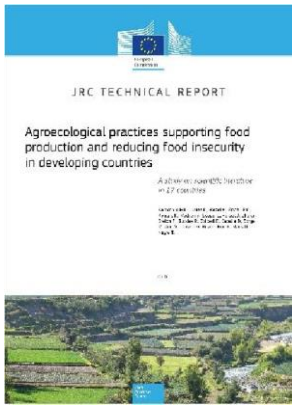
Economic performance and climate change mitigation potential of agroecology: evidence and knowledge gaps

An Agroecology webinar will be held in 12th of December @ 10:OO am CET with **Maria Luisa PARACCHINI**, European Commission, **Joint Research Centre**, Directorate D - Sustainable Resources and with **Felix REMBOLD**, **Carlo REGA** and **Caroline CALLENIUS**.

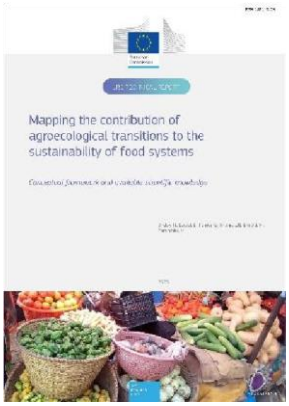
She will present findings from systematic reviews on the impact of agroecology on food security, on socioeconomic performance, and food system sustainability, highlight ongoing review on climate change mitigation and adaptation. She will point to open research questions and emphasize the need for more quantitative data.



The Joint Research centre's core mission is to provide scientific evidence to European policymakers. And this includes agroecology. JRC is not engaged in primary research about agroecology. In the last three years, together with other research centres such as CIRAD but also several European universities, JRC has started several systematic scientific reviews of scientific literature and also meta-analysis. JRC has already published the results of three of them.

1. Paracchini, M., Justes, E., Wezel, A., Zingari, P.C., Kahane, R., Madsen, S., Scopel, E., Hérault, A., Bhérer-Breton, P., Buckley, R., Colbert, E., Kapalla, D., Sorge, M., Adu Asieduwaa, G., Bezner Kerr, R., Maes, O. and Negre, T., (2020) Agroecological practices supporting food production and reducing food insecurity in developing countries **# 80 pp.**
2. Paracchini, M., Wezel, A., Madsen, S., Stewart, B., Karuga, J., Attard, P., Rème, L., Bezner Kerr, R., Maes, O. and Zingari, P.C., Agroecological practices supporting food production and reducing food insecurity in developing countries - Volume 2 (2022) .
3. Sirdey, N., Scopel, E., Ferrier, G., Khann, L., Ermolli, M. and Paracchini, M.L., (2023) Mapping the contribution of agroecological transitions to the sustainability of food systems **# 78 pp.**
4. Mouratiadou, I., Wezel, A., Kamilia, K., Marchetti, A., Paracchini, M.L. and Barberi, P. (2024) The socio-economic performance of agroecology. A review AGRONOMY FOR SUSTAINABLE DEVELOPMENT, **# 21 pp.**

The impacts of agroecology on food security in comparison with conventional systems



The first reviews were specific to developing countries. 19 out of 26 are in Africa. It was an opportunity to characterize what agroecological practices are being implemented. There is a clear positive impact of agricultural practices on food security. It's not only through yield and production, but it's also very clearly in terms of **increased availability of nutritious food** and **dietary diversity** (the link between food security and health).

Socioeconomic impacts. *In 80 peer reviewed papers scientific JRC found clear positive association with farmers income, with revenue and also with efficiency and productivity. But, agroecology is also labor intensive and can increase costs. It is always a question of trade offs and cost benefit. It is important to look very specifically at local context to understand whether the overall effect on income prevails on the increase of costs or on pressure, for example on gender inequality that can be linked to the increase of labor need.*

Food system sustainability. *There is less literature on the agroecology- food nexus available. JRC compared the principles of agroecology with the food systems framework and food systems sustainability dimensions. Most evidence is there on the agro-biodiversity- food security/nutrition nexus. Increased biodiversity has a positive impact on food systems resilience*

Climate change mitigation. *JRC is currently close to finalizing a review of 16,000 scientific papers about the potential of agroecology in terms of climate change mitigation and adaptation. There is strong evidence that agroecology has a potential to reduce greenhouse gas emissions in particular CO2 and N2O thanks to the reduced carbon intensive inputs and thanks to the use of less fossil-based fertilizers. From the 16,000 papers 300 papers have full text contributions and some have quantitative data. There is scientific evidence about the fact that the agricultural practices can clearly and strongly increase the carbon stocks in the soil through the various practices from mulching to practices that increase organic material in the soil and agroforestry which clearly contributes to Carbon Sequestration. Rice producing systems are contributing very strongly to methane. Methane can be reduced by different agroecological practices. The same applies also to livestock.*

Climate change adaptation. *There is a strong body of evidence that some aspects or some practices in agroecology and in particular diversification at the farm level have a strong potential to contribute to climate change adaptation. Increased biodiversity can support resistance to drought or drought tolerance.*

Challenges

- One of the challenges with the scientific reviews was to consider practices which are not named as Agroecology. Another challenge throughout all these reviews is that many research papers work on single practices. **So the complexity and the systemic aspects are very difficult to evaluate**.
- Policymakers need not only conclusions about the potential and whether the associated impact of agricultural practices is positive or neutral or negative. They need also more quantitative data. JRC started working on and as well as other research centres.
- There is a need for more modelling to also provide quantitative information, possibly in local contexts and not just globally.
- A lot of research is focused on the farm and on production aspects and not on the other parts of the food system. There is clearly a research gap. The identification of **research gaps** is the second benefit of the literature review, after identifying the main comparative advantages of agroecology with conventional agriculture. This is also something JRC is discussing with the colleagues of RUFORUM, FARA and others: to identify the research gaps so that new initiatives can focus on those gaps.