

水-水循环在生姜叶片耗散过剩光能中的作用

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Role of water-water circulation in excessive light energy dissipation of ginger leaves.

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摘要

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摘要

为探讨水-水循环对生姜叶片的光保护作用,通过对生姜采取叶面喷施10 mmol·L⁻¹碘乙酰胺(IA)与遮光50%交互处理,研究了自然强光+清水(T₁)、遮光50%+清水(T₂)、自然强光+10 mmol·L⁻¹ IA(T₃)、遮光50%+10 mmol·L⁻¹ IA(T₄)对生姜叶片叶绿素荧光参数、Mehler反应及超氧化物歧化酶(SOD)、抗坏血酸过氧化物酶(APX)活性的影响.结果表明: 处理过程中,T₃、T₄处理生姜叶片光合速率及最大光化学效率均持续降低,至处理9 d时,光合速率分别较处理前降低了64%和33.2%,最大光化学效率分别降低了16.5%和10.9%,Mehler反应分别升高了139.4%和72.6%,且SOD和APX活性显著增强,而T₁、T₂ 则无显著变化.处理6 d时,一天内各处理生姜叶片光合速率、最大光化学效率在午间均显著降低,叶片的Mehler反应及SOD、APX活性在午间均显著增强,但以T₃变幅较大,T₄次之,T₁、T₂较小.可见,外源IA抑制生姜叶片光合速率后,Mehler反应及活性氧清除酶活性增强,表明水-水循环在耗散生姜叶片过剩光能中起重要作用.

关键词: 生姜 水-水循环 光能耗散

Abstract:

To investigate the photo protection of water water circulation in ginger leaves, the effects of different treatments such as natural light + water control (T₁), shading 50% + water control (T₂), natural light + 10 mmol·L⁻¹ IA (T₃), shading 50% + 10 mmol·L⁻¹ IA (T₄) on leaf chlorophyll fluorescence parameters, Mehler reaction and the activities of SOD, APX of potted ginger were studied. The results showed that the P_n and F_v/F_m of ginger leaves in T₃ and T₄ reduced constantly, but that of T₁ and T₂ had no significant change during treatment. For example, at the ninth day after treatment, the P_n of T₃ and T₄ decreased by 64% and 33.2% respectively, and the F_v/F_m decreased by 16.5% and 10.9% respectively, while Mehler reaction of T₃ and T₄ increased by 139.4% and 72.6% respectively, the activity of SOD and APX were significantly higher than those of the controls. At the sixth day after treatment, the leaf P_n and F_v/F_m in all treatments reduced significantly at noon, but Mehler reaction and the activities of SOD and APX increased markedly, and the largest amplitude was observed in T₃, followed by T₄, and then T₁ and T₂. So, it was clear that Mehler reaction and the activity of reactive oxygen scavenging enzymes increased when leaf P_n was inhibited by exogenous IA. The results suggested that water water circulation played an essential role in dissipating excessive light energy of ginger leaves.

Key words: ginger water-water circulation light energy dissipation.

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