

聚合物包膜肥料中钾素释放特征及其模拟

Characteristics of potassium release from polymer-coated controlled-release fertilizer and its modeling

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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性发展国家重点实验室, 南京 210008
周健民	中国科学院南京土壤研究所土壤与农业可持续性发展国家重点实验室, 南京 210008
Avi Shaviv	以色列理工大学土木与环境工程学院, 海法 32000

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中文摘要:

以水和水饱和石英砂为介质,研究了2种聚合物包膜肥料中钾素的释放特征。结果表明,钾素释放主要受温度影响,同时还受到颗粒大小和形态的影响;在水饱和石英砂中溶出与在水中溶出差别不大。采用水为介质,以一聚合物包膜肥料养分释放的理论模型为基础,对影响聚合物包膜肥料钾素释放的因素进行了研究,并进行了灵敏性检验。结果表明,温度越高、包膜的厚度和颗粒半径越小时钾素释放越快,且试验结果和模拟结果达到极显著的相关性;模拟结果比实际结果明显偏低,但表现出了较好灵敏性和相关性,是一个具有理论基础和应用潜力的聚合物包膜肥料养分释放模型。

英文摘要:

Two kinds of polymer-coated controlled-release fertilizers(Multicoate) were used to study the characteristics of potassium release in the medium of water or water-saturated silicon sand in the column. The results show that the potassium release is mainly influenced by temperature and granule radius and shape. There is no significant difference in the potassium release rate in the medium of water and water-saturated silicon sand. Based on a theoretic model of nutrients release from polymer-coated controlled-release fertilizer, the factors that influenced the nutrients release in the water were studied, and sensitivity analysis was carried out. Temperature, fertilizer granule radius and membrane thickness influence the nutrients release significantly. The experimental value is significantly related with modeling one. However, the modeling value is significantly lower which is due to two factors: one is the granule shape that is not exactly spherical, the surface area(diffusion area) of granule used in the experiment is larger than modeling one. The other factor is the granule thickness which is not completely uniform and nutrients can easily release from the thinner part. Though there is a certain difference between experimental value and modeling value, the model is still very useful with great potential in the development of application in the polymer-coated controlled-release fertilizers.

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