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Analysis of the Dry Matter Production Process and Yield Formation of the High-Yielding Rice Cultivar Takanari, from 1991 to 1994

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Abstract:

To clarify the physiological and ecological characteristics directly responsible for high yields in rice plants, the yield and yield components, the process of dry matter production and the light-intercepting characteristics were compared between the cultivar Takanari, a high-yielding variety bred in 1990, and the cultivar Nipponbare, a standard Japanese variety. The Takanari yield of 528 ~ 642 kg/10 a was about 100 kg/10 a higher than the yields for Nipponbare in 1991 and 1993, poor harvest years. The Takanari yield of 817 ~ 888 kg/10 a was about 230 kg/10 a higher in 1992 and 1994, good harvest years, owing to higher dry matter productivity and harvest index for Takanari. In spite of a great number of spikelets per square-meter for Takanari, due to the large number of spikelets per panicle with more secondary rachis-branches, the percentages of ripened grains were almost the same as those of Nipponbare. Crop growth rates were higher owing to the higher net assimilation rate after heading in 1991, and owing to both higher net assimilation rate and larger mean leaf area index after the maximum tiller number stage in 1994. The net assimilation rate for Takanari was higher due to better light-intercepting characteristics considering the arrangement of leaves and position of panicles in the canopy. The higher harvest index for Takanari mainly resulted from a higher amount of assimilates translocated to the panicle from the culm and leaf sheath after heading.

Keywords:

Dry matter production, Growth analysis, High-yielding variety, Light-intercepting characteristics, Rice, Yield, Yield component

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