

## 长期施钾与秸秆还田对西北区不同种植制度下作物产量及土壤钾素的影响

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Effect of long-term K fertilizer application and returning wheat straw to soil on crop yield and soil K under different planting systems in northwestern China

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**摘要** 研究了在西北地区代表性的灌淤土、栗钙土上连续13年施用钾肥和小麦秸秆还田对作物产量和耕层土壤钾素的影响。结果表明, 施用化学钾肥和小麦秸秆还田能显著增加宁夏轮作种植制度下作物产量, 表现为: 氮磷钾肥配合秸秆还田>只施用氮磷钾肥>氮磷肥配合秸秆还田>只施用氮磷肥; 且作物种类对施钾措施的显效时间上有差异, 而钾素投入对青海点小麦产量无显著作用。宁夏点作物年际间产量变异系数低于青海点, 小麦的产量变异系数大于玉米但钾肥产量效应却低于玉米。两定位点除氮磷钾+秸秆还田外, 其余处理土壤钾素均表现亏缺, 轮作制度下土壤钾素亏缺量较小麦单作制大。两定位点施钾或秸秆还田处理的水溶性钾、非特异性吸附钾、非交换性钾和全钾含量均不同程度高于只施氮磷处理; 除矿物钾外, 其余几种形态钾比例均高于氮磷处理, 特殊吸附钾不受施钾措施的影响。与定位开始相比, 两种类型土壤各形态钾含量和比例随时间变异特点不同, 与原始土壤钾素状况及种植制度密切相关。

**关键词:** 不同种植制度 长期施钾 秸秆还田 土壤钾素 作物产量 不同种植制度 长期施钾 秸秆还田 土壤钾素 作物产量

Abstract:

Experiments of long-term K fertilizer application and returning wheat straw to soil in Ningxia irrigation silting soils and Qinghai castanozems in northwestern China were started in 1992. Effect of K fertilizer application and returning wheat straw to soil on crop yield and soil K status in the plough layer under different planting systems was studied. The results showed that K fertilizer and wheat straw could improve crop yield significantly in Ningxia site, with the treatments being in the following order: NPK+Straw>NPK>NP+Straw>NP. The time when the positive effect of K application on yield became significant in Ningxia differed with varieties, however, K application or returning wheat straw to soil did not have any significant effect on wheat yield in Qinghai. Coefficient of variance of wheat yield in each treatment of Ningxia was lower than in Qinghai and was higher than maize, but yield efficiency of K fertilizer application was on the contrary. Except for treatment NPK+Straw, soil K was deficient in each treatment of the two fixed sites, and the consumption of soil K was more serious in the rotation system of Ningxia than in wheat monoculture of Qinghai. K fertilizer and straw could improve content of water-soluble K, non-specifically adsorbed K, non-exchangeable K and total K in contrast to NP, however reduce proportion of mineral K and improve those of others in the two fixed sites, and content and proportion of specifically adsorbed K had no relations with K fertilizer and straw. Compared with the beginning of the experiment, temporal variability characteristics of content and proportion of different forms of K differed between two soil types, which were closely related to K status of original soil and planting system.

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