

Effect of Long-term Potassium Application on Rice Yield and Potassium Supply Capacity of Paddy Soil in Hunan

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Available soil K in arable lands within the middle reaches of the Yangtze River region, especially in Hunan Province, has decreased since the 1970s because of large areas of super-hybrid rice planting. The area of K-deficient soil has expanded and K deficiency has become a serious problem. The Hunan Soil and Fertilizer Institute has conducted a long-term experiment at the Key Field Monitoring Experimental Station in Wangcheng County since 1981 to study the effect of long-term K application. The station is located within the central region of the Xiangjiang River (a branch of Dongting Lake). The cropping pattern of the experiment has been early rice-late rice-fallow (in winter). The field treatments include a zero fertilizer check, various combinations of N, P, and K, NK plus pig manure (PM), NP plus rice straw(RS), and NPK plus RS.

Highest yields over the last 27 years were usually obtained with the NPK+RS treatment (average of 5.8 t/ha for both early and late rice). The NPK treatment increased rice yield by 1,080 and 1,150 kg/ha per year over no K application (NP) treatment for early and late rice, respectively. Pig manure plus NK fertilizer increased rice yield by an additional 1,233 kg/ha per year compared to NK fertilizer alone. The combined application of rice straw with fertilizers increased rice yields by an additional 650 kg/ha and 389 kg/ha per year compared to NP and NPK fertilizer, respectively. The annual average rice yields of NPK, NK+PM, NP+RS, and NPK+RS treatments increased by 16%, 11%, 12%, and 24% compared to the no K application treatment, respectively.

At present, there are 2.7 million ha of rice planted in Hunan. If all farmers used 120 kg K₂O/ha for rice yearly, net income for farmers would increase by an estimated US\$79.4 M per year. *Hunan-14*