Determination of evapotranspiration and crop coefficient of cucumber by using microlysimeter in greenhouse conditions

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Abstract

Soil and water resources are limited and optimal use of water resources in agriculture requires accurate determination of water consumed by plant species in different circumstances. This situation is necessary more than ever due to fast development of greenhouse cultivation. In this regard, to determine evapotranspiration and crop coefficient (K_C) of greenhouse cucumber, two microlysimeters were installed for growing cucumber and grass. Daily evapotranspiration rate of both plants was measured by weighing method. Also, by using meteorological data, recorded inside the greenhouse, the reference crop evapotranspiration was calculated with Penman-Monteith-FAO, Hargreaves-Samani and Makkink methods. Evapotranspiration of cucumber plants, with plant spacing of 40×70 cm, during the 4-month growth period was measured as 273.2 mm. Mean values of K_C for cucumber in greenhouse was 0.14 in the initial stage of growth, 0.78 in the development stage, 1.37 in the middle stage and 0.86 in the last stage. Also, crop coefficient values for reference crop evapotranspiration estimated by the Hargreaves-Samani and Makkink methods were closer to the actual values. The Penman-Monteith-FAO equation estimated Kc value about 1.6 to 5 times higher than the actual value.

Keywords: Reference crop evapotranspiration, Penman-Monteith- FAO, Hargreaves-Samani, Makkink.

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