Assessing yield and water use efficiency of *Capsicum annuum* L. cultivated in a greenhouse under different irrigation strategies

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INTRODUCTION

The global production of peppers is 19 million tons of fresh fruits, being Asia the main producer (65%) followed by the Americas, Europe, Africa and Oceania (Jarret et al., 2019). Pepper crop is very susceptible to water deficit in the different development stages and, to obtain profitable production, requires between 406 and 534 mm of water in the whole cycle (Zheng et al., 2010).

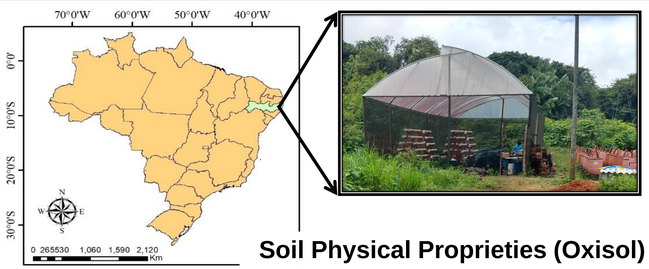
Several methodologies and techniques are available for irrigation management in protected environments, such as soil water content sensors, meteorological sensors, plant water status sensors and weighing lysimeters (Beeson, 2011; Casanova et al., 2009; Toyin et al., 2015). In addition, the partition of daily irrigation depth in different watering is a technique that can contribute to increase the water use efficiency (WUE) in horticultural crops (Rebouças Neto et al., 2017; Eid et al., 2013; Liu et al., 2012).

Despite the cultivation of vegetables in the greenhouse is largely present in the northeastern region of Brazil, not many research has been aimed at supporting growers for accurate irrigation management.

OBJECTIVES

To evaluate yield and WUE of *Capsicum annuum* L. cultivation in terms of a) the irrigation management technique used to define the daily depth and, b) the irrigation depth application strategy (single watering or split into two applications).

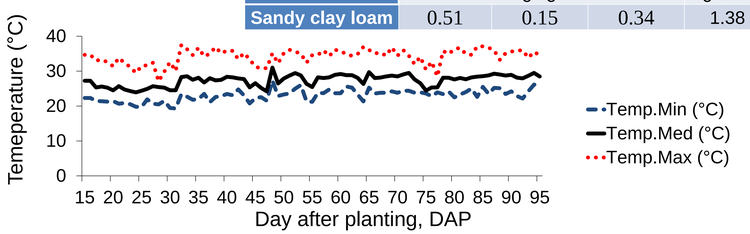
MATERIALS AND METHODS



Source: Almeida et al. (2020)

Soil Physical Proprieties (Oxisol)

Textural Class	Particle Size Analysis			Bulk density
	Sand	Silt	Clay	
	---------- g kg^{-1} ----------			g cm^{-3}
Sandy clay loam	0.51	0.15	0.34	1.38



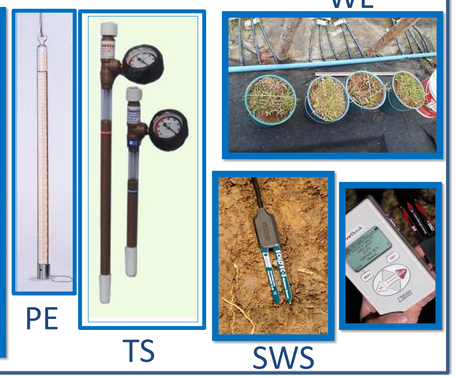
MATERIALS AND METHODS

IRRIGATION WATER MANAGEMENT

Atmospheric evaporative demand
- Weighing lysimeter (WL)
- Piché evaporimeter (PE)

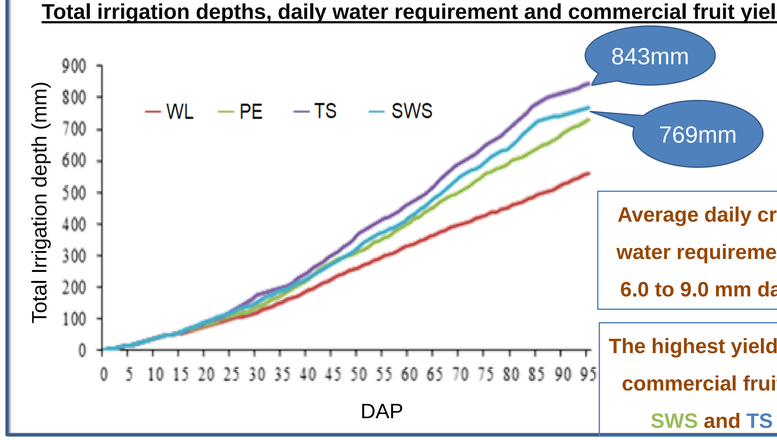
Soil
- Soil water content sensor EC-5 (SWS)
- Tensiometers (TS)

Photos: Authors



RESULTS

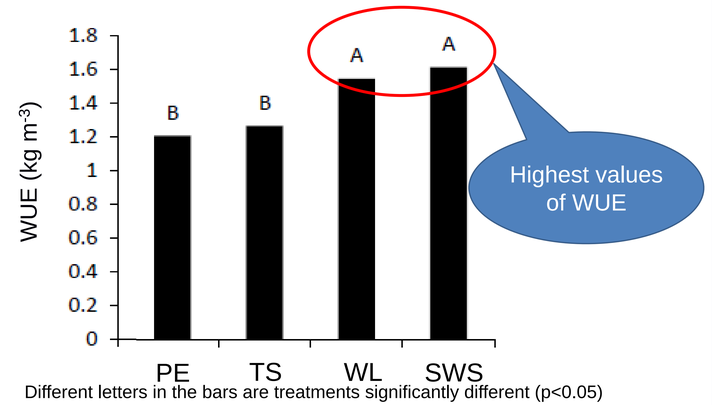
Total irrigation depths, daily water requirement and commercial fruit yield



Average daily crop water requirement: 6.0 to 9.0 mm day^{-1}

The highest yields of commercial fruits: SWS and TS

Water Use Efficiency of *Capsicum annuum* L. under four methodologies used to define irrigation depths.



Different letters in the bars are treatments significantly different (p<0.05)

Yield and WUE of *Capsicum annuum* L. under two irrigation depth application strategies (single watering or split into two applications).

Depth application	Yield (t ha^{-1})	WUE (kg m^{-3})
Continous	10.7 B	7.1 B
Splitting	12.6 A	9.2 A

The means with different letters in a column are significantly different (p<0.05)

Splitting daily water requirement into two watering resulted in the significant yield and WUE improvement.

CONCLUSIONS

- ✓ The highest values of commercial yield were obtained under irrigation depth based on Soil Water content Sensors (EC-5) and Tensiometers; while the highest values of WUE were achieved under irrigation depth based on Soil Water content Sensor (EC-5) and Weighing Lysimeter.
- ✓ Splitting the daily irrigation depth is a promising strategy to increase yield and water use efficiency for vegetable crops cultivated in protected environments.

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