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A Comparison of the Accumulation and Partitioning of Nitrogen in Plants between Two Rice Cultivars, Akenohoshi and Nipponbare, at the Ripening Stage

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Abstract: To clarify the factors responsible for the maintenance of a high rate of photosynthesis at the ripening stage in the high-yield rice cultivar Akenohoshi, as compared with that in a Japanese standard cultivar, Nipponbare, we investigated the nitrogen content of leaves, focusing on the accumulation and the partitioning of nitrogen in rice plants. The nitrogen content of leaves of plants that were grown in the field or in pots remained higher in Akenohoshi than in Nipponbare during the ripening stage, and there was a close correlation between the rate of photosynthesis and the nitrogen content irrespective of cultivar and treatment. The accumulation of nitrogen in the whole plant was greater in Akenohoshi than in Nipponbare before heading and during the ripening stage. The extent of partitioning of nitrogen to leaves was higher and that to ears was lower in Akenohoshi than in Nipponbare during the ripening stage. By application of additional nitrogen fertilizer to Nipponbare, the nitrogen content of leaves was increased as a result of the increased accumulation of nitrogen in the whole plant and the enhanced partitioning of nitrogen to leaves. Our results indicate that the higher nitrogen content of Akenohoshi leaves was due to the greater accumulation of nitrogen in the plant before heading and during the ripening stage and the more effective partitioning of nitrogen to leaves during the ripening stage, which resulted in the maintenance of a high rate of photosynthesis during ripening.

Keywords: Leaf nitrogen content, Nitrogen accumulation, Nitrogen partitioning,

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