

## 钾对春小麦生理特性、产量及品质的影响

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### Effects of potassium on physiological characteristics, yield and quality of spring wheat

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**摘要** 采用盆栽和田间试验方法研究钾对春小麦生理特性、产量和品质的影响。盆栽试验设5个处理,于三叶期和拔节期采植株倒二叶,于开花期、灌浆期和蜡熟期采植株旗叶测定叶绿素含量、光合作用速率和硝酸还原酶活性。结果表明,适量的钾肥能提高小麦叶片叶绿素含量和光合作用速率,增加硝酸还原酶活性,延缓叶片衰老。田间试验在黑龙江省小麦主产区黑土和白浆土上进行。试验设5个处理,于收获期测产,并取子粒样品进行品质分析。试验结果表明,黑龙江省春小麦钾的适宜用量为(K<sub>2</sub>O)37.5~52.5kg/hm<sup>2</sup>,施钾平均增产9.9%;适量的钾肥能提高小麦品质,尤其是对加工品质效果显著。

**关键词:** 钾 春小麦 生理特性 产量 品质 钾 春小麦 生理特性 产量 品质

**Abstract:** Spring wheat is one of the main grain crops in Heilongjiang province of China. The annual planted area is about 0.2 million hectares. The yield and quality of the spring wheat in the province is below the medium level in the country. So it is an urgent problem to enhance the yield and the quality. Potassium is not only the essential nutrient for crops growth and development, but also an important element in quality formation. The aim of the paper is to study the effect of potassium on the physical characteristics, yield and quality of spring wheat, and to provide technical support for high yield and high quality and high efficiency fertilization for wheat production in Heilongjiang province. The methods of pot culture and field experiment were adopted to study the effect of potassium on the physiological characteristics, yield and quality of the spring wheat. There were 5 treatments for the pot culture experiment and the rate of potassium (K<sup>2</sup>O) was 0, 0.05, 0.10, 0.20, 0.50 g/kg. The samples of the second leaf from the top of the wheat plants at the stages of three-leaf and jointing and the samples of the flag leaf at the stages of blooming, filling and maturing were collected for the determination of chlorophyll content, photosynthesis rate and the activity of nitrate reductase. The result of pot experiment showed that potassium could increase the chlorophyll content in the leaves. With potassium application, the chlorophyll content in the leaves increased by 0.51, 0.37, 0.75, 0.55 and 0.28 mg/g from three-leaf stage to maturing stage respectively compared to the control, on average. Among these, the optimum rate for the increase of chlorophyll content was K<sup>2</sup>O 0.10g/kg. With potassium application the rate of photosynthesis increased by 0.44, 1.87, 2.11 and 1.49 μmol/(m<sup>2</sup>s) from jointing stage to maturing stage respectively compared to the control, on average. Among these treatments, the optimum rate of potassium for photosynthesis was K<sup>2</sup>O 0.20g/kg. Potassium also showed a good effect on the activity of nitrate reductase of the spring wheat. With potassium application the nitrate reductase activity(NRA) increased by NO<sup>2-</sup> 17.7, 17.6, 21.9, 23.9 and 13.5 μg/(gh),FW from three-leaf stage to maturing stage respectively compared to the control, on average. Among these treatments, the optimum rate of potassium for NRA was K<sup>2</sup>O 0.20g/kg. The field experiments were conducted in the main region of spring wheat production in Heilongjiang province. The soils for the experiments were black soil and planosol. There were 5 treatments with 3 replications. The rate of potassium was (K<sup>2</sup>O): 0, 22.5, 37.5, 52.5 and 82.5 kg/ha. The experimental result showed that potassium had a significant effect on the yield and quality of spring wheat. On the view point of yield and quality, the optimum rate of potassium for wheat in Heilongjiang province was K<sup>2</sup>O 37.5-52.5 kg/ha, the yield increased by 3.8%-18.1%, the average was 9.9%. Appropriate rate potassium application could improve wheat quality, especially on the processing quality. Compared the treatments of potassium with control, the protein content increased by 0.36 percent, wet gluten content by 2.33 percent, sedimentation value by 3.07mL, time of stability by 4.13 min, the maximum resistance by 10.2 EU, the extensibility by 1.4cm and the bread volume increased 10.4mL, on average. Potassium application could affect the components of protein in wheat. Compared the treatments of potassium with control, albumine content increased by 0.14 percent, globuline content by 0.13 percent, glutenine content by 0.39 percent and prolamine content decreased by 0.42 percent.

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