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Yield Gap Analysis of Cotton in two Major Production Regions of China

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Abstract

Cotton is globally the most important agricultural trade commodity, with China being the number one producer and consumer of cotton fiber. Its production offers high income possibilities in rural China, however often at the expense of severe natural resource degradation. The North China Plain (NCP) in the East and the Xinjiang Province in the Northwest account for more than 50% of national cotton production. Comparing the two regions shows that yield levels per hectare in the NCP are only half of the average yields in Xinjiang, with both regions lacking far behind the potential yields. Closing the yield gap would improve resource use efficiency significantly, and give a strong contribution to a more sustainable production of cotton in China. Therefore the present paper tries to analyse the causes for the yield gaps, and elaborate the potentials for closing the gaps in the two regions.

Two main reasons for the differences in yields were identified: management and climate. The NCP features much smaller production units compared to Xinjiang, which leads to a higher occurrence of poor management and a much lower technological level. This becomes evident comparing the level of mechanisation, with drip-fertigation and flood-irrigation being the prevailing irrigation method in Xinjiang and the NCP, respectively. The climatic conditions for cotton production are even more unfavourable in the NCP compared to Xinjiang, with high night temperatures, very high relative humidity and frequent heavy rainfalls from flowering to bud-opening stage. This leads to an increased disease pressure, increased shedding of squares, flowers and buds, increased respiration, unsuccessful pollination and degraded fiber quality, which explains the low yield levels in the NCP. Xinjiang on the other side, being blessed with favourable climatic conditions for cotton production, cannot tap its full yield potential due to seasonal water shortage and high salinity levels of agricultural soils. Due to the climatic constraints, an increase in technological level in the NCP has only limited potential to increase cotton yields significantly. Thus shifting cotton production from the NCP to Xinjiang is recommended to achieve higher yield levels, and thus resource use efficiency on national level.

Keywords: China, cotton, yield gap