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"Agricultural development within the rural-urban continuum"

Production Function of Irrigated Eggplant in Protected Environment

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Introduction

Currently and in recent years there has been an increasing demand for Eggplant due to its medicinal characteristics and richness of vitamins and minerals. Maximum physical productivity can be achieved with results of agricultural experiments that provide production functions, which evaluate the effects of input variation on production variation. Then, with the prices of inputs and products, we can determine the optimum amount of each input that maximizes the profitability of the farmer (Frizzone & Andrade Júnior, 2005). The question is: Is it better to irrigate the Eggplant to achieve the maximum physical productivity or maximum economic efficiency?

Objectives

To establish optimal irrigation strategies for Eggplant crop, Napoli cultivar, grown in greenhouse in southern Minas Gerais, considering water as a limiting production factor and different values for product and electricity prices.

Methodology

We used a completely randomized design with 6 replicates. Treatments comprised 5 different irrigation depths - 50, 75, 100, 125 and 150% of replacement depth up to field capacity. Tensiometers were installed at 0.125 m depth at experimental units with replacement of 100% of the recommended water depth. Product price was obtained at CEASA - MG, while price of water was based on variable costs of energy, labor, maintenance and repairs of a pumping system.

Results

Maximum physical productivity of Eggplant: 229 liters (Figure 1).

Maximum economic efficiency, considering product price (Py) of R\$ 0.30 kg^{-1} and price of water (Pw) of R\$ 0.08 m^{-3}: 227 liters.

Total income (R\$. $Cycle^{-1}$) showed a quadratic function in relation to treatments, whereas total variable cost (R \$.$Cycle^{-1}$) presented a linear response (Figure 2).

The optimum economic depth is always very close to the depth recommended for maximum physical productivity, 229 liters (Table 1).

The highest percentage of saving in variable cost with the optimum

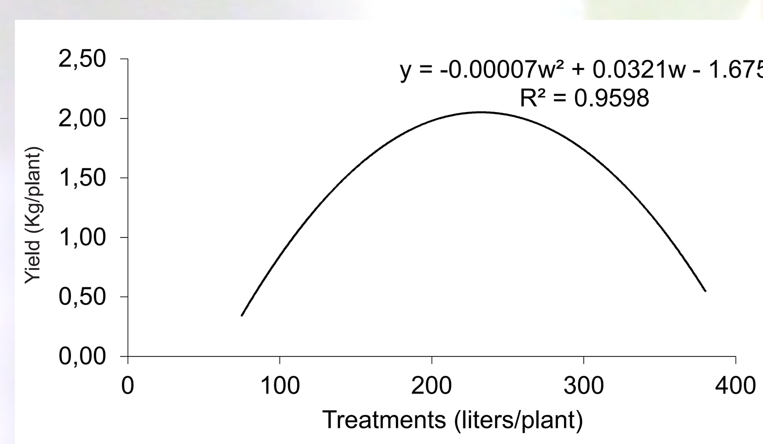

Figura 1. Efeito de diferentes lâminas de irrigação na produtividade das plantas da berinjela submetida a diferentes lâminas de irrigação UFLA, Lavras/MG, 2008.

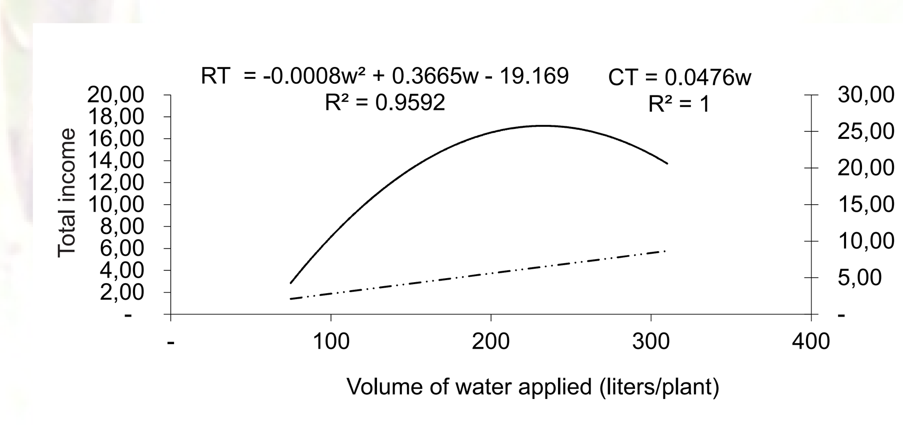

Figure 2. Effect of different irrigation depths on total revenue (R \$) and total variable cost

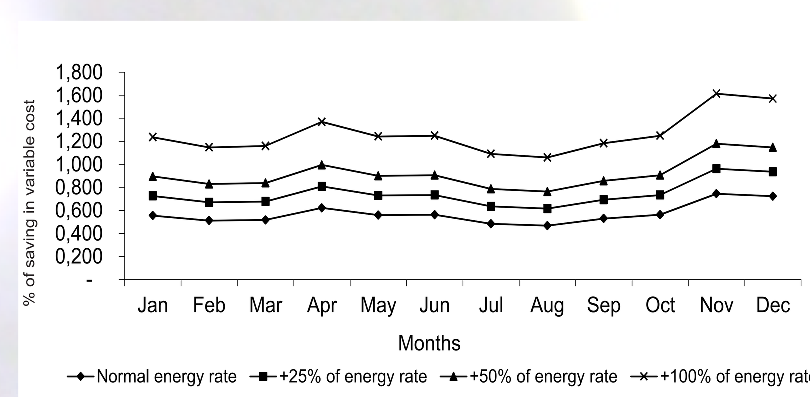

Figure 3. Percent saving in variable cost considering application of the depth required to obtain maximum economic yield in relation to the depth required to obtain maximum physical performance. UFLA Lavras / MG, 2008.

Month	Seasonal Price Index	Py R\$.kg^{-1}	P_w R\$.$liter^{-1}$			
			0.000084	0.000105	0.000125	0.000167
			----Water economic depth (liters.$plant^{-1}$)---			
Jan	1.01	0.38	227.73	227.34	226.95	226.17
Feb	1.08	0.41	227.83	227.47	227.10	226.37
Mar	1.07	0.41	227.82	227.45	227.08	226.35
Apr	0.92	0.35	227.58	227.15	226.72	225.87
May	1.01	0.38	227.72	227.33	226.94	226.16
Jun	1.00	0.38	227.71	227.32	226.93	226.14
Jul	1.13	0.43	227.89	227.55	227.20	226.50
Aug	1.16	0.44	227.93	227.59	227.25	226.57
Sep	1.05	0.40	227.79	227.41	227.04	226.29
Oct	1.00	0.38	227.71	227.32	226.93	226.14
Nov	0.79	0.30	227.30	226.80	226.30	225.30
Dec	0.81	0.31	227.34	226.86	226.37	225.40

Table 1. Irrigation strategies (W) with different combinations of product price (Py) and water price (Pw) in four electricity prices

Conclusion

The highest yield was estimated by applying 229 liters of water, and maximum economic efficiency by applying 227 liters. Variation in price (Pw / Py), considering the seasonal index price and increase in power price, did not proportionally influence the depth recommended to achieve maximum economic efficiency.

References

FRIZZONE, J. A.; ANDRADE JÚNIOR, A. S. **Planejamento de irrigação**: análise de decisão de investimento. Brasília, DF: Embrapa Informação Tecnológica, 2005.

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