



Yield and water use efficiency of different irrigated sugarcane cultivars in Brazil

André L.B.O. Silva (1), Regina C.M. Pires (1), Augusto Y.P. Ohashi (1), and Rafael V. Ribeiro (2)

(1) Agronomic Institute, Ecophysiological and Biophysics Center, Campinas, Brazil (rcmpires@gmail.com), (2) University of Campinas, Institute of Biology, Campinas, Brazil

There is an increasing demand for bioenergy production to provide environmental, economic and agricultural sustainability. In this context Brazil has an important option with sugarcane cultivation. The sugarcane cultivation has been increasing in marginal and appropriate areas depending on weather conditions. In appropriate areas, such as the State of São Paulo, it is important to increase yield and quality instead of expanding new areas. In this context, irrigation becomes an important cultural practice as a guarantee and to achieve high yields. Thus, the use of subsurface drip irrigation (SDI) in sugarcane cultivation is an interesting cultural practice to save water since water and nutrients are applied in root zone plants. As irrigation demands great volume of water, it is important to study the most responsive cultivars to adopt this technique and improve water use efficiency (WUE). Thus, this study aimed to evaluate the yield and WUE of four sugarcane cultivars irrigated by a SDI system. The experiment with the SP79-1011, IACSP94-2101, IACSP94-2094 and IACSP95-5000 cultivars was carried out in Campinas, SP, Brazil, between October 2012 and November 2013 (second ratoon). These cultivars have different canopy characteristics and development. IACSP95-5000 and IACSP94-2094 are more responsive to soil water availability and presents higher light interception when compared to IACSP94-2101 and SP79-1011. The irrigation was applied by a subsurface drip system daily and it was suspended when precipitation occurred. Crop evapotranspiration was estimated through field water balance. In order to do so the soil moisture was evaluated with capacitance probe with sensors installed at depths of 0.2, 0.3, 0.4, 0.6, 0.8 and 1.0 m. Samplings were collected to estimate yield and qualitative attributes. The water use efficiency (WUE) was estimated based on stem production per hectare reached in each cultivar divided by (1) water volume contributed considering the actual evapotranspiration, (2) the actual evapotranspiration plus the rain before applying the irrigation at the beginning of the cycle due to irrigation system problems, and (3) the total of rain plus irrigation received by the crop throughout the cycle. The highest yields and water use efficiency were observed in IACSP94-9101 and IACSP95-5000 cultivars regardless of the methodology used to estimate WUE. The obtained yields were 241,9, 236,5, 197,8, and 183,5 Mg ha⁻¹ for IACSP 94-2101, IACSP95-5000, SP791011 and IACSP 94-2094 cultivars, respectively. Considering yield and actual evapotranspiration, the WUE achieved 20,75, 18,18, 17,17 and 14,44 kg m⁻³ for IACSP 94-2101, IACSP95-5000, SP791011 and IACSP 94-2094 cultivars, respectively. Using the total rain and irrigation depth, the WUE were 12,40, 12,12, 10,13 and 9,4 kg m⁻³ for IACSP 94-2101, IACSP95-5000, SP791011 and IACSP 94-2094 cultivars, respectively. Although the IACSP94-2094 is considered responsive to water availability, it did not result in the best yield and WUE when cultivated and irrigated by SDI. According to the obtained results there were different response in yield and WUE by sugarcane cultivars irrigated by SDI. In the second sugarcane ratoon cycle the achieved yields were high in all cultivars evaluated regardless of whether the areas were irrigated or not.