

142. Evaluating the impact of rising fertilizer prices on crop yields

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Due to tensions on fossil energy and phosphorus markets, the sharp rise in fertilizer prices observed during the last decades is expected to persist in the future, putting into question production pathways relying heavily on crop intensification. To evaluate how, in this context, economic choices may alter crop yields, we first construct different fertilizer price scenarios up to 2050, based on an econometric relation with oil and gas prices, or on the continuation of recent trends. The resulting changes in fertilizer price range between +0.8% and +3.6% per year over the 2005-2050 period. Once developed, these scenarios are tested in a global land-use model incorporating an endogenous representation of the land-fertilizer substitution. In doing so, this paper shows that the crop yields in 2050 are reduced by 6%-13%, depending on the scenario, due to the supply-side response to rising fertilizer prices. To meet the demand for food and non-food products, the fall in crop yields implies a global increase in cropland area ranging from 100 to 240 Mha. The sensitivity of the results is finally tested with regard to assumptions on food consumption, change in potential yield and nutrient use efficiency.