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"Agricultural development within the rural-urban continuum"

Determination of kc Values for *Acrocomia aculeata*

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Abstract

Against the background of climate change and the accompanying decrease of available irrigation water in many parts of the world, efficient irrigation in agriculture becomes more and more important. The water consumption of plants can be calculated with the climatic water balance. Doing so, potential evapotranspiration (ETpot) of plants is estimated with measured climate data only. The needed irrigation height can then be assessed by balancing water input (precipitation) and output (ETpot).

In irrigation practice, ETpot is often calculated with the crop coefficient approach of the FAO (FAO irrigation and drainage paper No. 24 and No. 56). In detail, ETpot is obtained by multiplying a potential reference evapotranspiration (ETo) with a crop specific crop coefficient (kc value). For the calculation of ETo, climate information (air temperature, air humidity, solar (net) radiation, wind speed) must be available. The needed kc values are provided by the FAO. However, kc values for *Acrocomia aculeata*, were not reported so far.

The objective of the present study was to investigate kc values for *Acrocomia* in order to be able to estimate its water consumption and irrigation water need with the FAO crop coefficient approach. The investigations took place on the research station of the Universidad Católica "Nuestra Senora de la Asunción" in Paraguay. The investigated *Acrocomia* trees were planted three years ago in plastic containers (heigt: 130 cm, diameter: 80 cm) with identical soils. According to the calculation procedure, ETo and ETpot of *Acrocomia* are needed to calculate the corresponding kc value. For ETo calculation, weather data of a nearby weather station could be used. ETpot of the *Acrocomia* trees (height: 2 m) was set equal to the water losses from the plastic containers. In order to avoid water stress of the *Acrocomia* trees, soil moisture within the container was regularly monitored with tensiometers and irrigation started (5 liter per irrigation) at a soil water potential threshold of 200 mbar.

Keywords: *Acrocomia aculeata*, crop coefficient approach, kc value, potential evapotranspiration

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