

Title Responses of superhigh-yield hybrid rice Liangyoupeijiu to enhancement of ultraviolet-B radiation

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Abstract

Effects of 111 days enhanced UV-B radiation on leaf pigments, grain quality, photosynthesis and growth were determined in Chinese superhigh-yield hybrid rice (*Oryza sativa* L.) Liangyoupeijiu (Peiai 64S × 9311). The chlorophyll concentrations of leaves under enhanced UV-B radiation were slightly reduced in the tillering stage, but recovered to levels equal to or above those of control in the later growth stages. Leaves treated with enhanced UV-B radiation for 99 days exhibited higher absorbance in the UV region than controls. Amylose concentration of UV-B treatment was significantly increased by 4.1%. Crude fat concentration, crude protein concentration and vitamin B₁ showed no significant difference between control and treatment. The light-saturated photosynthetic activity of UV-B treated leaves normalized on fresh weight or chlorophyll concentration was, respectively, 45.2 and 35.3% higher than controls. Both indoor and field experiments indicated that UV-B treated leaves were more tolerant to photoinhibition, and its D_0 values tended to be higher than controls during the strong light period of midday. The D1 protein turnover played more important role in UV-B treated leaves against strong irradiance than in control leaves. Little difference was observed in the maximal PSII quantum efficiency of UV-B treated and control leaves during the process of leaf senescence. UV-B radiation reduced diseased grains per panicle and led to a higher seed setting rate. It may have a direct harmful effect on pathogens or reduced susceptibility of UV-B exposed plants to pathogens. Our results suggest that long-term exposure to enhanced UV-B radiation is unlikely to have detrimental effects on the photosynthetic capability of Liangyoupeijiu, and tends to inhibit its growth and biomass.