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Comparison of Photosynthesis, Photorespiration and Carbohydrate Synthesis from 8 wild Rice Relatives

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Currently, it is known that there are 27 of *Oryza* genus species including *sativa* and *glaberrima*, which are broadly cultivated throughout the planet. According to previous reports, wild rice relatives are considered to have a tolerance/resistance against biotic and abiotic stresses due to their characteristics. From the point of view, wild rice relatives could be utilized as an important genetic resource to improve yield and environmental impacts of cultivated rice species. Therefore, our approach is to better understand the differences in photosynthesis/photorespiration and photosynthetic products between wild rice relatives, and, to do this, we have tried to compare the expression of genes closely involved in the photosynthesis metabolism. We selected 10 rice genotypes including 2 cultivated species (*sativa*, *glaberrima*) and 8 wild species (*nivara*, *meridionalis*, *rufipogon*, *punctata*, *officinalis*, *minuta*, *alta*, *latifolia*), and analyzed photosynthesis parameters and the expression levels of related genes from the fully expanded leaves at tillering stage (60 day after germinated). Overall, wild rice relatives tended to a tendency of higher photosynthetic performance, and, especially, the photosynthesis in *Oryza punctata* and *latifolia* showed significantly higher compared to the cultivated. A water use efficiency (CO₂ fixation/transpiration) also was slightly higher in wild rice relatives although there was not significant in a majority. We also analyzed the expression levels of 15-related genes; photosynthesis (OEC, Rubisco, PGK and PPK), photorespiration (PGLP, GOX, GGAT and GDC), sucrose synthesis and transport (SS, SPP, SUT1 and SUT2) and starch synthesis (AGP2a, SSIIb and BEIIa). Interestingly, most of wild rice relatives resulted in higher expression in Rubisco compared to *Oryza sativa*, whereas lower in PGLP and GOX. Moreover, considering the expression levels of SS, SPP and AGP2a, photosynthetic products such sucrose and starch were strongly assumed to be increased, and the distribution rate of sucrose from the source tissue to sink was also enhanced with higher levels of SUT1 and 2. From our result, wild rice relatives were turned out to have potential characteristics to improve rice yield. In current, we are trying to focus on understanding major destination (seed vs. other tissues) of photosynthetic products in terms of considering seed production and growth rates of wild rice relatives.

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