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缓释氮肥对菊芋生长季土壤CH_4和N_2O排放的影响

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Effect of Slow/Controlled Release Fertilizers on CH_4 and N_2O Emissions From *Helianthus tuberosus* Field on Tidal Flat During Growing Season

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摘要 设置尿素+硝化抑制剂（U+DCD）、尿素+脲酶抑制剂（U+HQ）、脲甲醛（UF）、钙镁磷肥包膜尿素（CMCU）、树脂包膜尿素（PCU）、硫包尿素（SCU）6种缓释氮肥处理以及普通尿素U）处理，在江苏大丰进行小区试验，采用静态箱气相色谱法同步观测沿海滩涂能源植物———菊芋（*Helianthus tuberosus*）生长季土壤的CH_4和N_2O排放通量及其减排潜力。结果表明，在2010年整个菊芋生长季，U、PCU、UF、SCU、CMCU、U+HQ和U+DCD处理土壤CH4排放总量依次为1.25、0.59、0.43、0.27、0.25、0.26和-0.21kg · hm^{-2}。与普通尿素处理相比，除U+DCD处理外，其余施用缓释氮肥处理可使CH_4排放量减少53%~80%。生长季PCU、SCU、CMCU、U、UF、U+HQ和U+DCD处理的N_2O排放总量分别为2.94、2.44、2.27、2.24、1.77、1.47和1.34kg · hm^{-2}。与普通尿素处理相比，施用化学型缓释氮肥（U+DCD、U+HQ和UF处理）使N_2O排放量减少21%~40%，而施用物理型缓释氮肥（CMCU、PCU和SCU处理）则使N_2O排放量增加1%~31%。从全球增温潜势看，各化学型缓释氮肥处理均表现出显著的减排效果。

关键词： 缓释氮肥 滩涂 能源植物 菊芋 CH_4 N_2O 温室气体

缓释氮肥；滩涂；能源植物；菊芋；CH4；N2O；温室气体

Abstract： A field experiment, designed to have seven treatments,i.e. U+DCD(urea plus dicyandiamide),U+HQ(urea plus hydroquinone),UF(urea formaldehyde), CMCU(Ca-Mg-P-coated urea),PCU(polymer-coated urea),SCU(sulfur-coated urea) and CK or U(urea), was conducted to explore effects of some typical slow-release fertilizers on methane (CH_4) and nitrous oxide (N_2O) emissions from *Helianthus tuberosus* fields on tidal flat in Dafeng of Jiangsu Province during its growing season in 2010.Fluxes of CH_4 and N_2O emissions from the field were measured simultaneously with the static chamber-GC method.Results show that in terms of seasonal CH4 emission, the 7 treatments followed the order of U > PCU > UF > SCU > CMCU > U+HQ > U+DCD, emitting 1.25, 0.59, 0.43, 0.27, 0.25, 0.26 and -0.21 kg•hm^{-2}, respectively. Compared with urea, the slow/controlled-release nitrogen fertilizers reduced seasonal CH_4 emissions by about 53%-80%, but did not vary much among themselves. In terms of seasonal N_2O emission, the treatments followed the order of PCU > SCU > CMCU > U > UF > U+HQ > U+DCD, emitting 2.94, 2.44, 2.27, 2.24, 1.77, 1.47 and 1.34 kg•hm^{-2}, respectively. Relative to urea, chemically-altered fertilizers reduced seasonal N_2O emission by 21%－40%, whereas physically-altered fertilizers increased total N_2O emission by 1%－31%. The findings suggest that from the aspect of the global warming potential, all the chemically altered nitrogen fertilizers display significant emission reducing effect.

Keywords： slow-released fertilizer coastal area energy plant *Helianthus tuberosus* CH_4 N_2O greenhouse gas

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