

伍洋,马欣,李玉娥,万运帆,张九天,仲平,贾莉.地质封存CO<sub>2</sub>泄漏对农田生态系统的影响评估及耐受阈值[J].农业工程学报,2012,28(2):196-205

## 地质封存CO<sub>2</sub>泄漏对农田生态系统的影响评估及耐受阈值

### Impact assessment and tolerable threshold value of CO<sub>2</sub> leakage from geological storage on agro-ecosystem

投稿时间: 2011-07-26 最后修改时间: 2011-08-10

中文关键词: [CO<sub>2</sub>](#),[pH值](#),[地质](#),[碳捕获与封存](#),[农田生态系统](#),[影响评估](#),[耐受阈值](#)

英文关键词: [carbondioxide](#) [pH value](#) [geology](#) [carbon capture and storage](#) [agro-ecosystem](#) [impact assessment](#) [tolerable threshold value](#)

基金项目:国家科技支撑计划(2011BAC08B03)

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中文摘要:

碳捕获与封存(carbon capture and storage, CCS)是全球碳减排的重要战略性技术,但封存CO<sub>2</sub>泄漏对地表生态系统的严重威胁是CCS活动的重要障碍之一。该研究选择受封存CO<sub>2</sub>泄漏威胁的农田生态系统作为研究对象,通过运用人工控制手段模拟地质封存CO<sub>2</sub>泄漏到达地表的系列情景,监测农田生态系统主要指标变化,评估和确定封存CO<sub>2</sub>泄漏对农田生态系统的影响和耐受阈值。研究表明,不同泄漏情景下玉米均受到不同程度的不利影响,并且泄漏通量越大,影响程度越深:CO<sub>2</sub>泄漏情景下的玉米出苗受到严重阻碍,株高和叶片数随泄漏通量增大而呈逐渐减小的趋势,地上部和地下部生物量较对照情景明显减少,光合作用受到干扰,土壤pH值降低。500~2 000 g/(m<sup>2</sup>·d)范围内的泄漏情景为玉米对地质封存CO<sub>2</sub>泄漏的耐受阈值。

英文摘要:

Carbon capture and storage (CCS) technology plays an important role in reducing global carbon emission. However, CCS project is facing many obstacles, particularly the leakage from carbon dioxide (CO<sub>2</sub>) storage sites severely threatens ground ecological systems. In this study, a manual control device was designed and constructed, on an agricultural ecological system threatened by leakage from CO<sub>2</sub> storage sites, to simulate the scenarios of geologically stored CO<sub>2</sub> leaking from underground to ground. The changes of several important parameters of an agricultural ecological system (AES) were observed and recorded so as to evaluate impacts of underground stored CO<sub>2</sub> leaking on an AES, and then to establish the tolerable threshold value. The results showed that maize growth was negatively affected under different CO<sub>2</sub> leakage amounts. In general, maize grew worse when CO<sub>2</sub> leaking flux increased. For example, seedling of maize was severely hampered, both plant height and leaf amount decreased with increasing of CO<sub>2</sub> leaking flux. Biomass for both underground and above ground with CO<sub>2</sub> leaking was significantly less than that of control, photosynthesis of maize was affected, and soil pH value dropped. As a result, the tolerable threshold value of CO<sub>2</sub> leakage from geologically stored sites is 500-2 000 g/(m<sup>2</sup>·d).

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