

## 硅对水稻叶片抗氧化酶活性的影响及其与白叶枯病抗性的关系

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## Influences of silicon on activities of antioxidant enzymes in rice leaves infected by Xoo strain in relation to bacterial blight resistance

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摘要

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**摘要** 以感白叶枯病的水稻品种日本晴(Oryza sativa L. cv. Nipponbare)为材料,在溶液培养条件下,研究了硅对接种白叶枯病菌后的水稻病情指数、叶片丙二醛(MDA)和过氧化氢(H<sub>2</sub>O<sub>2</sub>)含量以及超氧化物歧化酶(SOD)、过氧化氢酶(CAT)、脂氧合酶(LOX)、过氧化物酶(POD)和抗坏血酸过氧化物酶(APX)活性的影响。结果表明,施硅能显著降低水稻白叶枯病的病情指数,防治效果达62.86%。接种白叶枯病菌后48 h内,施硅处理的水稻植株,叶片中丙二醛(MDA)和过氧化氢(H<sub>2</sub>O<sub>2</sub>)含量显著升高;显著提高感病植株叶片中脂氧合酶(LOX)和超氧化物歧化酶(SOD)活性;降低过氧化氢酶(CAT)、过氧化物酶(POD)和抗坏血酸过氧化物酶(APX)活性;促进过氧化氢(H<sub>2</sub>O<sub>2</sub>)在植物体内积累,加强膜脂过氧化作用。因此,硅可通过参与植株体内代谢,调节抗氧化系统酶活性,激发机体过敏反应(HR),增强植株对白叶枯病抗性。

**关键词:** 硅 水稻 白叶枯病 酶活性 抗性

**Abstract:** Hydroponics experiments were performed with an Xoo-susceptible rice cultivar (Oryza sativa L. cv. Nipponbare) to study the effects of silicon(Si) on disease development, concentrations of malondialdehyde(MDA) and hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>), activities of superoxide dismutase(SOD), catalase(CAT), lipoxigenase(LOX), peroxidase (POD) and ascorbate peroxidase (APX) in leaves inoculated with Xoo strain. Si addition could significantly decrease the rice severity index of bacterial blight, with the relative immunization efficiency of 62.86%. The concentrations of MDA and H<sub>2</sub>O<sub>2</sub> in Si-amended rice plants were increased significantly during a 48-h-period of time after inoculation with Xoo strain. Activities of SOD and LOX were significantly higher but those of CAT, POD and APX were lower in Si-amended plants than in Si-deprived plants, resulting in accumulation of H<sub>2</sub>O<sub>2</sub> in plants and intensification of membrane lipid peroxidation. It is concluded that Si can enhance rice resistance to bacterial blight through regulating the antioxidant defense system and triggering hypersensitive reaction(HR) and Si is involved in physiological and biochemical metabolisms in plants.

**Keywords:** Si rice Xoo enzyme activity resistance

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