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Effects of Elevated Atmospheric Carbon Dioxide Concentration on Silica Deposition in Rice (*Oryza sativa* L.) Panicle

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Abstract: The effects of elevated carbon dioxide concentration ($[\text{CO}_2]$) on silica deposition on husk epidermis of rice (*Oryza sativa* L. cv. Akitakomachi) during the flowering stage were investigated in this study. The study was motivated by the concept that the rice yield maybe affected by global warming as a result of elevated $[\text{CO}_2]$ environment since sterility of rice is related to the panicle silica content that influences transpiration, and elevated $[\text{CO}_2]$ could affect plant transpiration. Silica deposition analysis was focused on the flowering stage of the rice crop grown hydroponically under two $[\text{CO}_2]$ conditions: 350 $\mu\text{mol mol}^{-1}$ (ambient) and 700 $\mu\text{mol mol}^{-1}$ (elevated). Silica deposition on the husk epidermis from three parts of the panicle at four flowering stages were examined using a scanning electron microscope (SEM) combined with an energy dispersive X-ray microanalyzer (EDX). The results demonstrated that elevated $[\text{CO}_2]$ significantly suppressed silica deposition on the husk epidermis at the lower part of the panicle, and at the early flowering stage when 1/3 of the panicle emerged from the leaf sheath. In the transverse section analysis of the husk, silica deposition on the husk epidermis under elevated $[\text{CO}_2]$ was less than that under ambient $[\text{CO}_2]$ at the late flowering stage. The less silica deposition observed on the husks at the late flowering stage under elevated $[\text{CO}_2]$ might be related to the suppressed transpiration from the panicle by elevated $[\text{CO}_2]$ found in a previous study.

Keywords: [Elevated \$\[\text{CO}_2\]\$](#) , [Oryza sativa L.](#), [Panicle](#), [SEM](#), [Silica](#), [Transpiration](#), [X-ray](#)

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