

Monitoring of evapotranspired plant water in the SITIS Platform of Plant Phenotyping for Drought Tolerance

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In the development of new cultivars that are more tolerant to water deficiency, it has become important to identify plants that consume less water during their life cycle and are able to uptake water from deeper soil layers. For phenotyping of populations and germplasm in water use, a greenhouse system was developed [1] where each plant is grown in a stationary soil column with up to approximately 0.049 m³ of soil (up to 5 PVC rings, 25 cm in diameter and 20 cm high each). Each soil column is placed on a digital scale with a capacity of 100 kg and a precision of 10 g. In turn, each scale is connected to an electronic module capable of requesting and storing the mass at any desired moment. Thus, by the difference in mass of the soil column at two different instants of time, it is possible to determine the amount of water evapotranspired. If it is desired to reduce the soil evaporation and obtain the plant transpiration value, it is possible to cover the soil with impermeable material, so that the evaporated water condenses and returns to the soil column. The system allows scheduling of monitoring either at predefined times or at regular intervals, or the combination between them. With this, it is possible to construct curves of plant water use daily, monthly or according to their phenological stages. Currently, the automated system is in the development and the process using the scale and manual irrigation was validated for rice, beans, soybean and cotton crops. In rice, for example, each unit of increase in water stress, from 100% to 20% of evapotranspiration replacement, reduced cumulative evapotranspiration of 0.57 L in 'Douradão' (more tolerant) and of 0.67 L in 'BRS Soberana' (more susceptible).

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References:

[1] GUIMARAES, C.M.; NARCISO, M.G; TORRE NETO, A.; et al. *Plataforma de fenotipagem para tolerância à deficiência hídrica*. In: SIMPÓSIO SOBRE INOVAÇÃO E CRIATIVIDADE CIENTÍFICA NA EMBRAPA, 2., 2010, Brasília, DF. Poster. Brasília, DF: Embrapa, 2010.