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Field Network System to Monitor Paddy Fields in the System of Rice Intensification in Indonesia

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Abstract

The current study was performed for establishing a field network system (FNS) to monitor paddy fields in the System of Rice Intensification (SRI) environment in Nagrak Organics SRI Center, Sukabumi, Indonesia. FNS works as a remote monitoring system which field router equipped with an in situ camera and connected to meteorological and soil data loggers. Changes in soil conditions (moisture, electrical conductivity and temperature) and meteorological parameters were measured and monitored at intervals of 30 minutes. Then, the data and plant image were daily transmitted to a remote server by means of the Global System for Mobile communication (GSM) with the help of a newly developed field router. All data were made accessible online at http://emsa-sri.org as images in addition to numeric and graphic data. There were four experimental plots with different water management regimes; continuously saturated soil (CSS) in the first plot, incompletely saturated soil (ISS) in the second plot, moderate soil drying (MSD) in the third plot and severe soil drying (SSD) in the fourth plot. In the CSS regime, the soil was kept saturated or at water levels -5 to 0 cm depth as recommended by SRI training center in Indonesia; while for ISS regime, the soil was kept drier than the CSS regime at water levels of -15 to -5 cm depth. Moderate soil drying was applied at water levels of -30 to -5 cm depth in the MSD regime and the last regime (SSD regime), severe soil drying was applied at water levels -60 to -10 cm depth particularly from 70 day after transplanting. Based on the findings of the experiment along a single crop season, the FNS run well and was reliable in the monitoring of the plants, meteorological and soil parameters. However, stability of the field router depends on the field solar power supply and the Internet connection. In case there is problem in the Internet connection within data transmitting time,
the images data were lost. The images data showed the series of SRI plant growth from a tiny seedling to a large cover area and facilitating evaluation of each growth stage. With the numeric data, the water productivity could be well determined and the values were 1.95, 2.01, 1.51 and 2.04 kg/m³ for CSS, ISS, MSD and SSD regimes, respectively. In addition, the evaluation of water management regimes revealed that in the CSS and MSD regimes, the soil should be more saturated to gain more yield and water productivity particularly in the early stage to the crop development stage as occurred in the ISS and SSD regimes.

Keywords: System of Rice Intensification, Environmental Parameters, Irrigation system, Field Network System, Quasi-real time monitoring