

# Plant Science

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## The grain yield and photosynthetic characteristics responses of rice to oxygen status in rhizosphere as affected by soil aerations

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Oxygen content in soil is one of the key factors for rice root growth and development, while root growth directly affect above growth and yield of rice. This study compared the effects of the different aeration methods viz., calcium peroxide application (T1), micro-bubble aerated water irrigation (T2), topsoil moist irrigation (T3) and water-logging(CK) on rice photosynthetic characteristics and yield, Three rice cultivars with different ecotypes, Zhongzheyu 1 (lowland rice), IR45765-3B (deep water rice) and Zhonghan 221 (upland rice) were used as materials. The results showed that calcium peroxide application and micro-bubble aerated water irrigation increased the leaf SPAD value, leaf area index, net photosynthetic rate, transpiration rate, stomatal conductance and dry matter accumulation of the three rice cultivars during the main growth stages, and enhanced the effective panicles numbers and seed setting rate significantly. Compared with the control, the SPAD value, leaf area index, photosynthetic parameters and dry matter weight of the three varieties were decreased in topsoil moist irrigation treatment, and the seed setting rate was also significantly decreased, but the water use efficiency of leaves was increased. The grain yields of Zhongzheyu 1, IR45765-3B and Zhonghan 221 were increased by 22.38%, 18.27% and 18.17%, respectively, in calcium peroxide application as compared to the control, and increased by 13.89%, 10.67% and 8.85%, respectively, in micro-bubble aerated water irrigation treatment. However, the yield was 5.86%, 8.19% and 6.16%, respectively, lower than that of control in topsoil moist irrigation treatment, with considerable differences between treatments ( $P < 0.05$ ).

### Biography

Qianyu Jin is the Director of Research and Development Center of Rice Cropping Technology, China National Rice Research Institute (CNRRI). Since 1988, he has been engaging in the research work on rice growth and development and paddy field ecosystem, and rice cultivation techniques and eco-physiological theory. Up to now, he has achieved more than 20 national invention and utility model patents, published 120 papers, and edited 3 books. Now he is mainly engaging in the researches and demonstration and extension on rice plant type and eco-physiological regulation and high light efficiency of super high-yielding cultivation, the theory of mechanization of rice cultivation and agronomic and agricultural machinery matching production technology, eco-physiology of rice drought resistance and water-saving technology, paddy planting-breeding compound ecosystem and rice-poultry, rice-fish ecological planting-breeding technology.

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