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## GHG Mitigation through Implementation of Simple Fertilisation Strategies in Crop Production in Northern China

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### Abstract

Overuse of nitrogen (N) fertiliser constitutes the major issue of current crop production in China, exerting a substantial effect on global warming through massive emissions of greenhouse gases (GHG). Despite the ongoing efforts, which include the promotion of technologically sophisticated N management schemes, farmers' N rates maintain at excessive rates. Therefore the current study tests two simple and easily to apply N fertiliser recommendation strategies, which could be implemented on large scale through the existing agricultural advisory system of China, at comparatively low cost. Building on a detailed crop production dataset of 65 winter wheat (WW) and summer maize (SM) producing farm households of the North China Plain, scenario analysis is applied. The effects of the two N strategies under constant and changing yield levels on product carbon footprint (PCF) and gross margin (GM) are determined for the production conditions of every individual farm household. The N fixed rate strategy realised a higher improvement potential in PCF and GM in WW and SM. The analysis furthermore revealed that improved N management has a significant positive effect on PCF, but only a marginal and insignificant effect on GM. On the other side, a potential 10 % yield loss would have only a marginal effect on PCF, but a detrimental effect on farmers' income. With farmers currently applying excessive N rates as a “cheap insurance” against potential N limitations, the agricultural advisory system of China requires fundamental changes to successfully overcome the excessive fertiliser use and respective environmental pollution. The study concludes that the indirect subsidisation of N fertilisers needs to be stopped and a N tax should be introduced. Furthermore a cross compliance system should be implemented, which punishes non-compliance with maximum allowed N rates by cutting direct farm payments.

**Keywords:** China, fertiliser, GHG mitigation, global warming, gross margin, nitrogen