

IMPACT: CROP YIELD

Reference 4

Lin, YR; Watts, DB; van Santen, E; Cao, GQ 2018 Influence of Poultry Litter on Crop Productivity under Different Field Conditions: A Meta-Analysis Agron. J. 807–18 10.2134/agronj2017.09.0513

Background and objective

Interest in using PL as a low-cost alternative to inorganic fertilizer (IF) sources have increased among row crop producers because of its availability coupled with the potential for improving crop production. Poultry litter contains all the nutrients essential for plant growth and has an approximate 3–3–2 (N–P₂O₅–K₂O) fertilizer grade equivalent. 1) use meta-analytic methods to summarize and quantitatively describe the effects of poultry litter on crop production; 2) compare crop yield with PL application to that of standard fertilization practices using inorganic fertilisers; and 3) examine the effect of variables (e.g., repeated PL applications, tillage system, soil texture, time of PL application, as well as the application method) that were included in this MA to explain the variability of the response to crop productivity.

Search strategy and selection criteria

A comprehensive literature review was conducted using the ISI Web of Science search tool with the search terms “poultry litter” for published data up to March 2016, yielding more than 6000 articles. A search of these records using the term “yield” resulted in 498 articles. 1) Replicated experimental design (≥3 replications); 2) Clear description of soil and poultry litter used; 3) Have at least one poultry litter treatment and is comparable against an IF treatment; 4) Data containing means and standard deviation (or standard error).

Data and analysis

This MA was based on the random-effect model; thus, the variance should be the original (within-studies) variance plus the estimate of between-studies variance.

Number of papers	Population	Intervention	Comparator	Outcome	Quality score
85	Corn, Cotton, Forages, Peanut, Rice, Soybean, Wheat	Poultry litter application with banding or soil incorporation	Poultry litter broadcast application	Metric: Crop yield; Effect size: Logarithm of ratio of the considered metrics in the intervention to the considered metrics in the control	81.25

Results

- The fertilizer application method had non-significant effect on crop yield. Subsurface band application of poultry litter (placing it in narrow bands below the soil surface) at the same total N rate was shown to have the (non-significantly) highest crop yield.
- Slightly greater (not significantly) crop yield was observed with surface broadcast application and in contrast, slightly lower (not significantly) crop yield was observed with surface incorporation of poultry litter.
- NULL
- NULL
- NULL

Factors influencing effect sizes

- No factors influencing effect sizes to report

Conclusion

The fertilizer application method had non-significant effect on crop yield.