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Improving nitrogen use efficiency in ricewheat rotations in southeastern china

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Excessive use of mineral nitrogen (N) fertiliser is a common practice in ricewheat rotations in southeastern China. However, at the same time the N use efficiency (NUE) in this rice-based cropping system is very low. The consequences are high N losses to water bodies (surface and ground water) and to the atmosphere. These losses from arable land can easily be reduced by applying 20-30% less mineral N fertilizer compared to the farmers without practice anv reduction in grain yield and with a clear increase in NUE. To demonstrate this, field experiments on farmers` field sites were conducted from 2008 to 2011 for three consecutive ricewheat double crop rotations in the two pilot counties Yixing and Huai'an in Jiangsu Province. The experimental design followed the so-called "3+x" approach with three different N fertilization treatments (conventional, reduced and zero-N application) and

two agronomical ("x") treatments within each N fertilization level. Effects on crop growth, N nutrient status, mineral N in the soil (N_{min}) and grain yields were determined and nitrogen balance sheets were calculated. In spite of a much lower N fertilization rate, no significant change on crop growth, N nutrient status and grain yield were observed in the reduced N fertilization treatments in any year and crop. However, a significant increase of NUE could be achieved and the calculated nitrogen balances showed a clear decrease in nitrogen unaccounted for in the reduced N fertilization treatments compared to the farmers practice. Therefore, we can estimate that the N losses to the environment can be efficiently decreased by reducing the overall nitrogen fertilization rate without any decline in grain yield for rice and wheat.