR "systematic* review*" OR "evidence map" OR "global synthesis" OR "evidence synthesis" OR "research synthesis"))) 3) TITLE-ABS-KEY: ("organic farm*" OR "organic agriculture" OR "organic system*" OR "organic product*") AND TITLE-ABS-KEY: (meta-analy* OR "systematic* review*" OR "evidence map" OR "global synthesis" OR "evidence synthesis" OR "research synthesis")
Time reference	No time restriction.
Databases	Web of Science and Scopus: run on 01 October 2021
Exclusion criteria	The main criteria that led to the exclusion of a synthesis paper are: 1) The topic of the meta-analysis is out of the scope of this review., 2) The paper is neither a systematic review nor a meta-analysis of primary research., 3) The analysis is not based on pairwise comparisons, 4) The paper is not written in English., 5) The full text is not available and 6) The paper report results on the effect of specific farming practices (e.g. organic fertilisation, green manure, alternative pest control techniques, etc.) which are part of organic systems, instead of the effect of the whole farming system. The search returned 0 synthesis papers from WOS and SCOPUS on Organic farming systems plus other 223 retrieved in the search of other farming practices, potentially relevant for the practice object of our fiche. From the 171 potentially relevant synthesis papers, 153 were excluded after reading the title and abstract, and 2 after reading the full text according to the above-mentioned criteria. Finally,31 synthesis papers were selected.

5. SYNTHESIS PAPERS INCLUDED IN THE REVIEW

Table 4: 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
Ref1	Alvarez, R	2022	Comparing Productivity of Organic and Conventional Farming Systems: A Quantitative Review	ARCHIVES OF AGRONOMY AND SOIL SCIENCE	10.1080/03650340.2021.1946040

Ref2	Alvarez, R	2021	Organic farming does not increase soil organic carbon compared to conventional farming if there is no carbon transfer from other agroecosystems. A meta-analysis	Soil Research 60(3) 211-223	10.1071/SR21098
Ref3	Puissant, J; Villenave, C; Chauvin, C; Plassard, C; Blanchart, E; Trap, J	2021	Quantification of the global impact of agricultural practices on soil nematodes: A meta-analysis	SOIL BIOLOGY & BIOCHEMISTRY, 161, 108383	10.1016/j.soilbio.2021.108383
Ref4	Smith, OM; Cohen, AL; Reganold, JP; Jones, MS; Orpet, RJ; Taylor, JM; Thurman, JH; Cornell, KA; Olsson, RL; Ge, Y; Kennedy, CM; Crowder, DW	2020	Landscape context affects the sustainability of organic farming systems	PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA 117 6, 2870-2878	10.1073/pnas.1906909117
Ref5	Doring, J; Collins, C; Frisch, M; Kauer, R	2019	Organic and Biodynamic Viticulture Affect Biodiversity and Properties of Vine and Wine: A Systematic Quantitative Review	AMERICAN JOURNAL OF ENOLOGY AND VITICULTURE 70 3, 221-242	10.5344/ajev.2019.18047
Ref6	Katayama, N; Bouam, I; Koshida, C; Baba, YG	2019	Biodiversity and yield under different land-use types in orchard/vineyard landscapes: A meta-analysis.	Biological Conservation 229: 125-133.	10.1016/j.biocon.2018.11.020
Ref7	Smith, OM; Cohen, AL; Rieser, CJ; Davis, AG; Taylor, JM; Adesanya, AW; Jones, MS; Meier, AR; Reganold, JP; Orpet, RJ; Northfield, TD; Crowder, DW	2019	Organic Farming Provides Reliable Environmental Benefits but Increases Variability in Crop Yields: A Global Meta-Analysis	FRONTIERS IN SUSTAINABLE FOOD SYSTEMS 3	10.3389/fsufs.2019.00082
Ref8	Garcia-Palacios, P; Gattinger, A; Bracht-Jorgensen, H; Brussaard, L; Carvalho, F; Castro, H; Clement, JC; De Deyn, G; D'Hertefeldt, T; Foulquier, A; Hedlund, K; Lavorel, S; Legay, N; Lori, M; Mader, P; Martinez-Garcia, LB; da Silva, P; Muller, A; Nascimento, E; Reis, F; Symanczik, S; Sousa, J; Milla, R.	2018	Crop traits drive soil carbon sequestration under organic farming	Journal of Applied Ecology 30, 1–10.	10.1111/1365-2664.13113
Ref9	Knapp, S; van der Heijden, MGA.	2018	A global meta-analysis of yield stability in organic and conservation agriculture.	NATURE COMMUNICATIONS 9, 3632	10.1038/s41467-018-05956-1
Ref10	Muneret, L; Mitchell, M; Seufert, V; Aviron, S; Djoudi, E; Petillon, J; Plantegenest, M; Thiery, D; Rusch, A.	2018	Evidence that organic farming promotes pest control	Nature Sustainability 1, 361-368	10.1038/s41893-018-0102-4
Ref11	Clark, M; Tilman, D.	2017	Comparative analysis of environmental impacts of agricultural production systems, agricultural input efficiency, and food choice.	ENVIRONMENTAL RESEARCH LETTERS 12 6	10.1088/1748-9326/aa6cd5
Ref12	Lesur-Dumoulin, C; Malezieux, E; Ben-Ari, T; Langlais, C; Makowski, D.	2017	Lower average yields but similar yield variability in organic versus conventional horticulture. A meta-analysis.	Agronomy for Sustainable Development 37, 45	10.1007/s13593-017-0455-5

Ref13	Lichtenberg, EM; Kennedy, CM; Kremen, C; Batary, P; Berendse, F; Bommarco, R; Bosque-Perez, NA; Carvalheiro, LG; Snyder, WE; Williams, NM; Winfree, R; Klatt, BK; Astrom, S; Benjamin, F; Brittain, C; Chaplin-Kramer, R; Clough, Y; Danforth, B; Diekotter, T; Eigenbrode, SD; Ekroos, J; Elle, E; Freitas, BM; Fukuda, Y; Gaines-Day, HR; Grab, H; Gratton, C; Holzschuh, A; Isaacs, R; Isaia, M; Jha, S; Jonason, D; Jones, VP; Klein, AM; Krauss, J; Letourneau, DK; Macfadyen, S; Mallinger, RE; Martin, EA; Martinez, E; Memmott, J; Morandin, L; Neame, L; Otieno, M; Park, MG; Pfiffner, L; Pocock, MJO; Ponce, C; Potts, SG; Poveda, K; Ramos, M; Rosenheim, JA; Rundlof, M; Sardinas, H; Saunders, ME; Schon, NL; Sciligo, AR; Sidhu, CS; Steffan-Dewenter, I; Tscharntke, T; Vesely, M; Weisser, WW; Wilson, JK; Crowder, DW.	2017	A global synthesis of the effects of diversified farming systems on arthropod diversity within fields and across agricultural landscapes.	23, 11, 4946-4957.	10.1111/gcb.13714
Ref14	Kopittke, PM; Dalal RC; Finn D; Menzies NW	2016	Global changes in soil stocks of carbon, nitrogen, phosphorus, and sulphur as influenced by longterm agricultural production.	Global change biology 23, 2509-2519	10.1111/gcb.13513
Ref15	Lee K.S., Choe Y.C., Park S. H.	2015	Measuring the environmental effects of organic farming: A meta-analysis of structural variables in empirical research	JOURNAL OF ENVIRONMENTAL MANAGEMENT 162, 263-274.	10.1016/j.jenvman. 2015.07.021
Ref16	Ponisio, LC; M'Gonigle, LK; Mace, KC; Palomino, J; de Valpine, P; Kremen, C	2015	Diversification practices reduce organic to conventional yield gap	Proc. R. Soc. B 282, 20141396	10.1098/rspb.2014.1396
Ref17	Montañez, MN; Amarillo-Suárez, A.	2014	Impact of organic crops on the diversity of insects: a review of recent research.	Revista Colombiana de Entomología 40: 131 - 142.	www.scielo.org.co/scielo.php?pid=S0120-04882014000200001&script=sci_abstract
Ref18	Skinner, C; Gattinger, A; Muller, A; Mader, P; Fliessbach, A; Stolze, M; Ruser, R; Niggli, U.	2014	Greenhouse gas fluxes from agricultural soils under organic and non-organic management - A global meta-analysis	Science of the Total Environment 468–469, 553–563	10.1016/j.scitotenv. 2013.08.098
Ref19	Tuck, SL; Winqvist, C; Mota, F; Ahnstrom, J; Turnbull, LA; Bengtsson, J.	2014	Land-use intensity and the effects of organic farming on biodiversity: a hierarchical meta-analysis.	Journal of Applied Ecology 51: 746-755.	10.1111/1365-2664.12219
Ref20	Ugarte, CM; Kwon, H; Andrews, SS; Wander, MM.	2014	A meta-analysis of soil organic matter response to soil management practices: An approach to evaluate conservation indicators	Journal of soil and water conservation 69, 422-430	10.2489/jswc.69.5.422
Ref21	Aguilera, E; Lassaletta, L; Gattinger, A; Gimeno, BS.	2013	Managing soil carbon for climate change mitigation and adaptation in Mediterranean cropping systems: A meta-analysis	AGRICULTURE ECOSYSTEMS & ENVIRONMENT 168, 25-36.	10.1016/j.agee.2013.02.003
Ref22	Wilcox, JC; Barbottin, A; Durant, D; Tichit, M; Makowski, D.	2013	Farmland Birds and Arable Farming, a Meta-Analysis.	Sustainable Agriculture Reviews 13: 35-63.	10.1007/978-3-319-00915-5_3
Ref23	Crowder, DW; Northfield, TD; Gomulkiewicz, R; Snyder, WE.	2012	Conserving and promoting evenness: organic farming and fire-based wildland management as case studies.	Ecology 93: 2001–2007.	10.1890/12-0110.1
Ref24	de Ponti T., Rijk B., van Ittersum M.K.	2012	The crop yield gap between organic and conventional agriculture.	AGRICULTURAL SYSTEMS 108, 1–9	10.1016/j.agsy.2011.12.004
Ref25	Gattinger A; Muller A; Haeni M; Skinner C; Fliessbach A; Buchmann N; Mäder P; Stolze M; Smith P; El-Hage Scialabba N; Niggli U.	2012	Enhanced top soil carbon stocks under organic farming	PNAS 109 (44), 18226-18231.	10.1073/pnas.1209429109
Ref26	Seufert, V; Ramankutty, N; Foley, JA	2012	Comparing the yields of organic and conventional agriculture	NATURE 485, 229–232.	10.1038/nature11069

Ref27	Tuomisto HL; Hodge ID; Riordana P; Macdonald DW	2012	Does organic farming reduce environmental impacts? – A meta-analysis of European research	Journal of Environmental Management 112, 309-320	10.1016/j.jenvman. 2012.08.018
Ref28	Garratt, MPD; Wright, DJ; Leather, SR.	2011	The effects of farming system and fertilisers on pests and natural enemies: A synthesis of current research	AGRICULTURE ECOSYSTEMS & ENVIRONMENT 141, 261-270.	10.1016/j.agee.2011.03.014
Ref29	Kaschuk, G; Alberton, O; Hungria, M.	2010	Three decades of soil microbial biomass studies in Brazilian ecosystems: Lessons learned about soil quality and indications for improving sustainability.	Soil Biology & Biochemistry 42: 1–13.	10.1016/j.soilbio.2009.08.020
Ref30	Mondelaers, K; Aertsens, J; Van Huylenbroeck, G.	2009	A meta-analysis of the differences in environmental impacts between organic and conventional farming	BRITISH FOOD JOURNAL 111 10, 1098-1119	10.1108 /00070700910992925
Ref31	Bengtsson, J; Ahnstrom, J; Weibull, AC.	2005	The effects of organic agriculture on biodiversity and abundance: a meta-analysis.	Journal of Applied Ecology 42: 261-269.	10.1111/j.1365-2664.2005.01005.x

[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.

[2] https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32018R0848&from=EN

[3] https://doi.org/10.1016/B0-12-227050-9/00235-0 and https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/organic-farming-system

[4] https://doi.org/ 10.1080/03650340.2021.1946040