

[P4] Crop Genetics and Physiology

Thu. Sep 9, 2021 12:15 PM - 2:00 PM Room 4 (Poster) (Crop Genetics and Physiology)

12:15 PM - 1:00 PM

[P4-39] Maintaining Higher Leaf Photosynthesis After Heading Stage Contributes to Higher Biomass Accumulation in Rice

*Nominated for Presentation Awards

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Leaf photosynthetic rate changes across the growing season as crop plants age. Most studies of leaf photosynthesis focus on a specific growth stage, leaving the question of which pattern of photosynthetic dynamics maximizes crop productivity unanswered. In this study, we obtained high-frequency data of photosynthesis from two elite rice cultivars and 76 inbred lines across the growing season and analyzed associations between leaf CO₂ assimilation rate (*A*) dynamics and crop growth rate (CGR). A brand-new device "MIC-100", which enables high-throughput gas exchange examination, was used for *A* measurements (Tanaka, Adachi et al. 2021). The *A* values decreased as plants aged but small increase was found at around heading stage with a genetic variation. The integrated *A* value from heading to harvest was positively associated with CGR, but that before heading was not. A curve-smoothing analysis of *A* after heading showed that accumulated *A* at >80% of its maximum (*A*₈₀) was positively correlated with CGR in analyses of all lines mixed and of lines grouped by genetic background, while the maximum *A* was less strongly correlated with CGR. These results suggest that maintaining high *A* after heading, rather than having high maximum *A*, is a potential target for enhancing rice biomass accumulation. We propose that multiple examinations of *A* with the high-throughput gas exchange device will achieve the screening of high-yielding crops with high photosynthetic capacity.