

长江三角洲主要超级稻CH₄排放特征及其与植株生长特性的关系闫晓君¹, 王丽丽¹, 江瑜¹, 邓艾兴², 田云录³, 张卫建^{1,2}¹南京农业大学应用生态研究所, 南京 210095; ²中国农业科学院作物科学研究所农业部作物生理生态与栽培重点开放实验室, 北京 100081; ³南京农业大学水稻研究所, 南京 210095**CH₄ emission features of leading super-rice varieties and their relationships with the varieties growth characteristics in Yangtze Delta of China.**YAN Xiao-jun¹, WANG Li-li¹, JIANG Yu¹, DENG Ai-xing², TIAN Yun-lu³, ZHANG Wei-jian^{1,2}¹Institute of Applied Ecology, Nanjing Agricultural University, Nanjing 210095, China; ²Ministry of Agriculture Key Laboratory of Crop Physiology, Ecology & Production, Institute of Crop Science, Chinese Academy of Agricultural Sciences, Beijing 100081, China; ³Institute of Rice, Nanjing Agricultural University, Nanjing 210095, China)

摘要

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摘要

采用盆栽试验研究了长江三角洲14个主要超级稻品种(6个粳型超级稻和8个籼型杂交超级稻)CH₄排放特征及其与植株生长特性之间的关系。结果表明: 粳型和籼型超级稻全生育期CH₄排放均呈双峰模式, 排放峰值分别出现在分蘖盛期和孕穗期。粳型超级稻的平均CH₄排放总量比籼型超级稻高37.6% ($p < 0.01$), 品种间排放差异主要出现在生长后期。虽然两种类型超级稻的CH₄排放总量均与最大叶面积呈显著正相关, 但CH₄排放与其他生长特性的关系因品种类型而异。在株高上, 粳型超级稻CH₄排放总量与株高呈显著正相关, 而籼型超级稻的相关不显著。在生产力上, 籼型超级稻CH₄排放总量与其总生物量、籽粒产量和收获指数呈显著负相关, 而粳型超级稻的相关不显著。籼型超级稻CH₄排放量低主要是由于其根系生物量显著高于粳型超级稻。

关键词: 气候变化 粮食安全 温室气体 生产力 超级稻 长江三角洲

Abstract:

A pot experiment was conducted to study the CH₄ emission features of fourteen leading super-rice varieties (six *Japonica* rice varieties and eight *Indica* hybrid rice varieties) and their relationships with the varieties growth characteristics in Yangtze Delta. Two distinct peaks of CH₄ emission were detected during the entire growth period of the varieties, one peak occurred at full tillering stage, and the other appeared at booting stage. The average total CH₄ emission of *Japonica* rice varieties was 37.6% higher than that of the *Indica* hybrid rice varieties ($p < 0.01$), and the differences in the CH₄ emission between rice types occurred at the post anthesis phase. For all the varieties, there was a significant positive correlation between the total CH₄ emission and the maximum leaf area, but the correlations between the CH₄ emission and the other growth characteristics varied with variety type. The total CH₄ emission of *Japonica* rice varieties had a significant positive correlation with plant height, while the correlations between the total CH₄ emission of *Indica* hybrid rice varieties and their plant height were not significant. The total CH₄ emission of *Indica* hybrid rice varieties had significant negative correlations with the total aboveground biomass, grain yield, and harvest index, but the correlations were not significant for *Japonica* rice varieties. The lower CH₄ emission of *Indica* hybrid rice varieties was likely due to their significantly higher root biomass, as compared with *Japonica* rice varieties.

Key words: climate warming food security greenhouse gas productivity super-rice Yangtze Delta

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