

Earthworms increase plant production: a meta-analysis

DATE & TIME

📅 Thursday, December 11th, 2014

🕒 16:45 - 17:00

LOCATION

📍 **Matisse 2** >

TRACKS

● [Plant-Soil Interactions and Biogeochemistry](#) >

+ [Add to Your Schedule](#)

📝 [Add Your Notes](#)

🐦 [Tweet about this session](#)

SPEAKERS



Jan Willem Van Groenigen

Wageningen University



DESCRIPTION

Earthworms are among the most important soil dwelling invertebrates. Their ability to increase plant production is recognized by soil ecologists as well as farmers. Yet, quantitative proof for this effect has remained elusive, and mechanisms through which it might be exerted have never been satisfactorily established. Such an effort has previously been hampered by the wide variety of conditions under which the effects of earthworms have been studied, making it difficult to determine the global effect of earthworms response from individual studies. A quantitative synthesis of results from multiple studies across the globe can overcome this problem. Here, we use meta-analysis to summarize the effect of earthworms on plant production. We collected 462 data points from 58 studies that were published between 1910–2013. Studies included the main global staple crops, pastures, as well as many other food crops and were conducted on all continents except Antarctica. On average, earthworm presence in agroecosystems increased crop yield with 25% and aboveground biomass with 23%. The magnitude of these effects depends on presence of crop residue, earthworm density and type and rate of fertilization. The positive effects of earthworms increased when more residue was returned to the soil, but disappeared when N fertilizer was applied or when N-fixing plants were present. Our results suggest that earthworms stimulate plant growth predominantly through releasing nitrogen locked away in residue and soil organic matter. Our results therefore imply that earthworms are of crucial importance to minimize the yield gap of farmers who can't -or won't- use nitrogen fertilizer. Future studies should focus on increasing earthworm populations in smallholder

farming systems in the tropics and on avoiding negative trade-offs with greenhouse gas emissions in organic farming systems.

Ingrid Lubbers (Wageningen University), Hannah Vos (Wageningen University), George Brown (Embrapa Forestry), Gerlinde De Deyn (Wageningen University), Kees Jan Van Groenigen (Northern Arizona University)