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What would be the effects of organic agriculture expansion on greenhouse gas emissions from agriculture?

This thesis preceded the CLINORG project (see p. 8). Its aim was to assess the effect of widespread adoption of organic farming and the systemic feedbacks it would generate on GHG emissions. Three models simulating (i) nutrient cycling in organic farming systems, (ii) soil carbon dynamics and (iii) land-use changes were coupled to simulate the consequences of different organic scenarios on crop productivity, N2O and CH4 emissions from agricultural activities, C dynamics in agricultural soils, and land use.

The results obtained show that a generalization of organic farming could increase GHG by 56% compared to current levels. These overall emissions result from two trends: a 60% drop in annual N2O and CH4 emissions, as well as an increase in CO2 emissions resulting from the destocking of soil carbon and from land-use changes. In addition, a non-linear response of emissions as a function of the world's agricultural land devoted to organic farming was estimated. Thus, in a scenario where organic farming covers only 20% of the world's agricultural land, GHG emissions could be reduced by 70%.

This result suggests the existence of a potential optimal development of organic farming that minimizes GHG emissions. The results make it possible to identify the farming practices (changes in livestock population, generalization of catch crops) that would attenuate GHG emissions. This work provides a methodological basis for the analysis of other

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scenarios that include a greater diversity of practices, shedding light on potential avenues to reduce agricultural GHG emissions.

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