

## 不同密闭材料硫包衣尿素氮素释放特性及对夏玉米生长的影响

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## Nitrogen release characteristics of different hermetic material sulfur coated urea and their effects on summer maize

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摘要

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**摘要** 通过静态水溶法和田间土培法,研究了采用石蜡和脲醛树脂作为密闭材料的硫包衣尿素养分释放特性;并通过田间试验研究这两种硫包衣尿素对夏玉米生长、产量、氮素利用效率、土壤硝态氮残留和净收益的影响。结果表明,采用石蜡和脲醛树脂作为密闭材料制造的两种硫包衣尿素SCUA和SCUB,其养分释放趋势均呈直线形,养分释放速率达到了中华人民共和国化工行业标准中硫包衣尿素(I型)的条件指标。由于肥料所处环境条件的不同,SCUA和SCUB均表现出静态水溶法氮素养分溶出速度快于田间土培法的测定值,且SCUA养分释放速度略快于SCUB。利用脲醛树脂作为硫包衣尿素的密闭材料较石蜡每吨肥料制造原料成本降低49.39元。夏玉米田间试验中SCUA和SCUB减量30%处理玉米的植株生长及产量与普通尿素当地习惯施肥无显著性差异,且可以显著提高氮肥表观利用率,分别达到了40.45%和42.59%;收获时普通尿素当地习惯施肥处理(CK1)及减量30%处理(CK2) 60—100cm土壤硝态氮含量显著高于硫包衣尿素处理。SCUA和SCUB在相同用量的情况下,净收益差异不显著,且减量30%的情况下仍可获得与普通尿素当地习惯施肥量相当的净收益。以脲醛树脂替代石蜡作为硫包衣尿素密闭材料是可行的,能达到降本增效的作用。

**关键词:** 硫包衣尿素 密闭材料 夏玉米 产量 氮素利用率

**Abstract:** The trials of nutrient release characteristics of different sulfur coated urea which coated with paraffin (SCUA) and urea formaldehyde colophony (SCUB) were studied by water extraction and soil incubation methods. At the same time, a field experiment was conducted to study the effects of SCUA and SCUB on plant growth, yield, nitrogen utilization efficiency and net benefits of summer maize, and the soil residual nitrate nitrogen. The results show that the nitrogen release curves of SCUA and SCUB are linear relationships with the time, and the nitrogen release rate is under the national chemical industry standard of SCU (I types). The nitrogen released rates of SCUA and SCUB in water are faster than those of buried in the field for the different environmental conditions. And the releasing rate of SCUA was higher than that of the SCUB. The cost of SCUB decreases 49.39 yuan/t compared to the SCUA. There are no significant differences in growth and yield among the treatments of SCU (SCUAJ and SCUBJ) which nitrogen application rates are 70% of custom dose and treatment of common urea with custom dose. The treatments of SCUAJ and SCUBJ could significantly improve apparent nitrogen utilization efficiency which can reach to 40.45% and 42.59% respectively. The residual nitrate nitrogen contents of CK1 (common urea with custom dose) and CK2 (nitrogen application rate was 70% of custom dose) in 60-100 cm depth of soil are higher than those of other SCU treatments after harvest. There are no significant differences in net benefits of the SCUA and SCUB with the same rate and there are no net benefit differences compared to the conventional one even under a 30% rate application reducing condition. Therefore, it can be speculated that urea formaldehyde colophony can be used in SCU production as hermetic material, and thus benefit to cost-saving and profit-increasing.

**Keywords:** sulfur coated urea hermetic material summer maize yield nitrogen utilization efficiency

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