

### Reference 30

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

### Background and objective

In recent years a lot of research has investigated whether the application of the organic farming principles indeed results in differences with respect to environmental pressure. This paper aims at comparing the environmental impacts of organic and conventional farming and linking these to differences in management practises. The studied environmental impacts are related to land use efficiency, organic matter content in the soil, nitrate and phosphate leaching to the water system, greenhouse gas emissions and biodiversity. Here we report only on Nutrients loss.

### Search strategy and selection criteria

1) Peer reviewed; 2) studies dating from after 1992 (year of EEC regulation 2092/91); and 3) (semi) paired samples, this means that organic and conventional data are compared within the same study. Weighting of the references is based upon the possibility of deriving the standard error (s.e.) from the references. Hereby, three cases are distinguished: 1) the s.e. is reported in the study, hence the data point can enter the meta-analysis; 2) the s.e. is not reported, but multiple data points are available in the study, enabling the calculation of a standard deviation based upon the available data which can be entered in the meta-analysis data base; and 3) no s.e. is reported, only a single observation is available. The latter data point has not been retained for the meta-analysis, but is only used in the sign-test.

### Data and analysis

The significance level of the overall effect size is computed. The statistical homogeneity of the effect sizes is calculated. The studies used in the meta-analysis are grouped according to various characteristics of the single studies, and the effect sizes between these groups of studies are statistically compared and analysed.

Number of papers	Population	Intervention	Comparator	Outcome	Quality score
9	Studies assessing the performance of organic systems in comparison to conventional systems.	Organic systems	Conventional systems	Metric: N leaching; P losses; Effect size: Ratio of organic matter content (%) in organic systems to conventional systems.	50

### Results

- The leaching is significantly lower for organic farming.
- Both for the P input and the P balance, the result seems to indicate a lower measure for organic farms, but the confidence intervals are too wide to conclude for a significant difference. The fixed effect for P output indicates a significantly smaller P output for organic farms.
- NULL
- NULL
- NULL

### Factors influencing effect sizes

- Fertilisation regime : Larger amounts of fertilizer application in conventional farming lead to higher nutrients loss.
- Crop diversification strategies : Lower use of green cover crops in conventional farming leads to higher nutrients loss.
- C/N ratio of fertilisers : Lower C to N ratio in fertilisers of conventional farming leads to higher nitrate leaching.
- Livestock density : Higher stocking density per ha in conventional farming leads to higher nutrients leaching.

### Conclusion

Nitrate leaching is significantly lower for organic farming. Results for phosphate losses are less clear.