



Tropentag, September 17-19, 2013, Stuttgart-Hohenheim
“Agricultural development within the rural-urban continuum”

Production Function of Irrigated Eggplant in Protected Environment

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Abstract

Eggplant (*Solanum melongena* L.) is native to the Middle and Far East and has been cultivated for over 1500 years by the Arabs and Chinese. Currently, there has been an increasing demand for the vegetable due to its medicinal properties and richness of mineral and vitamins. The biggest drawback to eggplant production is the inappropriate soil moisture during plant cycle. Irrigation acts as a supplement to rainfall and keeps soil water rates at ideal levels for crop development, thus increasing plant growth, product quality and yield. Appropriate irrigation management can improve efficiency in water use, reduce energy consumption and promote optimal economic productivity. The point of maximum physical productivity can be achieved with production functions obtained from agricultural experiments, which evaluate effects of variation of inputs on variation of outputs. This study aimed to establish optimal strategies for crop irrigation of eggplant, Napoli cultivar, grown in protected environment in southern Minas Gerais, Brazil, considering water as a limiting production factor and different values for product price and electricity costs. Thus, an experiment was conducted in completely randomised design with 5 treatments and 6 replicates. Treatments consisted of 5 different irrigation depths, 50, 75, 100, 125 and 150 % of crop evapotranspiration up to field capacity. Results showed significant differences for all variables: stem diameter, plant height and yield. Total production (kg plant^{-1}) had a quadratic response to treatments, whereas cost showed a linear function. The treatment with 229 litres plant^{-1} showed the highest yield, while the one with 227 litres plant^{-1} provided the highest investment turnover. According to the analysed conditions, we concluded that irrigation can be performed to achieve maximum crop yield. Also, variation in price relationship (P_w/P_y) did not proportionally affect the depth recommended to promote maximum economic efficiency.

Keywords: Eggplant, irrigation management, yield