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“Global food security and food safety:
The role of universities”

The Carbon Footprint of Cotton Production in Xinjiang, China

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Abstract

Agriculture contributes to and suffers from global climate change at the same time. In China, which is the world's largest GHG emitter, emissions from agricultural sources increased by around 50 % over the last 20 years. Hence, it is important to evaluate the sources of GHG emissions from crop production and identify opportunities for emission reduction. Cotton (*Gossypium hirsutum* L.) as the most important cash crop in China supplies feedstock for the national textile industry and contributes to rural incomes and development. However, cotton is a very resource intensive crop with significant environmental impact. We selected Xinjiang province for our study, as it is the most important cotton production region in China, contributing around 10 % to global cotton production. The region features an ideal climate for cotton cultivation with high radiation and low precipitation. We interviewed more than 200 cotton producers on their detailed crop management including all material inputs like seed and fertiliser, their use of electricity and diesel as well as their cotton yield and by-product use. Applying a partial life cycle assessment approach, we calculated the GHG emissions per unit of land and the carbon footprint per produced unit of cotton for every specific farm. We found huge differences among farms indicating the potential for improving input use efficiency and yield levels to reduce emissions and improve carbon footprints. Energy for irrigation, fertiliser use and soil borne N₂O emissions constituted the major emission sources. We furthermore found that farmers using modern irrigation technology excerpted higher emission per unit of land. However, their higher yield levels overcompensated and resulted in lower carbon footprints per produced unit of cotton. The study highlights the potential for reducing the climate change impact of cotton production through improved crop management.

Keywords: Carbon footprint, china, cotton, farm survey