**Entry No. IRRC-0592**

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| Category | : International Rice Research Conference |
| Select Theme | : Climate change and environmental sustainability |
| Endorsement email | : |
| Keyword 1 | : Water scarcity |
| Keyword 2 | : Environmental sustainability |
| Keyword 3 | : Soil, water, and air pollution |
| Title of Entry | : Optimizing intermittent irrigation methods that maximize rice productivity while saving irrigation amount by promoting root developmental plasticity |
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| Abstract | : The declining availability of water resources is a major threat to the sustainability of irrigated rice-based production. The intermittent irrigation method is effective for reducing irrigation amount while maintaining or increasing yield. However, rice productivity is often reduced by the delaying of irrigation and subsequent severe drought. While severe drought greatly inhibits root development and thus reduces water uptake, mild drought tends to promote root developmental plasticity that may contribute to enhanced water uptake (Kano et al., 2011). In this study, we aimed to determine the optimal timing of irrigation to maximize |

rice productivity and minimize irrigation amount, based on soil water tension (SWT) which led to promoting root developmental plasticity. 1 Nipponbare (japonica), Swarna (indica) and KDML105 (indica), which are known to have high root developmental plasticity under mild drought (Kameoka et al. 2016) were grown in pots with 4 irrigation schedules; daily, and intermittent (AWD irrigation when the SWT at 12.5 cm soil depth reached either -20, -40 and -70 kPa. In the daily irrigated treatments, 40 mm standing water depth was maintained. Experiments were conducted in RCBD with 3 replications under a rainout shelter in 2017. Shoot and root sampling were carried out just before heading. The total root length (TRL) and root diameters of root samples were determined by using the computer-aided image analysis method proposed by Tajima and Kato (2011). Higher shoot dry matter production (+10~20%), TRL (+60~70%) and nodal root elongation (+90~110%) compared to those in daily irrigated were observed in a few AWD treatments in two genotypes (Nipponbare at -40 kPa and Swarna at -20 kPa). In contrast, both of shoot growth and root development were inhibited in all the AWD treatments in KDML105. These results suggest the feasibility of reducing irrigation amount while maximizing rice productivity through promoting root developmental plasticity by controlling the irrigation timing based on SWT. As the optimal irrigation timing that can most promote the root developmental plasticity may differ among genotypes, examination of root development and function with different intensities of drought and/or irrigation timing is necessary for establishing optimal intermittent irrigation methods for specific rice genotypes.

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