

研究报告

## 不同氮素水平下二氧化碳加富对草莓叶片光抑制的影响

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**摘要** 用便携式调制叶绿素荧光仪和光合仪研究了强光下不同供氮水平 (12、4和0.4 mmol·L<sup>-1</sup>) 和不同CO<sub>2</sub>浓度下 (700和390 μl·L<sup>-1</sup>) 丰香草莓叶片的荧光参数及净光合速率的变化. 结果表明, CO<sub>2</sub>和氮素对草莓叶片光抑制有明显的互作效应. 在富CO<sub>2</sub>下, 12 mmol·L<sup>-1</sup>供氮水平的草莓叶片净光合速率升高了62.7%, 4和0.4 mmol·L<sup>-1</sup>供氮水平则分别降低了7.4%和21.3%; 12 mmol·L<sup>-1</sup>供氮水平的 $F_m$ 和 $F_v/F_m$ 在强光胁迫时降幅减小, 暗恢复时 $F_m$ 和 $F_v/F_m$ 恢复程度提高, 而4和0.4 mmol·L<sup>-1</sup>供氮水平却相反. 表明氮素供应不足时草莓叶片在富CO<sub>2</sub>环境下光合作用出现适应性下调, 光抑制增强.

**关键词** [草莓](#) [CO<sub>2</sub>加富](#) [缺氮](#) [叶绿素荧光](#) [光抑制](#)

分类号

## Effects of elevated CO<sub>2</sub> on photoinhibition of strawberry leaves under different nitrogen levels

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### Abstract

By using PAM-2000 portable chlorophyll fluorometer and HCM-1000 photosynthesis measurement system, this paper measured the initial fluorescence ( $F_o$ ), maximal photochemical efficiency of PSII ( $F_v/F_m$ ), maximal fluorescence ( $F_m$ ), amount of inactive PS II reaction centers ( $F_i-F_o$ ), proportion of  $Q_B$ -non-reducing PS II reaction centers [ $(F_i-F_o)/(F_p-F_o)$ ], and net photosynthetic rate ( $P_n$ ) of strawberry leaves under conditions of elevated CO<sub>2</sub> (700 μl·L<sup>-1</sup>) and ambient CO<sub>2</sub> (390 μl·L<sup>-1</sup>) at three levels of nitrogen application (12, 4 and 0.4 mmol·L<sup>-1</sup>).

The results showed that there was a significant joint effect between CO<sub>2</sub> and N on the photoinhibition of strawberry leaves. Under elevated CO<sub>2</sub> condition, the  $P_n$  in treatment 12 mmol N·L<sup>-1</sup> increased by 62.7%, while that in treatments 4 and 0.4 mmol N·L<sup>-1</sup> decreased by 7.4% and 21.3%, respectively. When exposed to high light and subsequently recovered in dark for 4 hours, the strawberry leaves in treatment 12 mmol N·L<sup>-1</sup> showed less changes of  $F_m$  and  $F_v/F_m$  in elevated CO<sub>2</sub> than in ambient CO<sub>2</sub>, while those in treatments 4 and 0.4 mmol N·L<sup>-1</sup> were in adverse, suggesting that for the strawberry leaves in elevated CO<sub>2</sub>, nitrogen deficiency could result in an acclimatized decrease of photosynthesis and an increase of photoinhibition.

**Key words** [strawberry](#) [elevated CO<sub>2</sub>](#) [nitrogen deficiency](#) [chlorophyll fluorescence](#) [photoinhibition](#)

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