基于胶粘物质的肥料控释装置的方案设计及其养分释放模拟

Release system for controlled release fertilizers based on gel materials

投稿时间：2003-6-27　　最后修改时间：2003-12-9

稿件编号：20040125

中文关键词：控释； 肥料控释装置； 胶粘物质； 模拟

英文关键词：controlled release; fertilizer release system; gel materials; modeling

基金项目：中国科学院资源环境领域知识创新重要方向项目(KZCX2-402)；国家高新技术研究发展计划(863)项目(2001AA246021)资助

作者	单位
杜昌文	中国科学院南京土壤研究所土壤与农业可持续发展国家重点实验室，南京 210008
周键民	中国科学院南京土壤研究所土壤与农业可持续发展国家重点实验室，南京 210008
王火焰	中国科学院南京土壤研究所土壤与农业可持续发展国家重点实验室，南京 210008
	以色列理工大学土木与环境工程学院，海法 32000

中文摘要：

该文提出了可应用于农田的肥料控释装置方案设计，此装置由肥料主管道和养分释放分管道组成，选取天然、半天然高分子材料壳聚糖和果胶作为释放分管道的胶粘物质，在实验室条件下检测了其控释效果，结果表明：养分主要呈线性释放，装置具有良好控释效果。利用Fick第一扩散定律和欧姆定律模拟了装置养分的释放，结果表明：养分的释放主要受扩散系数或物阻率、扩散面积、胶粘物质厚度等因素影响。该模型表明，养分是呈线性释放的，和实测结果相一致，并由此计算出了胶粘物质的控释参数：扩散系数或物阻率，为实际应用提供了理论基础。

英文摘要：

A release system for controlled release fertilizer was developed for practical use, which was composed of main tube for holding fertilizers and branch tube for releasing nutrients. Natural and semi-natural materials such as chitosan and pectin were used as gel materials in branch tube, and the controlled release effect was checked in laboratory. The results showed that the nutrients in release system were released linearly, and a good controlled effect was observed. The nutrients release was modeled respectively according to the Second Fick Diffusion Law and Ohm law, and the results were almost the same. The nutrients release was mainly controlled by diffusion coefficient, resistance, diffusion area and thickness of gel materials. From this model nutrients were released linearly, which agreed with experimental result, and then the diffusion coefficient and resistance were evaluated, which gave a theory basis for further application.

查看全文　　关闭　　下载PDF阅读器