高吸水性树脂包膜尿素的水肥一体化调控效果研究

Effects of integral regulation and control of super absorbent polymer coated urea on water and fertilizer use efficiencies

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英文关键词：super absorbent polymer coated urea; integral regulation and control of water and fertilizer; water use efficiency; N use efficiency

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作者	单位
杜建军	(1966-)，男，陕西商州人，博士，副教授，主要从事植物营养的肥水调控、新型肥料和保水剂研究。广州仲恺农业技术学院植物营养与新型肥料研究室，510225。Email：dujj@tom.com
廖宗文	华南农业大学新肥料资源研究室，广州 510642
王新爱	仲恺农业技术学院植物营养与新型肥料研究室,广州 510225
崔英德	仲恺农业技术学院绿色化工研究所，广州 510225

中文摘要：

以不同类型和吸水倍率的高吸水性树脂为包膜材料，以大颗粒尿素和改性矿物包膜尿素为核心肥料，研制出高吸水性树脂单层包膜尿素、高吸水性树脂复式包膜尿素系列产品。通过盆栽玉米试验，在养分淋失和水分胁迫条件下研究了肥料的水肥一体化调控效果。结果表明：在高吸水性树脂与核心肥料配比为6∶100、9∶100时，高吸水性树脂包膜尿素能显著延缓氮素释放速率，减少淋溶损失量，降低耗水量，玉米生物量、水分利用效率和氮肥利用效率较核心肥料均显著提高。高吸水性树脂包膜尿素的水肥一体化调控效果主要与肥料包膜状况、内膜材料的性质、高吸水

英文摘要：

A series of products of super absorbent polymer(SAP) coated urea(SAPCU) with single membrane of SAP or with duplex membranes of modified mineral inside and SAP outside were developed by using different types and different water absorbent rates of SAPs as coating material, and big granule urea and modified mineral coated urea as the core fertilizers. A pot experiment of corn was carried out to study the effects of integral regulation and control of SAPCUs on water and fertilizer use efficiencies under nutrient leaching and water stress conditions. The result showed that SAPCUs could obviously decelerate N release, reduce N amount of leaching loss and decrease water amount used. As the ratios of SAP to Core Fertilizer were 6∶100 and 9∶100, the corn biomass, water and fertilizer use efficiencies of SAPCU treatment were significantly increased compared with those of core fertilizers. The effects of integral regulation and control of SAPCUs on water and fertilizer use efficiencies were mainly related to membrane, properties of inner membrane, types of SAP and their use levels. The inner membrane of SAPCUs with duplex membranes could obviously increase the effects of nutrients controlled/slow release, and SAPCUs with duplex membranes had better fertilizer effect than that of SAPCUs with single membrane. The material of inner membrane, which had a less influence on water absorbent rate of SAP and could absorb and fix nutrient ions, had a better effect. For all SAPCUs, the effects were more noticeable with the increase of SAPs use level.

主办单位：中国农业工程学会 单位地址：北京朝阳区麦子店街41号

服务热线：010－65929451 传真：010－65929451 邮编：100026 Email：tcsae@tcsae.org