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## Saving Water with the Ground Cover Rice Production System in China

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### Abstract

In China, the water demand for agriculture accounts for about 71 % of the total water consumption, and 70 % of all water used in agriculture is consumed in paddy rice production. In the last decade, increasing agricultural production and industrial growth led to a severe shortage of water resources, and in northern China, the problem has reached a dramatic extent. The water use efficiency of paddy rice is low, and the demand for irrigation water is at least twice as high as in other cereals, while the physiologic demand of the rice plant for transpiration accounts for only 10–12 % of total water used in paddy rice production. The aim of the present study was to evaluate and improve this new water-saving technology of rice cultivation for competitive yield and increased water use efficiency.

With the new technique, the so-called ground cover rice production system (GCRPS), the soil is irrigated to approximately 70–90 % water holding capacity, and covered by plastic film (0.0014 mm), or plant mulch. In 2001 and 2002, identical field experiments were carried out in three Chinese locations (Beijing, Nanjing and Guangzhou) representing three major rice growing regions in China. Our results show that, GCRPS reduced the water demand by up to 60 %, depending on soil conditions. This reduction cannot be explained by reduced evaporation only. Seemingly in paddy fields, seepage was much higher than usually assumed. Rice grain yields were typically up to 10 % lower than in paddy rice, grown as a control, only in Beijing, micro-element deficiency and difficulties in nitrogen fertiliser management contributed to higher yield penalty in GCRPS. Unexpectedly, fertiliser nitrogen use efficiency (NUE) was high in traditionally submerged control fields and fell back in GCRPS. Only with expert system fertilizer management (based on SPAD), improvements were achieved.

**Keywords:** GCRPS, water saving technology, water use efficiency, China