

Category	: International Rice Research Conference
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Title of Entry	: The sd1 gene regulates leaf inclination angle in rice
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Abstract : Manipulating canopy structure for better light penetration is a sustainable way of improving canopy photosynthesis and increasing rice production. Leaf inclination angle (LIA) determines the canopy extinction coefficient. Erect leaves (larger LIA) allow better penetration of light into the canopy, which increases the efficiency of sunlight capture for photosynthesis and enables denser plantings with a higher leaf area index, thus increasing biomass production and grain yield. We detected a QTL for larger LIA on the long arm of chromosome 1 including the region of *sd1*, a loss-of-function allele of the *SD1* gene. This gene encodes gibberellin-20 oxidase-2, which catalyzes the late steps of gibberellin (GA) biosynthesis. A near-isogenic line carrying the *sd1* allele of semi-dwarf cultivar ‘Takanari’ in the ‘Koshihikari’ genetic background showed higher LIA at the ripening stage than did ‘Koshihikari’. The LIA of ‘Reimei’, another *sd1* allele mutant of ‘Fujiminori’, was also significantly higher than that of ‘Fujiminori’ at the full heading stage and thereafter. These results show that *sd1* is a candidate gene for larger LIA and suggest the involvement of GA in the regulation of LIA. Treatment with either brassinolide or GA significantly decreased the LIA of flag leaves in comparison with control leaves, whereas treatment with the GA biosynthesis inhibitor, paclobutrazol increased the LIA in comparison with that of control leaves. Thus, the LIA declined with the increase in GA level. These results suggested that the *sd1* allele contributed to the increase rice yield in the ‘green revolution’ not only through the improvement of lodging resistance but also through the decrease in the canopy extinction coefficient.

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