

## 研究报告

## FACE水稻茎蘖动态模型

孙成明<sup>1</sup>,庄恒扬<sup>1</sup>,杨连新<sup>1</sup>,杨洪建<sup>1</sup>,黄建晔<sup>1</sup>,董桂春<sup>1</sup>,朱建国<sup>2</sup>,王余龙<sup>1</sup><sup>1</sup>扬州大学农学院江苏省作物遗传生理重点实验室, 扬州 225009; <sup>2</sup>中国科学院南京土壤研究所, 南京 210008

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摘要 借助农田开放式空气CO<sub>2</sub>浓度增高(FACE)技术平台,以武香粳14为供试水稻品种,设置不同施N量处理,研究大气CO<sub>2</sub>浓度为570 μmol·mol<sup>-1</sup>(比对照高200 μmol·mol<sup>-1</sup>)的FACE处理对水稻茎蘖动态的影响,并建立了相应的模拟模型:  $T_t = A_1(1 + e^{a_1 - b_1 t}) - A_2(1 + e^{a_2 - b_2 t}) + C \times [B_1(1 + e^{a_3 - b_3 t}) - B_2(1 + e^{a_4 - b_4 t})] + D$ . 模型以时间为驱动因子,描述了水稻茎蘖数随移栽天数的动态变化过程,对常规及CO<sub>2</sub>浓度增加条件下水稻茎蘖的变化均有很好的拟合性.通过不同年份试验数据对模型的检验,预测根均方差(RMSE)最大为44.27个·m<sup>-2</sup>,最小为13.96个·m<sup>-2</sup>,且相关系数均达到了极显著水平.表明模型的预测程度较高,具有很好的适用性.

关键词 [水稻](#) [FACE](#) [茎蘖动态](#) [模拟模型](#)

分类号

## Dynamic model of rice tiller in FACE

SUN Chengming<sup>1</sup>, ZHUANG Hengyang<sup>1</sup>, YANG Lianxin<sup>1</sup>, YANG Hongjian<sup>1</sup>, HUANG Jianye<sup>1</sup>, DONG Guichun<sup>1</sup>, ZHU Jianguo<sup>2</sup>, WANG Yulong<sup>1</sup><sup>1</sup>Key Laboratory of Crop Genetics and Physiology of Jiangsu Province, Yangzhou University, Yangzhou 225009, China; <sup>2</sup>Institute of Soil Science, Chinese Academy of Sciences, Nanjing 210008, China

## Abstract

With *Japonica* cultivar Wuxiangjing 14 as test material, a free-air CO<sub>2</sub> enrichment (FACE) experiment was conducted at Anzhen and Wuxi of Jiangsu Province in 2001~2003. The target CO<sub>2</sub> concentration of FACE plots was 570 μmol·mol<sup>-1</sup>, 200 μmol·mol<sup>-1</sup> higher than that of ambient air. Three levels of N were supplied as LN (150 kg·hm<sup>-2</sup>), MN (250 kg·hm<sup>-2</sup>) and HN (350 kg·hm<sup>-2</sup>). The effects of FACE treatment on the dynamics of rice tiller was studied, and the simulation model was established as  $T_t = A_1(1 + e^{a_1 - b_1 t}) - A_2(1 + e^{a_2 - b_2 t}) + C \times [B_1(1 + e^{a_3 - b_3 t}) - B_2(1 + e^{a_4 - b_4 t})] + D$ . Where  $T_t$  was the numbers of rice tiller in t days after transplanting;  $A_1$  and  $A_2$  were the maximal tillers of production and death under ambient air, respectively;  $B_1$  and  $B_2$  were the maximal potential tillers of production and death under FACE, respectively;  $C$  was the coefficient of CO<sub>2</sub> concentration;  $D$  was the initial tillers after transplanting; and  $a_1, a_2, a_3, a_4, b_1, b_2, b_3$  and  $b_4$  were the control coefficients of the model. The dynamics of tiller numbers with the days after transplanting was described, and the model fitted well under ambient air and FACE conditions. Through testing with different year experimental data, the maximum and minimum RMSE was forecasted as 44.27 and 13.96 ind·m<sup>-2</sup>, respectively, suggesting that the model was accurate and applicable.

Key words [Rice](#) [FACE](#) [Tiller Dynamic](#) [Simulation model](#)

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