AgriCom 2013 "International Symposium on Advances in Irrigation and Hydroponics"

Effect of irrigation regime on growth, flowering and water use of *Bougainvillea spectabilis*

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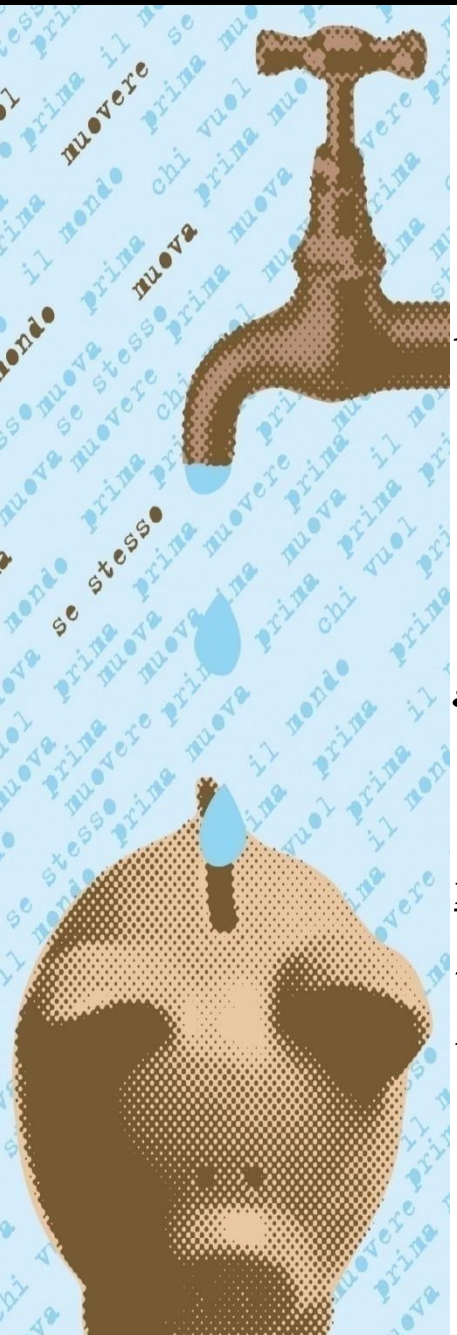
Background



THE NEED FOR WATER-SAVING

- **Reduction of water availability for irrigation use**

Anomalous rainfall and competition with other productive sectors (e.g. industry, tourism)

- **Reduction of water quality available for irrigation**

Salinization due to climate changes and overuse of groundwater resources

- **High irrigation requirements for ornamental and nursery productions**

Low water use efficiency due to empirical management of irrigation, use of open system (currently more than 90% of ornamental and nursery production in Mediterranean countries), obsolete irrigation system and poorly retentive substrates

APPROCHES FOR WATER-SAVING

Technology

- ***Drip irrigation systems***

Management of nutrient solution

- ***Minimization of runoff in open systems (issues with salts accumulation in substrate)***
- ***Recycling of the drainage solution (closed systems)***

Optimization of crops water use efficiency

- ***Achievement of drought tolerance through moderate water stress***

Background

ACHIEVEMENT OF DROUGHT TOLERANCE THROUGH MODERATE WATER STRESS

Effects of regulated deficit irrigation on ornamental crops:

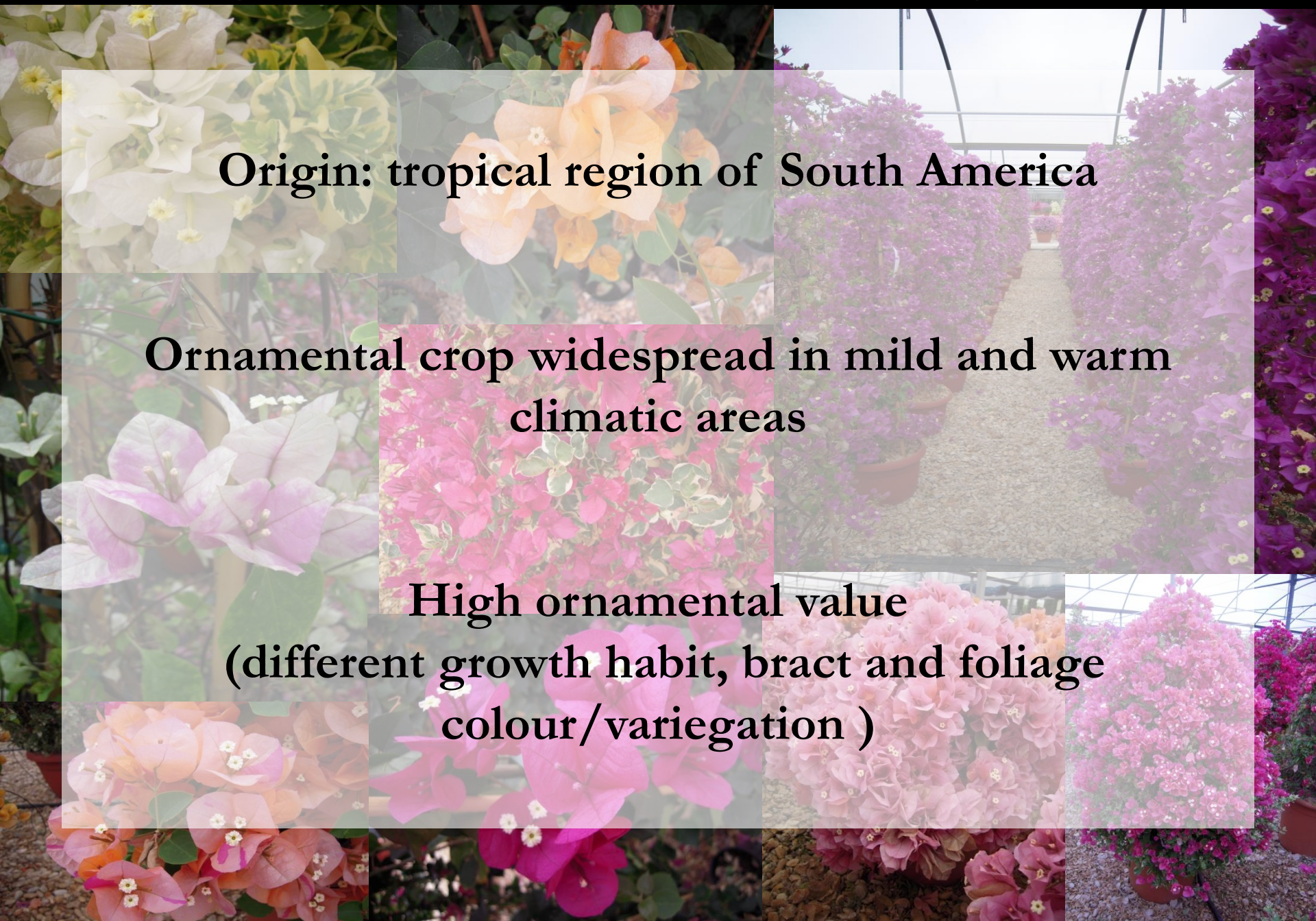
- **Compact plant habit (substitution of plant growth retardants)**
- **Flowering regulation**
- **Higher water use efficiency**
- **Improvement of performance in post-production**
- **Tolerance to storage and shipping conditions (drought and darkness causing leaf and flower abscission)**

Objective

Investigation about the effect of three irrigation regimes on growth, flowering, water use efficiency and post-production performance in Bougainvillea crop

MiPAAF Project "Tecnologie di filiera per il controllo della tolleranza a stress idrico in Bougainvillea"(D.M. 11053/7643/09 of 7 May 2009).
"Technologies for drought tolerance in Bougainvillea"

Bougainvillea Comm. ex Juss. (Nyctaginaceae)



Origin: tropical region of South America

Ornamental crop widespread in mild and warm climatic areas

High ornamental value (different growth habit, bract and foliage colour/variegation)

Materials & Methods

Bougainvillea spectabilis Willd. "Fucsia colour"

vivai torsanlorenzo

Materials & Methods

- 3 irrigation regimes: 100%, 60% and 40% of daily water use

- Drip irrigation system (drippers 8, 6 and 2 L h^{-1})

- Plastic pots (20 cm Ø)

- Substrate: peat/pumice (2:1 v/v)

- Fertilization at planting and during the growth cycle

DAILY WATER USE (DWU)
Water required to bring the substrate to container capacity plus 15% of runoff

Materials & Methods

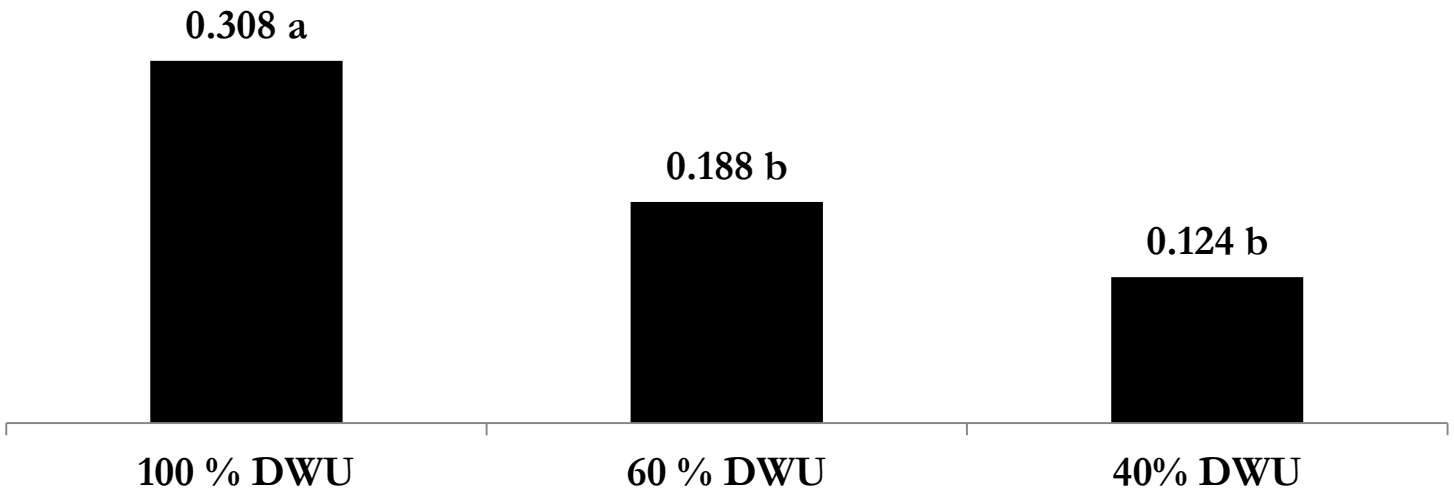
- Biometric measurements
- Chlorophyll index with SPAD
- Leaf water potential (Ψ)
- Water use efficiency (WUE)
(aboveground dry biomass/water consumption)
- Water consumption through gravimetrical method

60% DWU treatment did not reduce growth and flowering

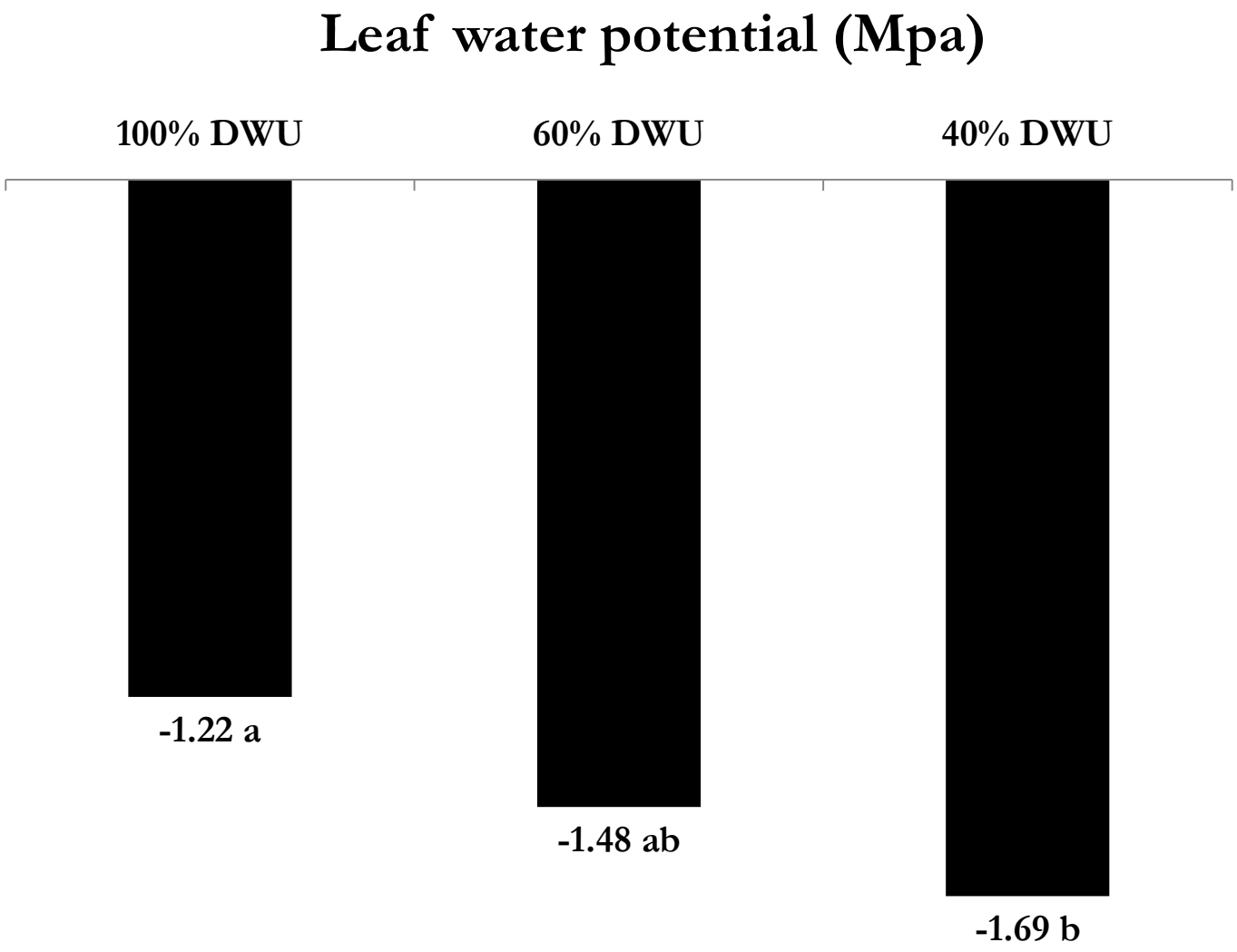
Dry biomass production (g plant^{-1})

Treatment	Leaf	Stem	Inflorescence	Total aboveground biomass
100% DWU	24.1 a	140.3 a	22.7 a	187.1 a
60% DWU	16.9 ab	124.1 a	23.5 a	164.5 a
40% DWU	10.8 b	64.1 b	13.1 b	88.0 b
Significance	*	**	**	***

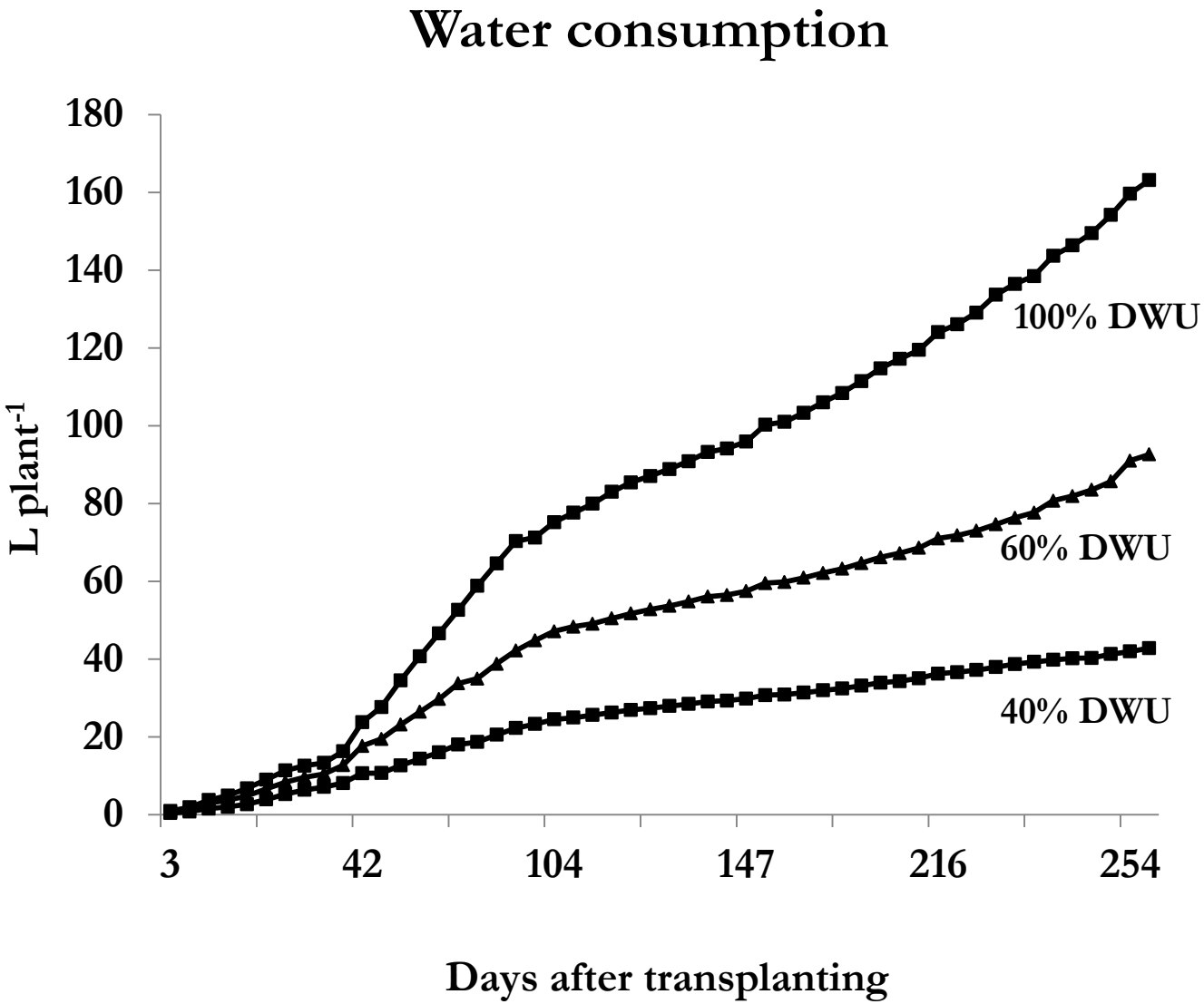
Total leaf area (m^2 plant^{-1})



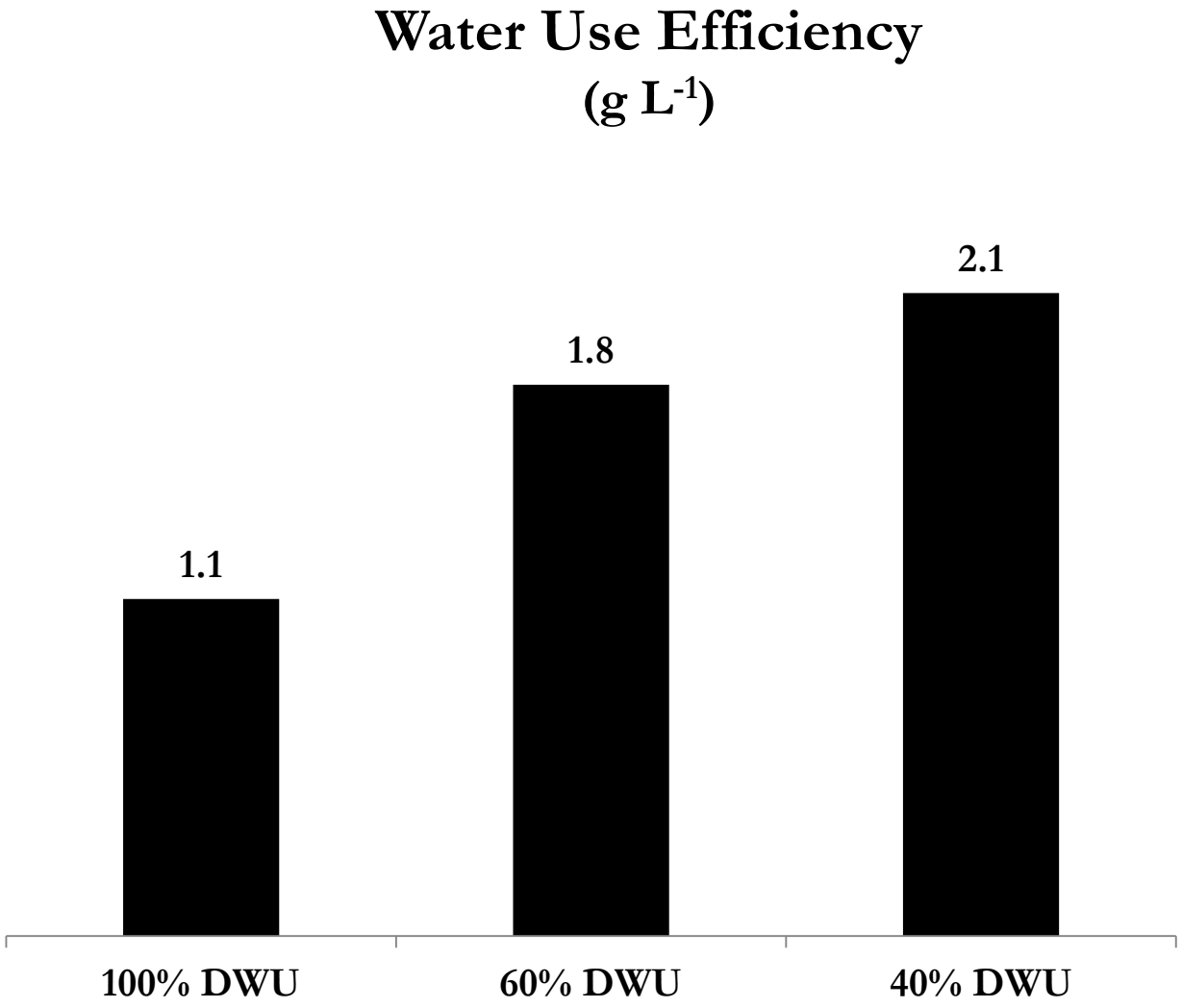
Ψ decreased with limited irrigation regimes



↑ irrigation regime = ↑ water consumption



Crop WUE improved with water stress



Post-production evaluation of plants performance

At the end of the experiment plants were moved to a closed container in order to simulate storage and shipping conditions (darkness and drought)

Leaves and inflorescences number was recorded weekly for 21 days in order to evaluate the abscission rate

Treatment	Number of inflorescences		
	7 days	14 days	21 days
100% DWU	53.00	26.60 b	7.40 b
60% DWU	118.17	85.00 a	55.33 a
40% DWU	159.60	93.20 a	60.20 a
Significance	ns	*	*

Conclusions

An irrigation regime based on 60% of daily water use can be recommended for potted production of Bougainvillea

Reduction of water consumption

No detrimental effect on plant growth and flowering

60% DWU

Improvement of tolerance to storage and shipping conditions

Increase of water use efficiency

Acknowledgments

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