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[\[Full-text PDF \(958K\) \]](#) [\[References \]](#)**Influence of Leaf Xylem Water Potential and Leaf Position on Relationship between Nitrogen Content and Photosynthetic Rate of Rice Plant**

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Abstract:

Even though the nitrogen content (mgNdm^{-2}) of rice leaves is the same, a large difference in the net photosynthetic rate (P_n) has been recognized. To determine the reasons for the difference, leaf xylem water potential (W_p), leaf position on stem, days after fully expanded and root respiration of plant having sample leaves were studied. Throughout the period from the booting stage to the middle ripening stage, W_p was measured by the pressure chamber method in the leaf of potted rice plant, cv. Yamabiko and Ochikara immediately after measuring P_n under the conditions 25°C air temperature and 45-50 Klx artificial light. The correlation between mgNdm^{-2} and P_n in both cultivars is shown for each group of first leaves at the top of the stem, and for the second leaves and third leaves, but not the fourth leaves. In the case of young first leaves at the top of the stem and also second leaves, showing the higher P_n (i.e., higher rate of transpiration), a positive correlation was seen between W_p and P_n . Otherwise, old leaves positioned third and fourth, existing a short distance from the roots, had a negative correlation between W_p and P_n . It seemed that the relationship between mgNdm^{-2} and P_n in the lower leaves was altered by W_p . The lower leaves of the plants which had a high respiratory rate in the roots were maintained at a comparatively high P_n until W_p decreased below -1.4MPa . The lower leaves of a plant having poor root activity were specialized as lower P_n and higher W_p ; possibly because of the lower degree of water transport resistance from the root system to the leaf.

Keywords:

Days after fully expanded, Leaf position, Leaf xylem water potential, Nitrogen content, Photosynthesis, Rice, Root respiration

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