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Effects of Planting Pattern on the Interception of Solar Radiation by the Canopy and the Light Extinction Coefficient of the Canopy in Rice Plants Direct-sown in a Submerged Paddy Field

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Abstract: In order to investigate effects of planting pattern on the interception of solar radiation by the canopy and the light extinction coefficient of the canopy in rice, the rice plants direct-sown in a submerged paddy field were grown in six planting patterns (A through F). In plots A, B and C, the planting density was 20.7 hills m^{-2} (22 cm×22 cm spacing) with five, three and one plant per hill, respectively, and in plots D, E and F, the planting density was 82.6 hills m^{-2} (11 cm×11 cm spacing), 44.4 hills m^{-2} (15 cm×15 cm spacing), and 44.4 hills m^{-2} (7.5 cm×30 cm spacing), respectively, with one plant per hill. At the tillering stage, the greater the tiller number and leaf area index, the larger the interception of solar radiation by the canopy. The tiller number was larger in the plots with one plant per hill, higher plant density and square arrangement of hills. At the early ripening stage, the light extinction coefficient of the canopy was smaller in such plots. The larger the average inclination of leaf blades, the smaller the light extinction coefficient of the canopy. The difference in stem inclination in the canopy might be responsible for the difference in the inclination of leaf blades. In the plots with one plant per hill, higher plant density and square arrangement of hills, stems were more erect. Within the range of planting patterns in our study, both the rate of interception of solar radiation by the canopy and the light-intercepting characteristics were significantly more favorable in the plots with one plant per hill, higher density and a square arrangement of hills.

Keywords: Crop growth rate, Direct sowing, Interception of solar radiation, Light-intercepting characteristics, Planting pattern, Rice

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