

## 不同温度下镁胁迫对黄瓜光合特性和活性氧清除系统的影响

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Effects of magnesium stress on photosynthetic character and active oxygen scavenging system in cucumber under different temperature

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摘要

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## 摘要

利用人工气候箱, 研究不同温度下镁胁迫对黄瓜幼苗光合特性和活性氧清除系统的影响。结果表明, 不论温度高低, 镁胁迫增加了叶绿素a/b, 且缺镁比高镁增幅大。在两种温度下, 镁均降低了叶绿素a、b和类胡萝卜素的含量; 而在适温下, 高镁使叶绿素a、b和类胡萝卜素含量增加, 低温则降低。镁胁迫使黄瓜幼苗中下部叶片净光合率(Pn)、气孔导度(Gs)下降, 低温、高镁Pn降低幅度最大; 但对胞间CO<sub>2</sub>浓度(Ci)、蒸腾速率(Tr)、水分利用率(WUE)和气孔限制值(Ls)的影响因温度和镁离子浓度不同而不同。缺镁胁迫, 黄瓜幼苗光合作用的主要限制因素是非气孔因素, 而高镁胁迫则主要限制因素是气孔因素。镁胁迫使黄瓜幼苗叶片MDA含量、O<sub>2</sub><sup>-</sup>产生速率、H<sub>2</sub>O<sub>2</sub>含量增加, 缺镁增幅大于高镁胁迫; 低温加剧了膜脂过氧化。低温下, POD活性下降, SOD活性升高, 而CAT活性变化不大; 适温下, 植株主要通过提高POD活性来抵御镁胁迫。低温、缺镁对植株的伤害较大, 与活性氧的增加有关。

**关键词:** 黄瓜 温度 镁 光合参数 活性氧清除酶系统 黄瓜 温度 镁 光合参数 活性氧清除酶系统

## Abstract:

To investigate the functional mechanism of Mg to cucumber under low temperature, we studied the effects of Mg stress on photosynthetic character and active oxygen scavenging system in cucumber seedlings under different temperatures using artificial climate box. The results showed that the value of Chla/Chlb was increased under Mg stress condition no matter what temperature, and increased more under Mg deficiency than under Mg excess. The contents of Chla, Chlb and carotenoid were decreased under Mg deficiency at both temperature levels, and under Mg excess at low temperature, but increased at suitable temperature. The Pn, Gs and Tr were decreased under Mg stress at both temperature levels with the lowest value observed under Mg excess and low temperature. The effects of Mg stress on Ci, WUE and Ls were different depending on temperature and Mg concentration. The main limiting factor of photosynthesis in cucumber seedling was non-stomata factor under Mg deficiency, while it was stomata factor under Mg excess. The O<sub>2</sub><sup>-</sup> producing rate, H<sub>2</sub>O<sub>2</sub> and MDA contents were increased under Mg stress in which the effect under Mg excess was higher than under Mg deficiency. Low temperature accelerated the Lipid peroxidation. Under low temperature, POD activity were increase, SOD activity decreased, but CAT activity were not significantly affected; under suitable temperature, Mg stress made POD activity increase, CAT activity decrease, but SOD activity did not change. At the suitable temperature, plant mainly alleviated Mg stress by increasing POD activities. At the low temperature, Mg deficiency had more severe damage on plant, which might be related to the increase of activity oxygen system.

## Keywords:

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