Yield gap analysis between dry and wet season rice crop grown under high-yielding management conditions

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Abstract

Rice (Oryza sativa L.) grain yield highly varies depending on cropping seasons under the tropical irrigated conditions. This study aimed to (i) compare the grain yield of rice in dry season (DS) and wet season (WS) and (ii) determine climatic and physiological factors critical to the yield gap between DS and WS. Six genotypes, two each for indica inbred, indica/indica F1 hybrid, and the second-generation new plant type, were grown in DS and WS of 2003 and 2004. Significantly higher grain yields were achieved in DS than in WS by 94% for 2003 and 35% for 2004. Mean daily radiation was higher in DS than WS, particularly during grain filling stage than before flowering. The greater radiation during ripening in DS contributed to the higher grain yield. Major difference in biomass production between DS and WS occurred after flowering. Greater biomass accumulation from flowering to physiological maturity was associated with higher grain yield in DS than in WS, particularly during grain filling stage than before flowering. Higher grain yield in DS was partly the result of greater spikelets due to higher spikelet production efficiency per unit biomass at flowering. Aboveground total biomass at physiological maturity was a crucial physiological factor to the yield gap between DS and WS. Daily mean radiation and biomass accumulation during ripening, and sink production efficiency per unit biomass were critical factors to the yield gap of rice between DS and WS under the high-yielding tropical irrigated conditions.

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Straw incorporated after mechanized harvesting of irrigated rice affects net emissions of CH4 and CO2 based on eddy covariance measurements
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There is high variability in rice yields among countries and regions as well as among farmers even in homogeneous domains. Profit gaps arise due to post-harvest losses in quantity and quality of rice grain. Biophysical, socio-economic, management, institutional, and policy factors are responsible for yield and profit gaps. Identification of problems/causes for such gaps and development of possible mitigation measures can only be considered the first of a two step process. The second and equally important step is to minimize the knowledge gap between researchers, extension staff. This yield gap between potential and rainfed production system is due to rainfall period during spring when temperature is not a limiting factor for wheat growth. Borujen Basin has semiarid climatic conditions with cold winter and winter precipitation. For the sake of it, temperature was a decisive factor during rainfall seasons, limiting the crop growth period. referred to here as the yield gap. Alternatively, it can be estimated as the difference between yields from crops grown under near-perfectly managed conditions, as in variety tests, and the yields of a farm or a national crop grown nearby in the same season (Jaggard et al., 2010).