

## 长期施用含硫化肥对稻田土壤养分含量及剖面分布的影响\*

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Effects of long-term application of sulphur-containing chemical fertilizers on nutrients contents in paddy soils and their distributions in profiles

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摘要

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**摘要** 在红壤水稻田每年施用等量氮、磷、钾养分条件下, 设每年施硫量分别为0、112、604 kg/hm<sup>2</sup> 3个处理, 进行了长期(33年)施硫与不施硫土壤碳、氮、磷、钾、硫等养分含量变化及其在土壤剖面的分布特征和含硫化肥长期施用的生态环境效应的定位试验。结果表明, 长期施硫土壤有效硫含量显著升高, 并在土壤剖面(0—100 cm)上累积; 高硫(HS)、低硫(LS)处理有效硫含量比无硫(NS)处理平均增加85.6%和12.8%; 施硫处理土壤耕层有机质、全氮、全磷含量升高, 其中高硫处理土壤有机质、全氮和全磷含量分别比试验开始时增加17.7%、25.6%和250.0%。长期施硫的土壤有机质增加速率显著高于不施硫处理, 高硫处理其含量比无硫处理增加了11.5%, 说明施用硫肥有利于提高耕层土壤有机质, 促进土壤养分累积。在南方红壤硫素养分缺乏的地区, 施用硫肥有显著的培肥效应, 生产中应重视硫肥的施用。

**关键词:** 长期施肥 含硫化肥 水稻 土壤养分 剖面分布

**Abstract:** Long-term fertilization experiment was carried out in typical red paddy soil in Qiyang county, Hunan province from 1975 to 2008. The application rates of sulphur in the three treatments [None S(NS), Low S(LS) and High S(HS)] were 0, 112 and 604 kg/(ha·a), and the same amounts of N, P and K were applied to each treatment. The experiment was used to study the effects of applying sulphur-containing chemical fertilizers on paddy field ecological environment by observing and analyzing the change of nutrient contents of C, N, P, K and S and their distributions in 0—100 cm soil layers after the 33 year fertilization. The results show that soil SO<sub>4</sub><sup>2-</sup>-S contents are increased and accumulated significantly after applying the sulphur fertilizers, and the average contents of SO<sub>4</sub><sup>2-</sup>-S in 0—100 cm soil layers are increased by 85.6% and 12.8% under the high S and low S treatments compared with the none S treatment, respectively. The contents of organic matter, total N and total P in tillage soils are also increased by 17.6%, 25.6% and 250.0% under the high S treatment compared with those at the beginning of the experiment in 1975. The increased rates of soil organic matter under applying sulphur fertilizers are higher, and organic matter in tillage soil is increased 11.5% under the high S treatment compared with the none S treatment. Because of the significant effects of applying sulphur fertilizers on improvement of soil fertility, such as increasing organic matter and other nutrients, sulphur-containing fertilizers should be applied for agriculture production, especially in the red soil regions of southern China where sulphur is often deficient.

**Keywords:** long-term fertilization sulphur-containing chemical fertilizer rice soil nutrient profile distribution

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