World Academy of Science, Engineering and Technology
International Journal of Agricultural and Biosystems Engineering
Vol:19, No:06, 2025

Plant Photosynthetic and Respiration Rates Are Key Populational Traits to Improve Yield and Quality for Good-Tasting Double-Cropped Rice

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Abstract : Improving the yield and quality of tasty rice varieties is a great challenge. In the present study, different nitrogen rates and plant densities were utilized to form differential rice populational structures, which were determined to clarify key traits determining grain yield and quality for tasty rice varieties in a double-cropped rice system in subtropical China. The present results showed that the plant photosynthetic rate, leaf area index and plant respiration rate had important and significant impacts on the grain yields of both early and late rice, though the late rice yield was also significantly affected by the canopy temperature. In addition, among the studied populational traits, plant photosynthetic and/or respiration rates had significant effects on all quality traits. Consistently, grain yield and quality were significantly improved with the increasing plant photosynthetic and respiration rates through correlative analysis, which was also observed in principal components analysis. Overall, the present study suggests that both the grain yield and milling and appearance qualities could be improved through the optimal management of nitrogen and plant density through increasing plant photosynthetic and respiration rates.

Keywords : rice yield, rice quality, plant photosynthetic rate, plant respiration rate
Conference Title : ICRRD 2025 : International Conference on Rice Research and Development
Conference Location : Tokyo, Japan
Conference Dates : June 05-06, 2025