Agricultural Water Management

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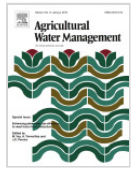
Enhancing plant water use efficiency to meet future food production



Linking thermal imaging to physiological indicators in *Carica papaya* L. under different watering regimes ☆

R.S.N Lima[a, b], I. García-Tejero[c], , T.S. Lopes[d], J.M. Costa[e], M. Vaz[a], V.H. Durán-Zuazo[c], M. Chaves[e], D.M. Glenn[f], E. Campostrini[d]

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Highlights

- We examined the feasibility of thermal imaging to assess the papaya water status.
- Relationships were obtained between leaf temperature and gas exchange measurements.
- Threshold values of leaf temperature were obtained according to these relations
- The optimum ranges of the difference of leaf to air temperature were defined.
- Thermal imaging can be used for irrigation scheduling and water stress monitoring.

Abstract

Water deficit is the most limiting factor for yield and fruit-quality parameters in papaya crop (*Carica papaya* L.), deficit-irrigation (DI) strategies offering a feasible alternative to manage limiting water resources. When DI is applied, it is crucial to assess the physiological status of the crop in order to maintain the plant within a threshold value of water stress so as no to affect yield or fruit-quality parameters. The aim of this work was to evaluate the feasibility of thermal imaging in young papaya plants to assess the physiological status of this crop when it is subjected to different DI regimes, studying the relationships between the changes in leaf temperature (T_{leaf}) and in the major physiological parameters (*i.e.,* stomatal conductance to water vapor, g_s; transpiration, E; and net photosynthesis, A_n). The trial was conducted in a greenhouse from March to April of 2012. Plants were grown in pots and subjected to four irrigation treatments: (1) a full irrigation treatment (control), maintained at field capacity; (2) a partial root-zone drying treatment, irrigated with 50% of the total water applied to control to only one side of roots, alternating the sides every 7 days; (3) a regulated deficit irrigation (50% of the control, applied to both sides of plant); (4) and a non-irrigated treatment, in which irrigation was withheld from both sides of the split root for 14 days, followed by full irrigation until the end of the study. Significant relationships were found between T_{leaf} and major physiological

which were used to establish the optimum range of $\Delta T_{leaf-air}$ as crop-water monitoring and irrigation scheduling in papaya, usin

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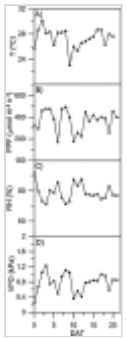

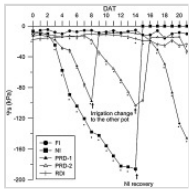

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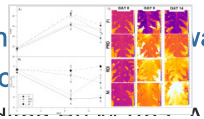

main source of information. According to the results, we conclu
a promising technique to monitor the physiological status of pap
conditions.

Keywords

Papaya; Thermography; Crop-water status monitoring; Deficit

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Corresponding author.

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Universidade Estadual do Norte Fluminense Darcy Ribeiro—UENF, Centro de Ciências e Tecnologias Agropecuárias—CCTA, Laboratório de Melhoramento Genético Vegetal—LMGV, Av. Alberto Lamego, 2000, CEP 28013-600 Campos dos Goytacazes, RJ, Brazil

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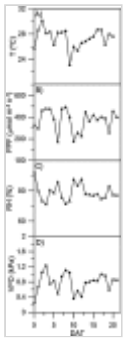

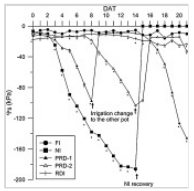

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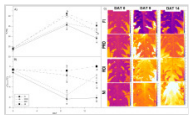

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E. Campostrini

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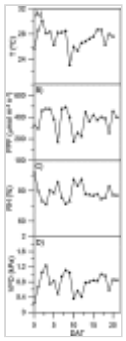

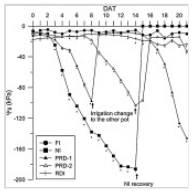

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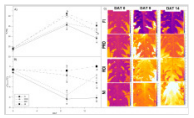

E. Campostrini

Universidade Estadual do Norte Fluminense Darcy Ribeiro—UENF, Centro de Ciências e Tecnologias Agropecuárias—CCTA, Laboratório de Melhoramento Genético Vegetal—LMGV, Av. Alberto Lamego, 2000, CEP 28013-600 Campos dos Goytacazes, RJ, Brazil

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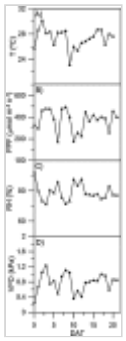

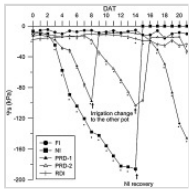

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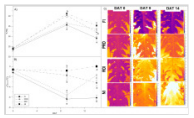

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