

The effect of seed coating technology on physio-morphological characteristics of Lucerne (*Medicago sativa*) seedlings

Leana Nel¹, Dr Wayne Truter¹, Dr Nicolette Taylor¹,
Lucas Swart²

¹Department Plant Production and Soil Science, University of Pretoria, Pretoria

²Advance Seed, Krugersdorp



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Introduction: Salinity

- Accumulation of soluble mineral salts
 - Arid and Semi-arid regions – Precipitation doesn't overcome evaporative losses, leaving dissolved salts behind in the soil
 - Irrigation – add salts through water and
 - Movement of salt containing water through soil



Introduction: Salinity

- Lucerne has a very high salinity tolerance
- Will only stop growing when salt concentration reaches between 400 and 500mM NaCl

Osmotic stress
Rapid
decrease in leaf size

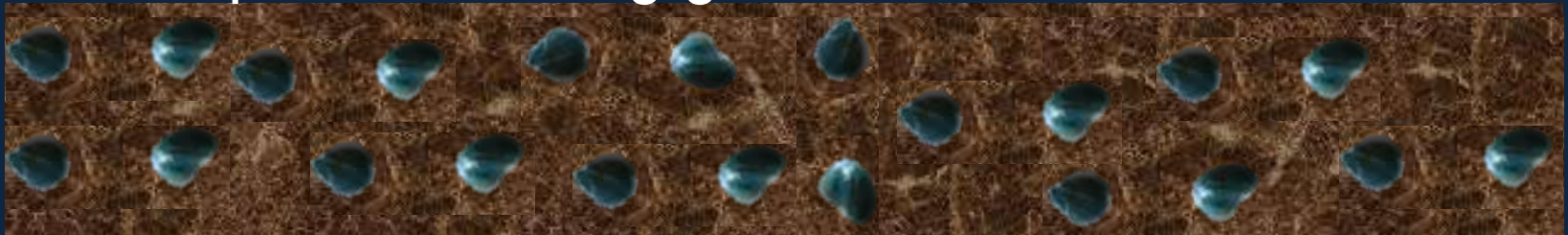


Ionic stress
Slow
leaf death



Introduction: Seed coating

Manipulate soil conditions with coated seed
→ improve seedling growth



↓
Nutrient
Status

↓
Disease
prevention

↓
Improve
Biological
Status

↓
Change the effect of
 T° and H_2O on
Germination



Problem Statement



- Soil salinity is a global concern influencing food security
 - causing decreases in productivity
- Lucerne is important protein source for game and beef industry
 - mostly produced under irrigation
- Growth parameters easily change when faced with environmental challenges
 - to adapt and overcome the limitations of a sessile lifestyle



Aims and Objectives

General Aims :

- Increase the lucerne production affected by saline conditions
- Rehabilitate saline soils planted to lucerne

My aims:

- Determine if seed coating will cause differences in seedling establishment
- Determine if salinity and seed coating will influence the growth and development of lucerne seedlings.



Methods

- Sandy loam soil fertilized with 50 kg P .ha⁻¹ and 250 kg K .ha⁻¹ mixed to 25 out of 30cm deep
- 2 lucerne cultivars (SA Standard and SuperCuf)
- 2 coatings (coated and non-coated)
- 5 reps
- 5 seeds planted – reduced to 1 seedling after 1 week
- Irrigated with 180, 500 and 750 $\mu\text{S}\cdot\text{cm}^{-1}$ water treatments
- Harvested at 20 days, 25 days, 30 days, 35 days



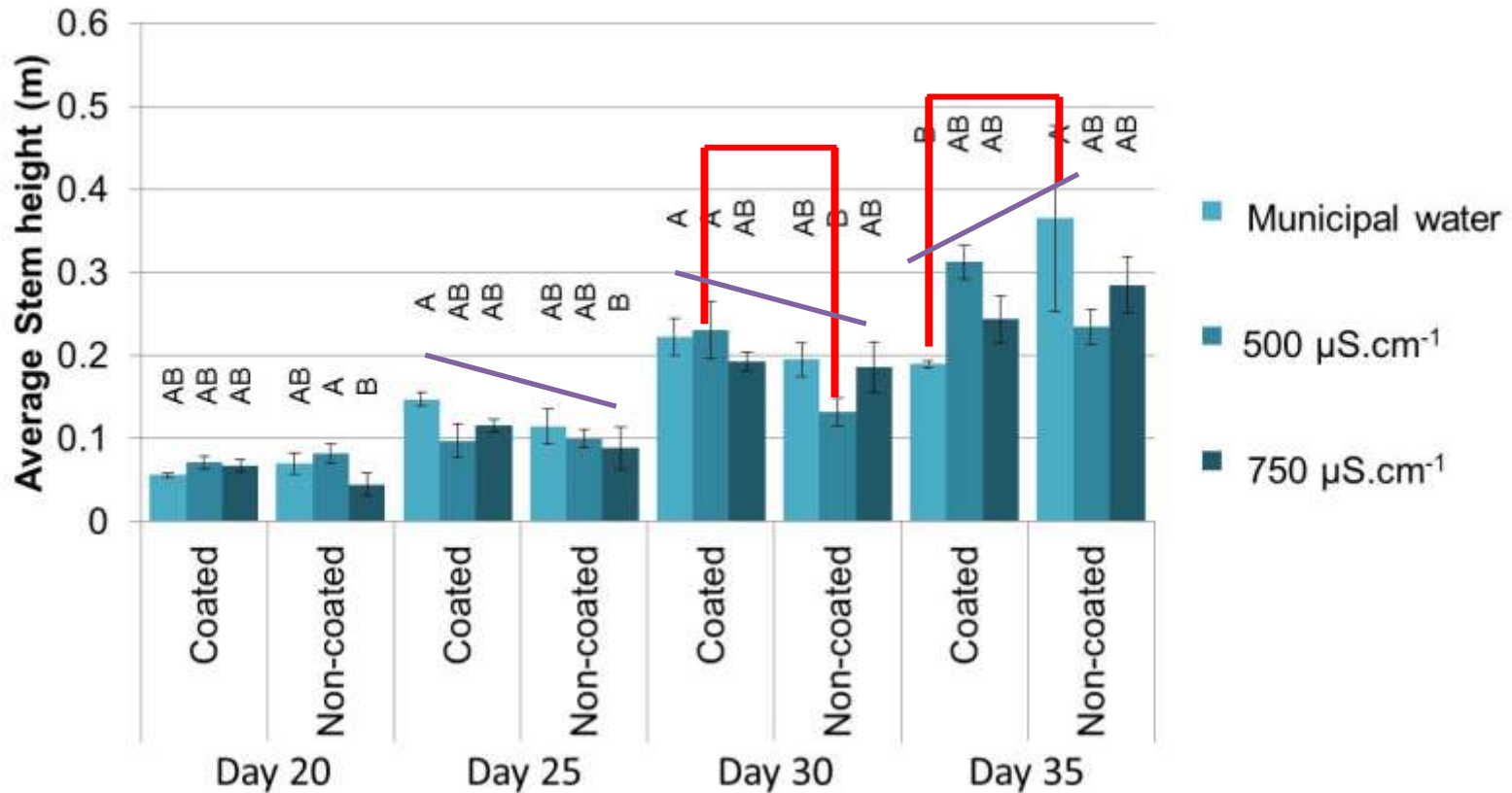
Methods

- Measurements:
 - Height of primary stem
 - # of trifoliate/multifoliate leaves
 - Leaf area
 - (using Adobe® Photoshop®)
 - Shoot DM



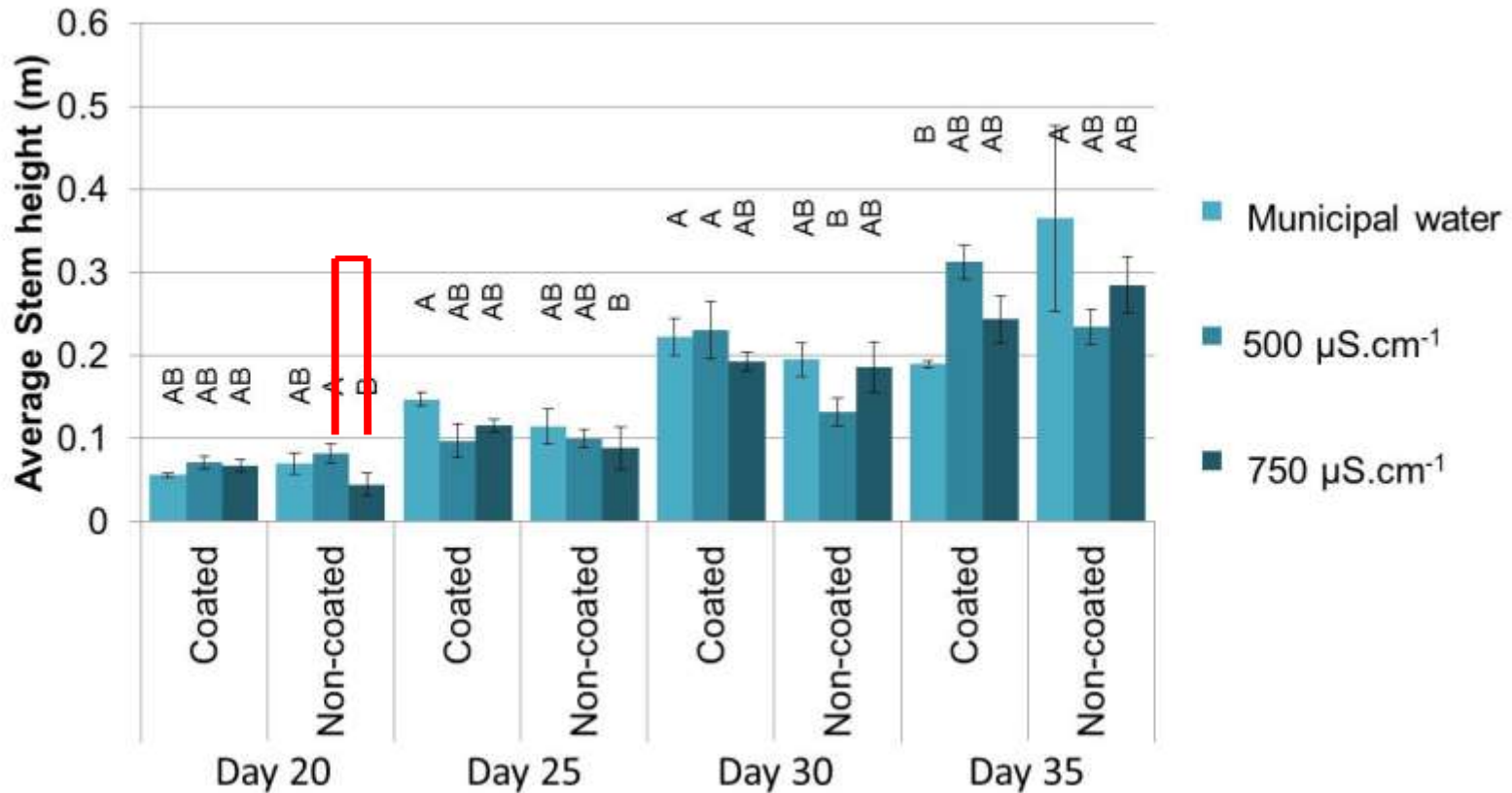
Results: Stem Height (SA Standard)

Coated vs Non-coated



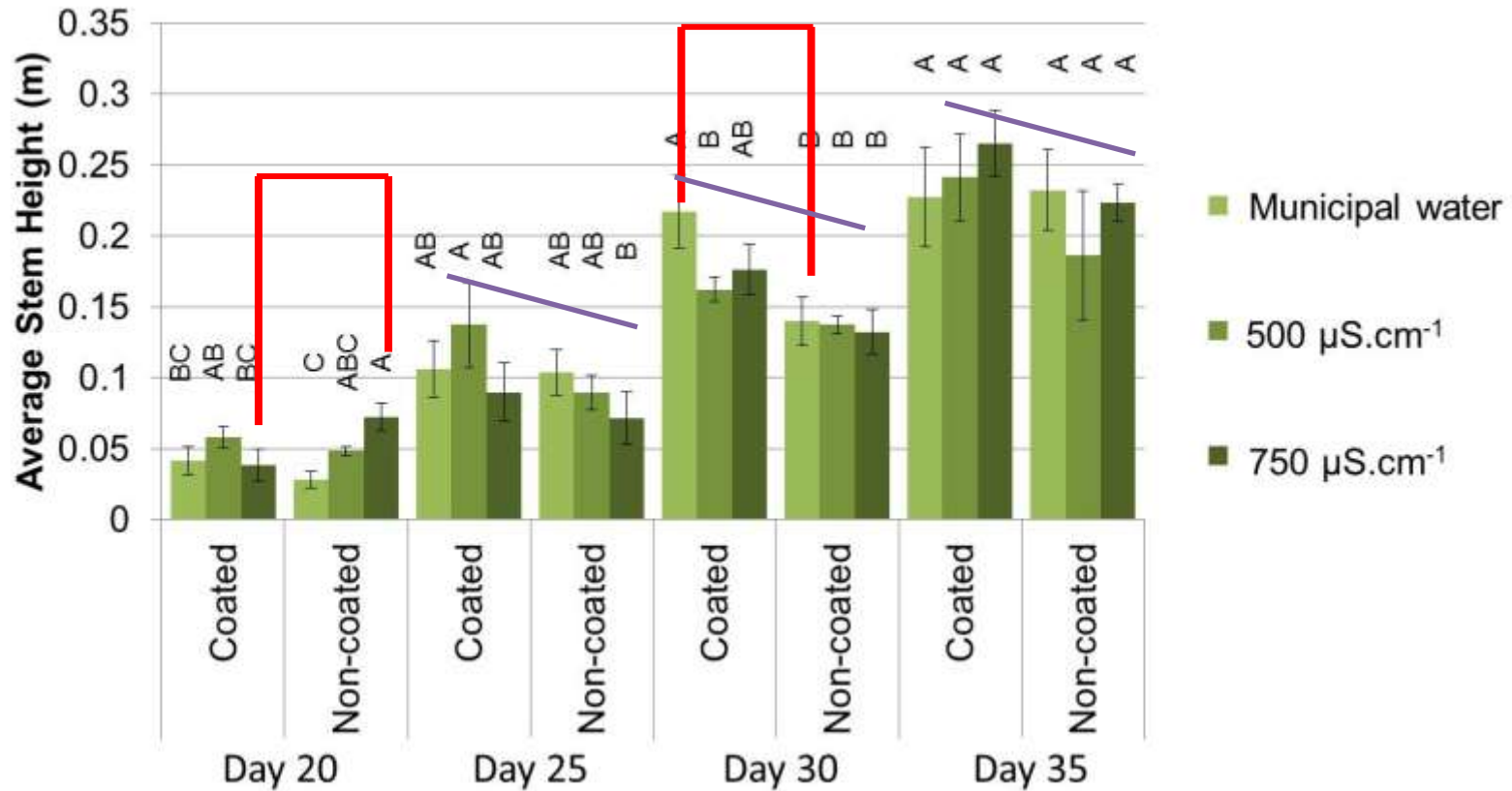
Results: Stem Height (SA Standard)

Salinity effects



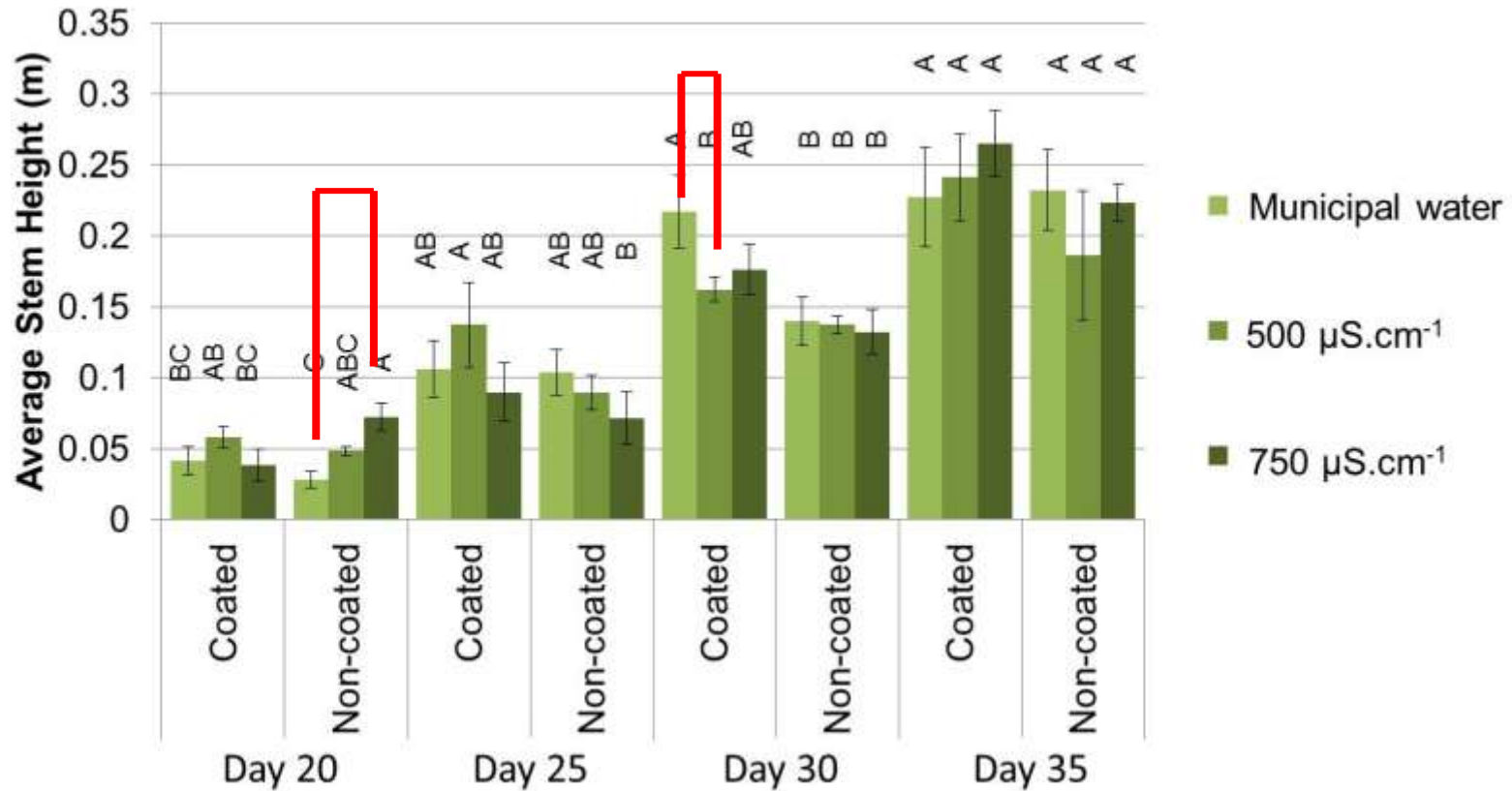
Results: Stem Height (SuperCuf)

Coated vs Non-coated



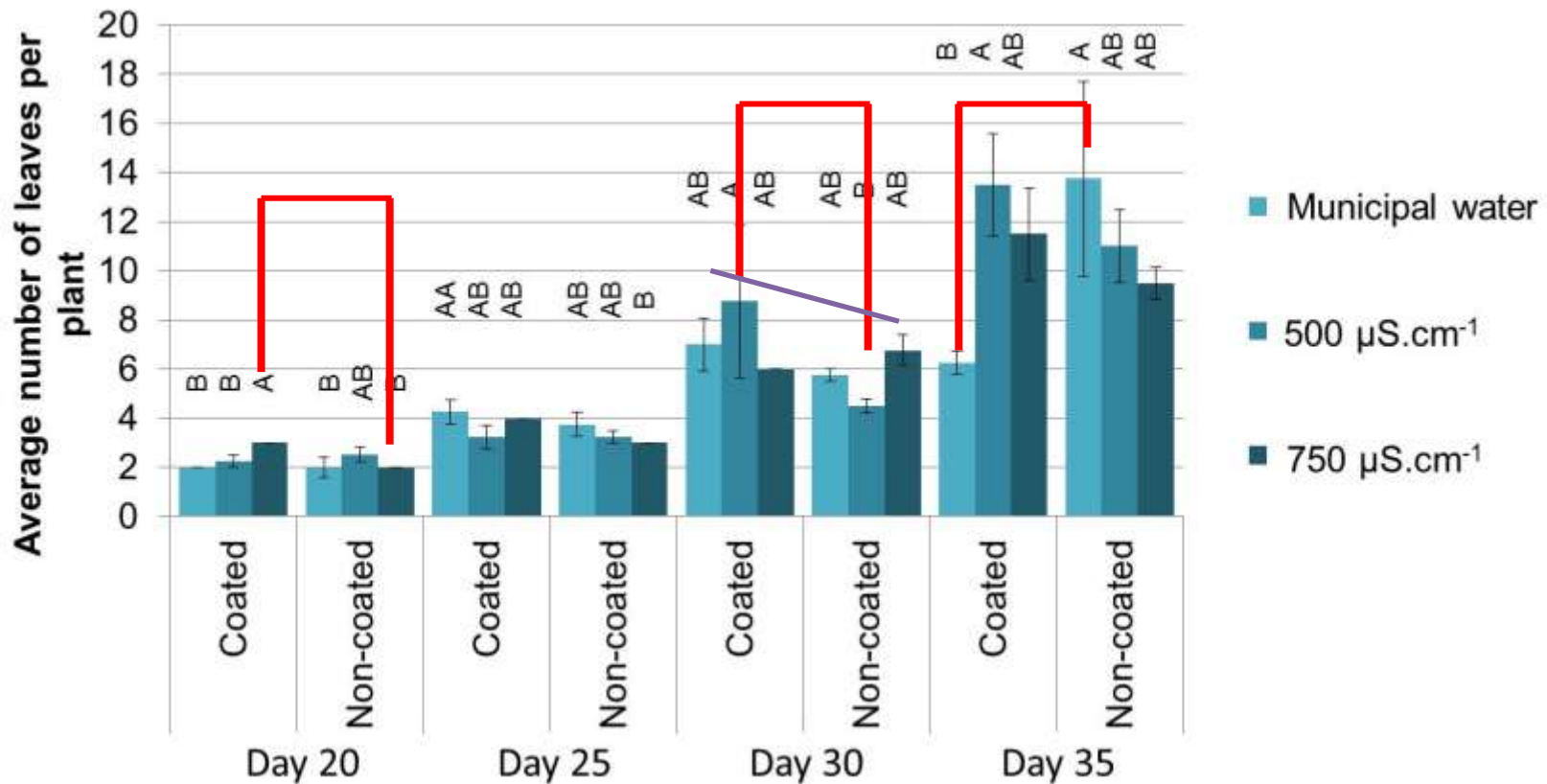
Results: Stem Height (SuperCuf)

Salinity effects



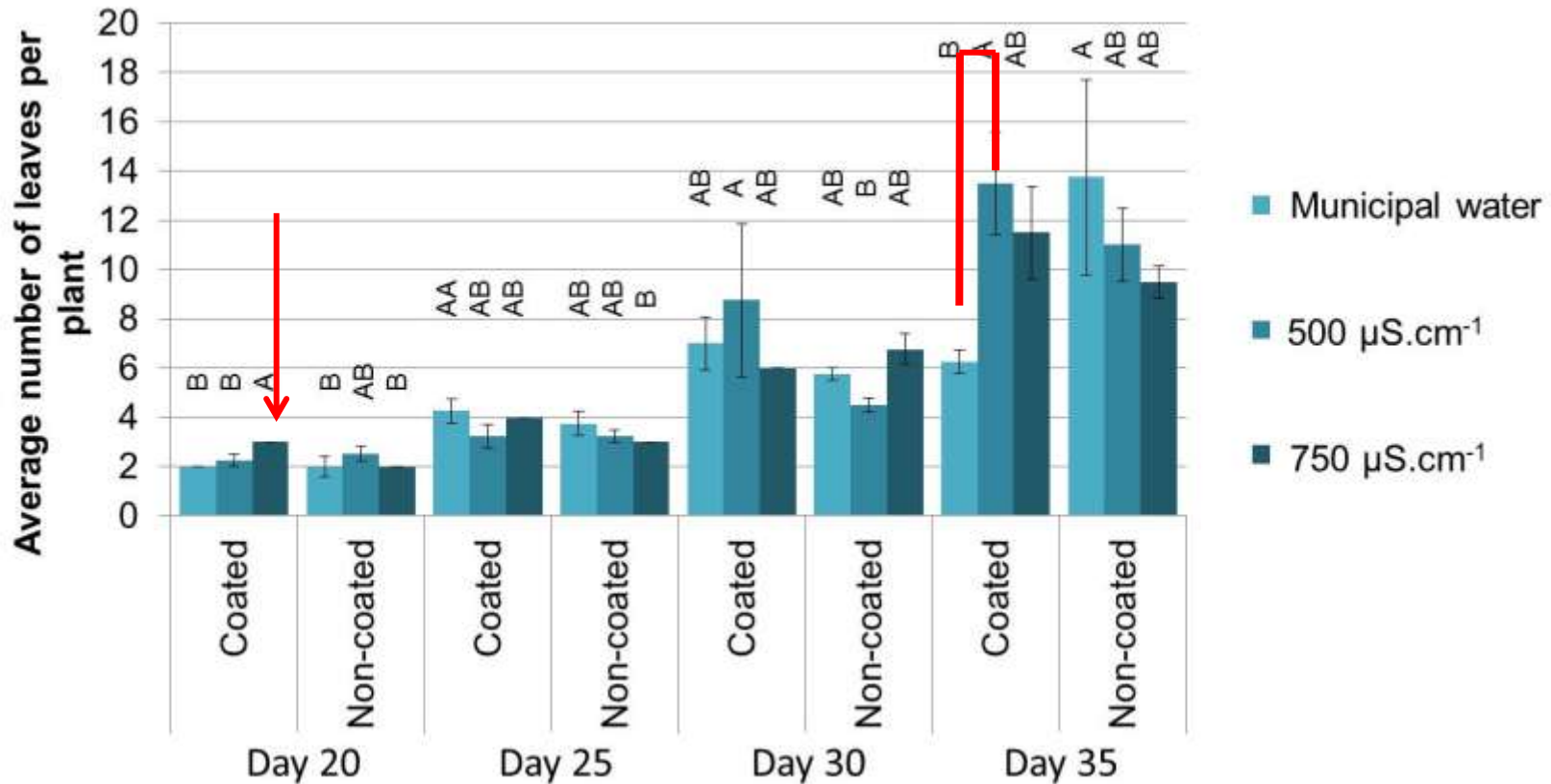
Results: # of leaves (SA Standard)

Coated vs Non-coated



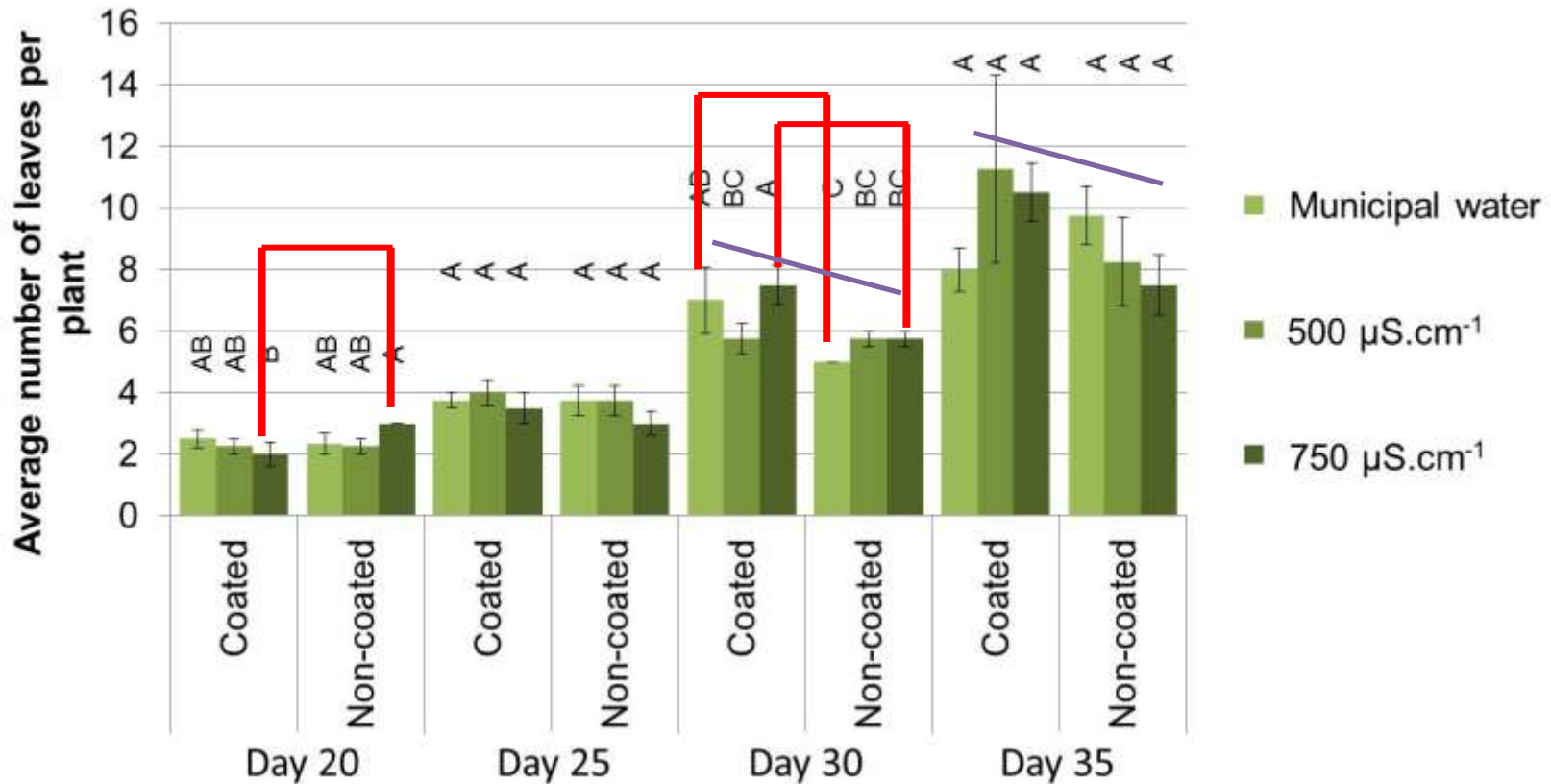
Results: # of leaves (SA Standard)

Salinity effects



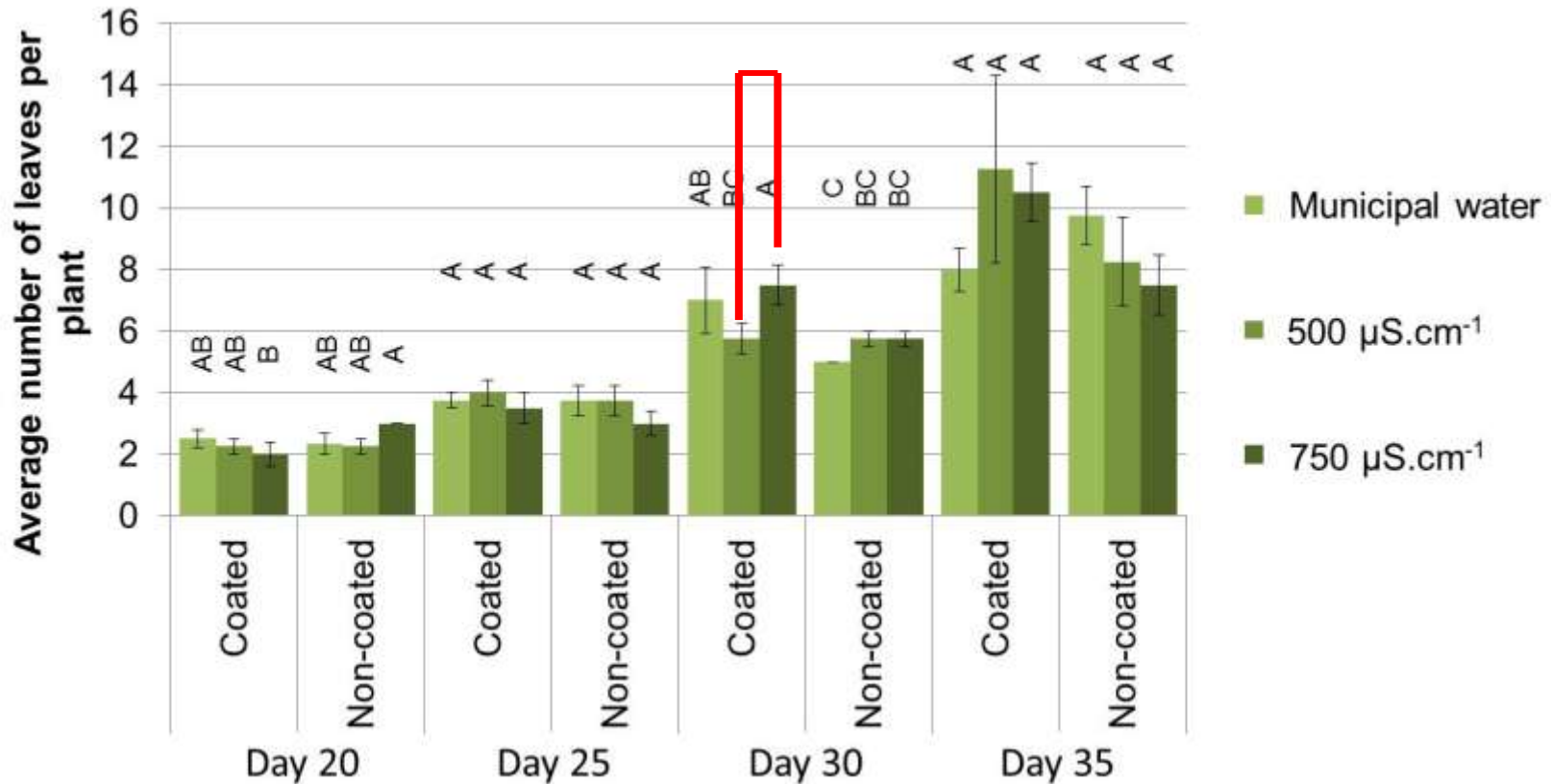
Results: # of leaves (SuperCuf)

Coated vs Non-coated



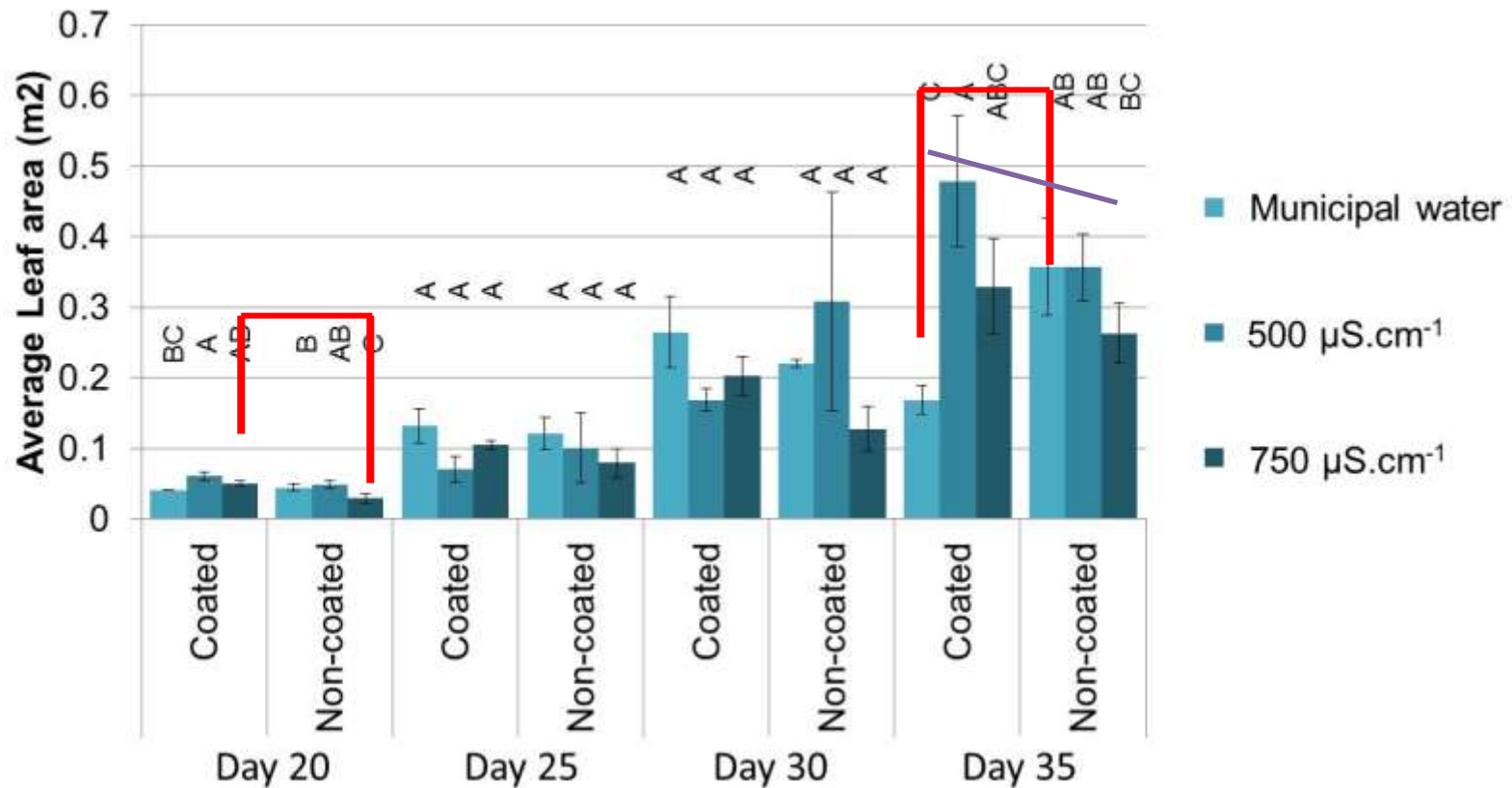
Results: # of leaves (SuperCuf)

Salinity effects



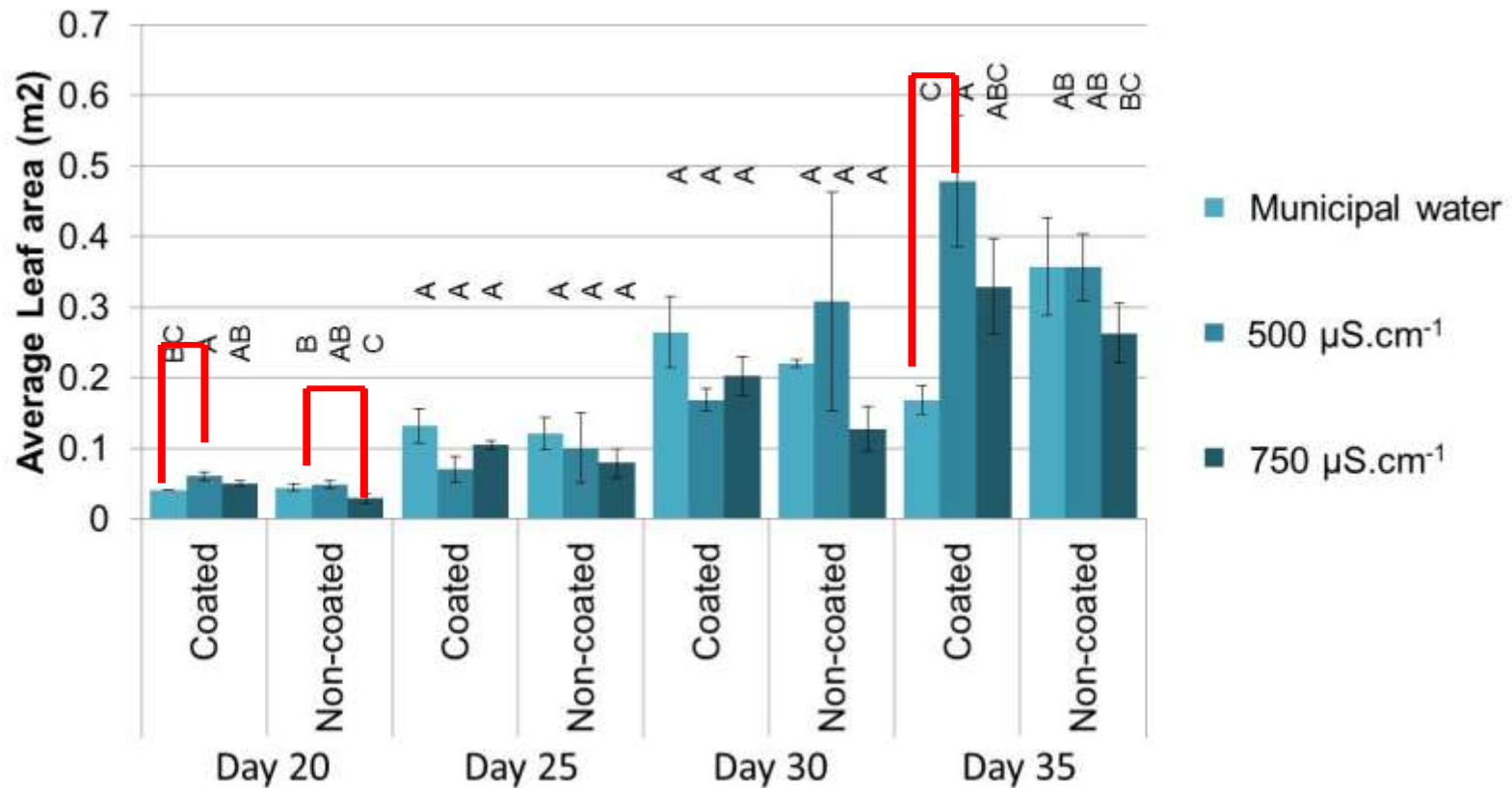
Results: Leaf area (SA Standard)

Coated vs Non-coated



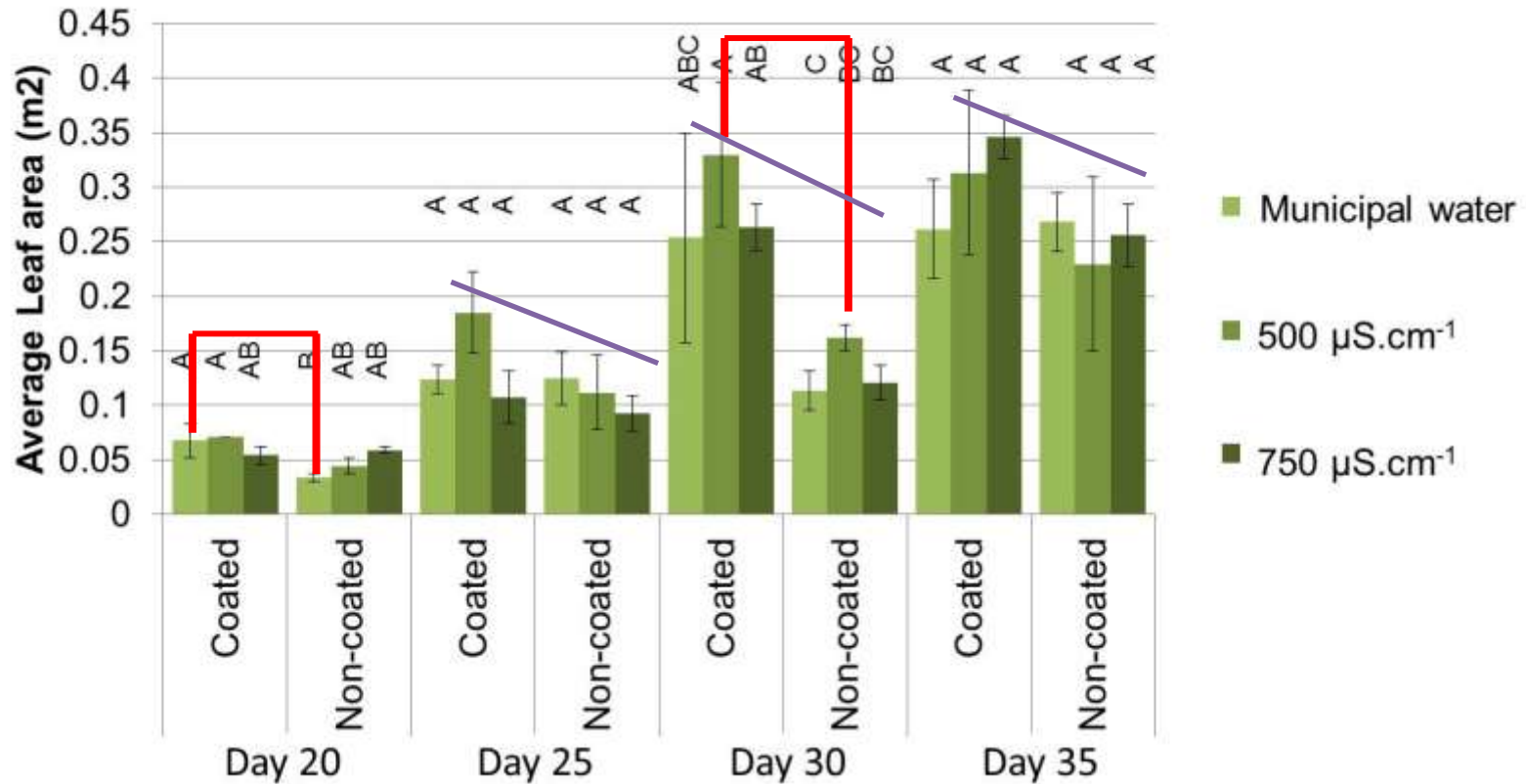
Results: Leaf area (SA Standard)

Salinity effects



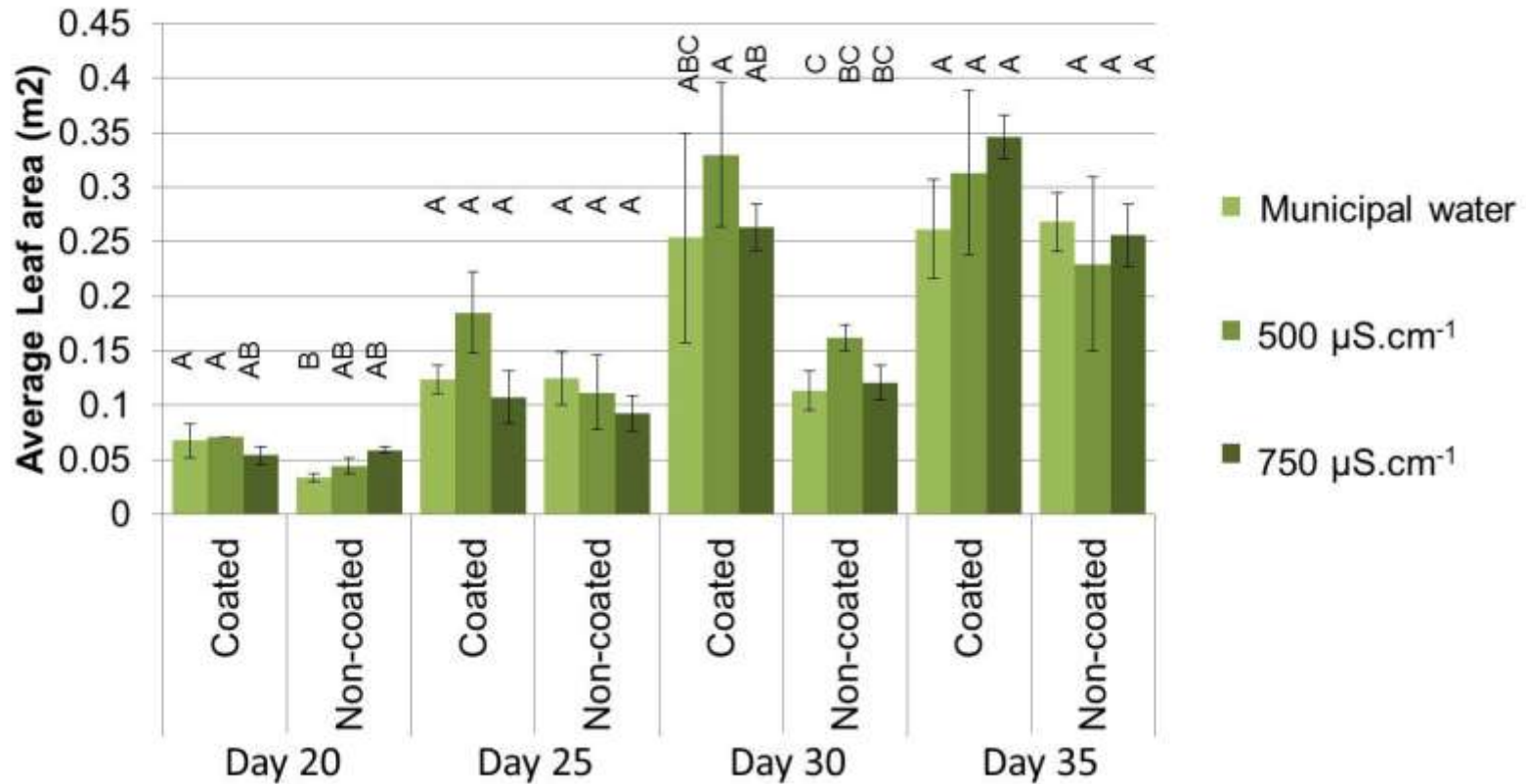
Results: Leaf area (SuperCuf)

Coated vs Non-coated



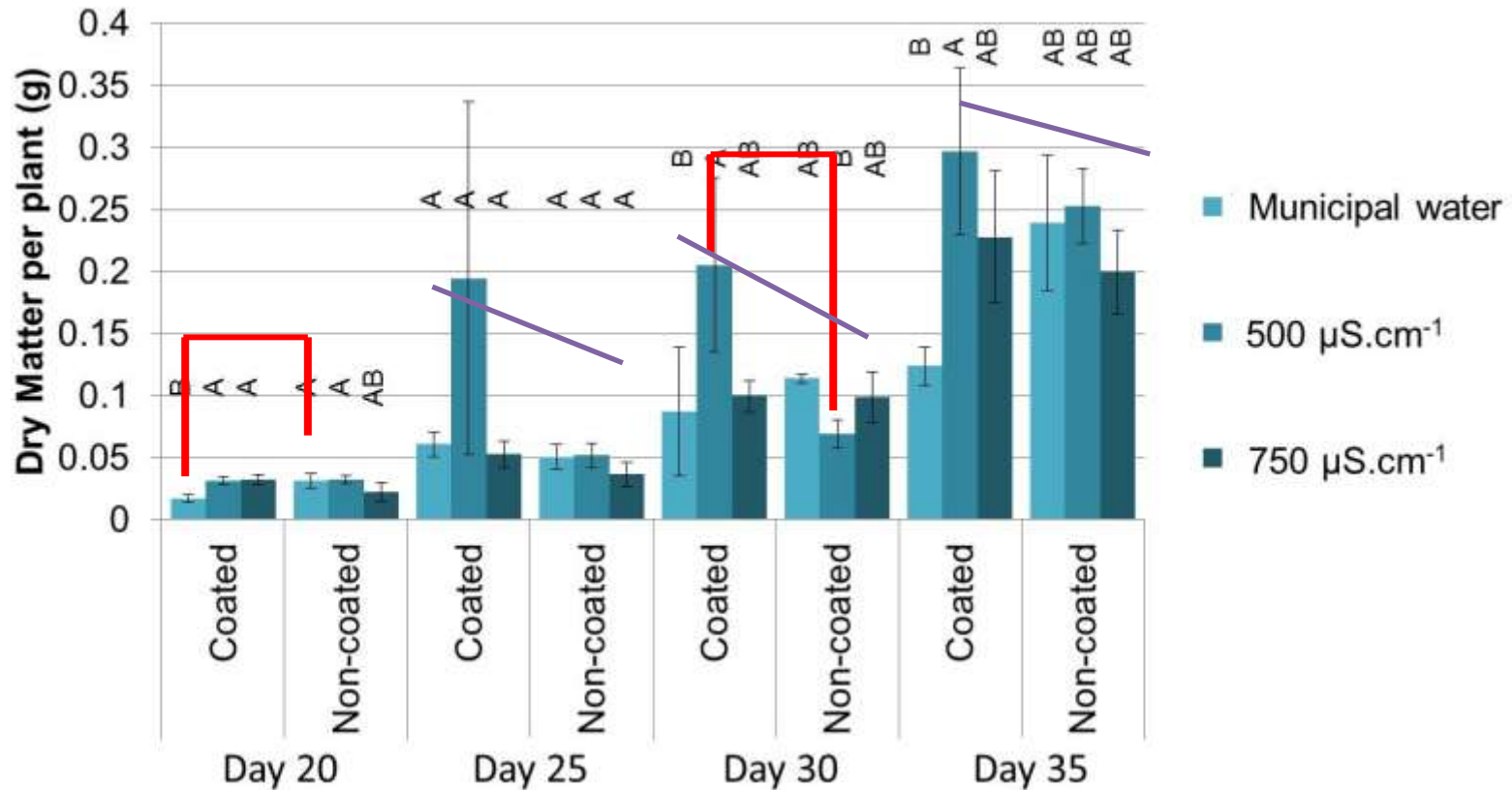
Results: Leaf area (SuperCuf)

Salinity effects



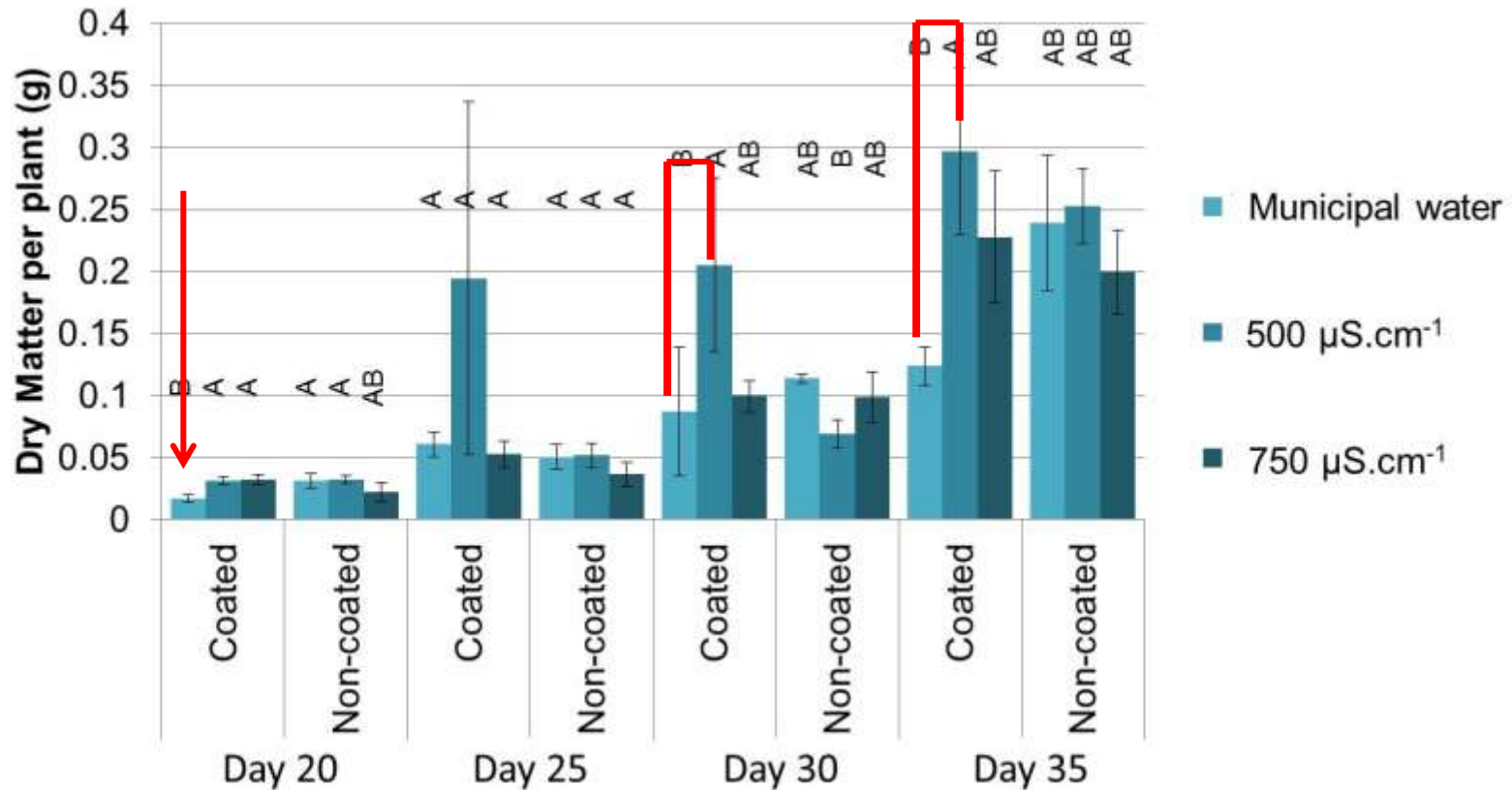
Results: DM (SA Standard)

Coated vs Non-coated



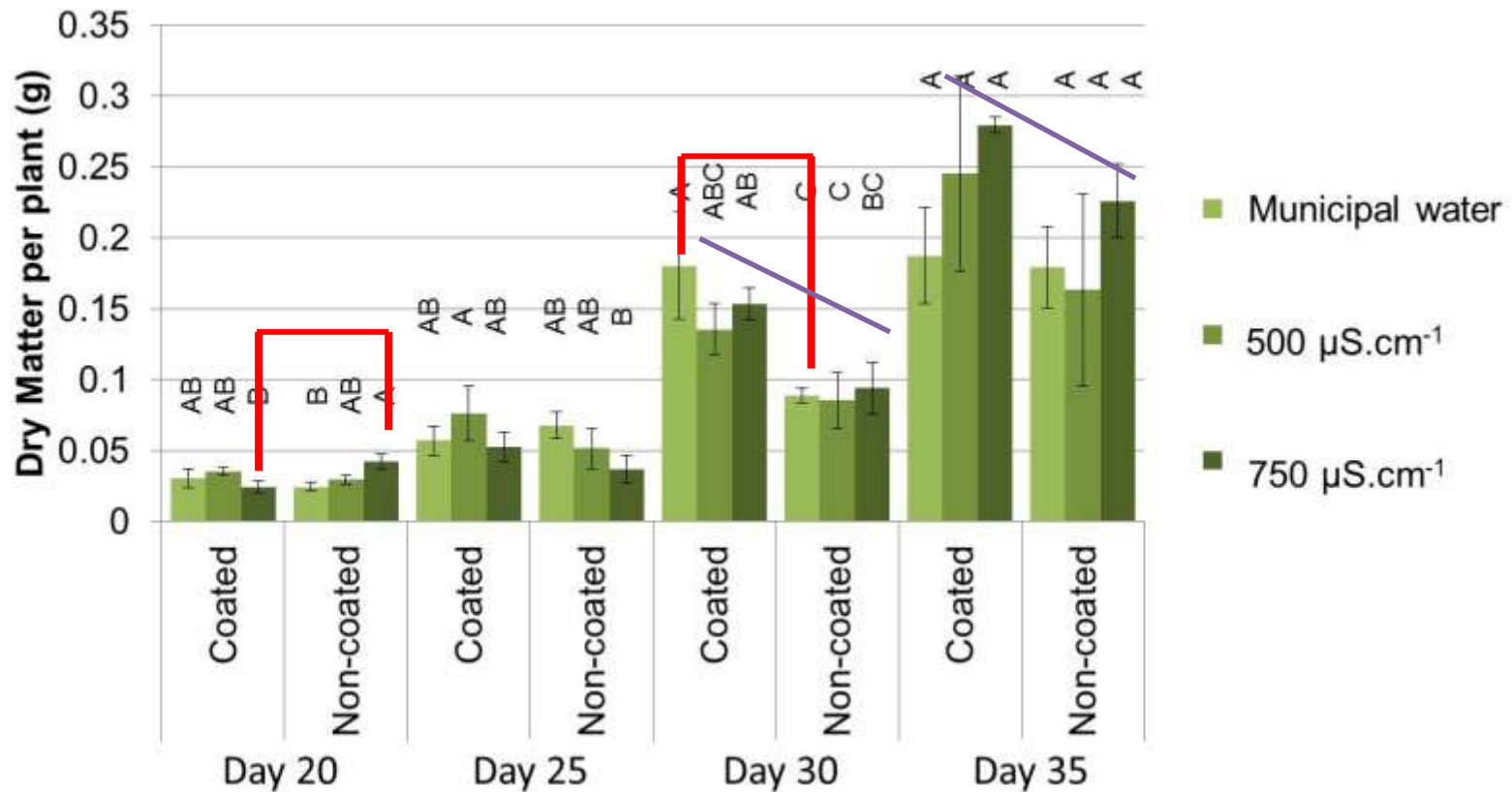
Results: DM (SA Standard)

Salinity effects



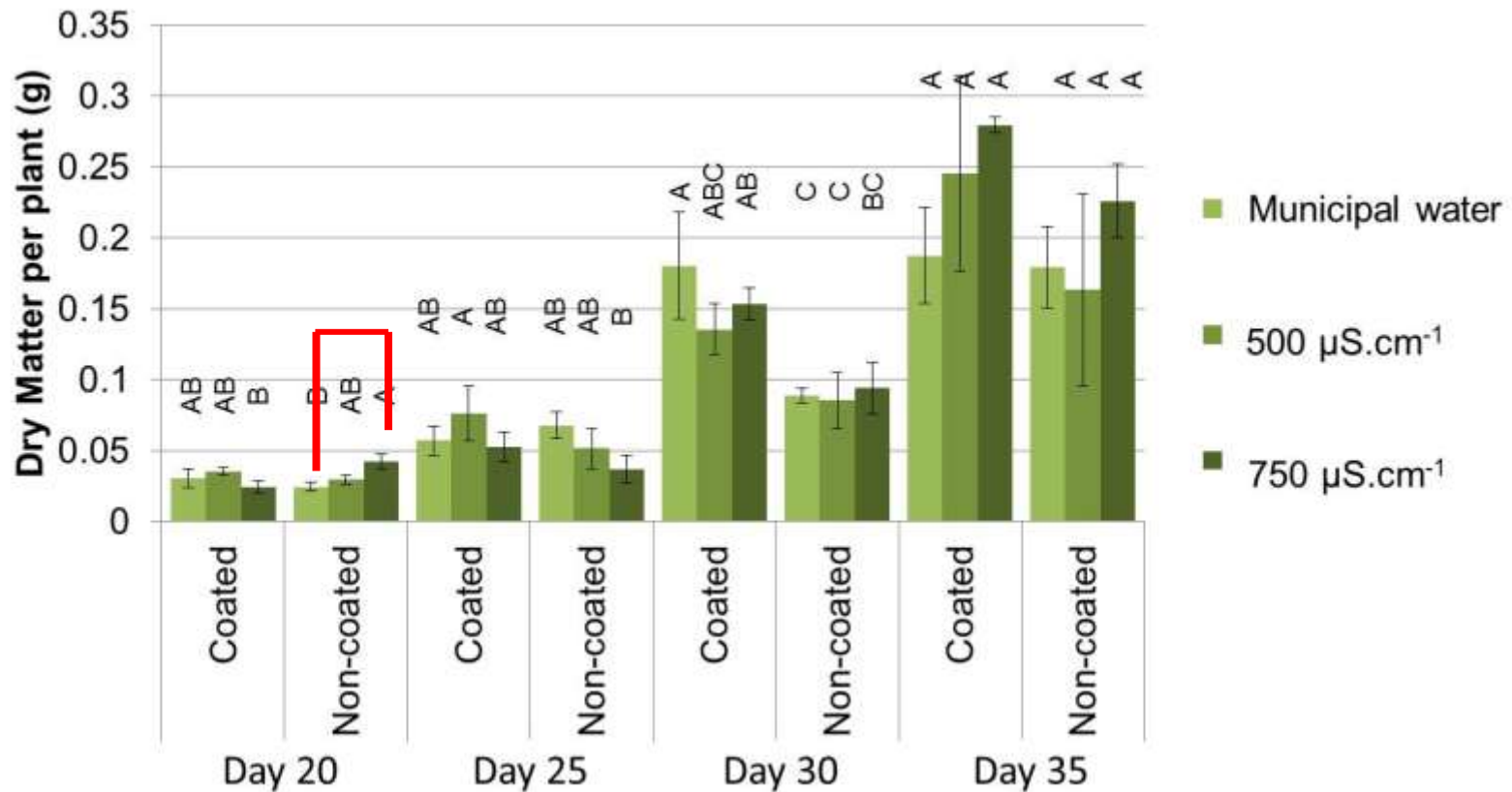
Results: DM (SuperCuf)

Coated vs Non-coated

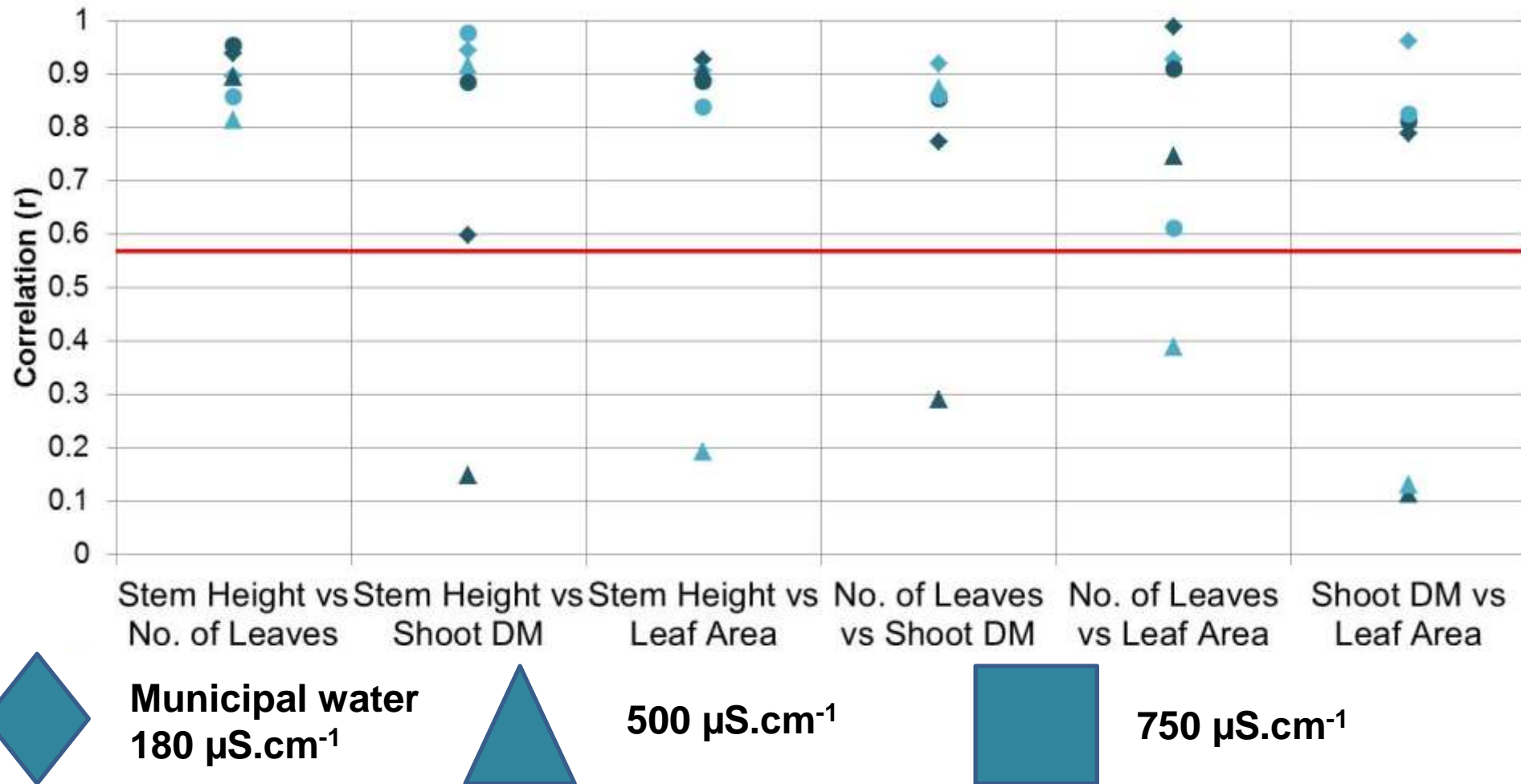


Results: DM (SuperCuf)

Salinity effects



Results: Correlation (SA Standard)



Results: Correlation (SA Standard)

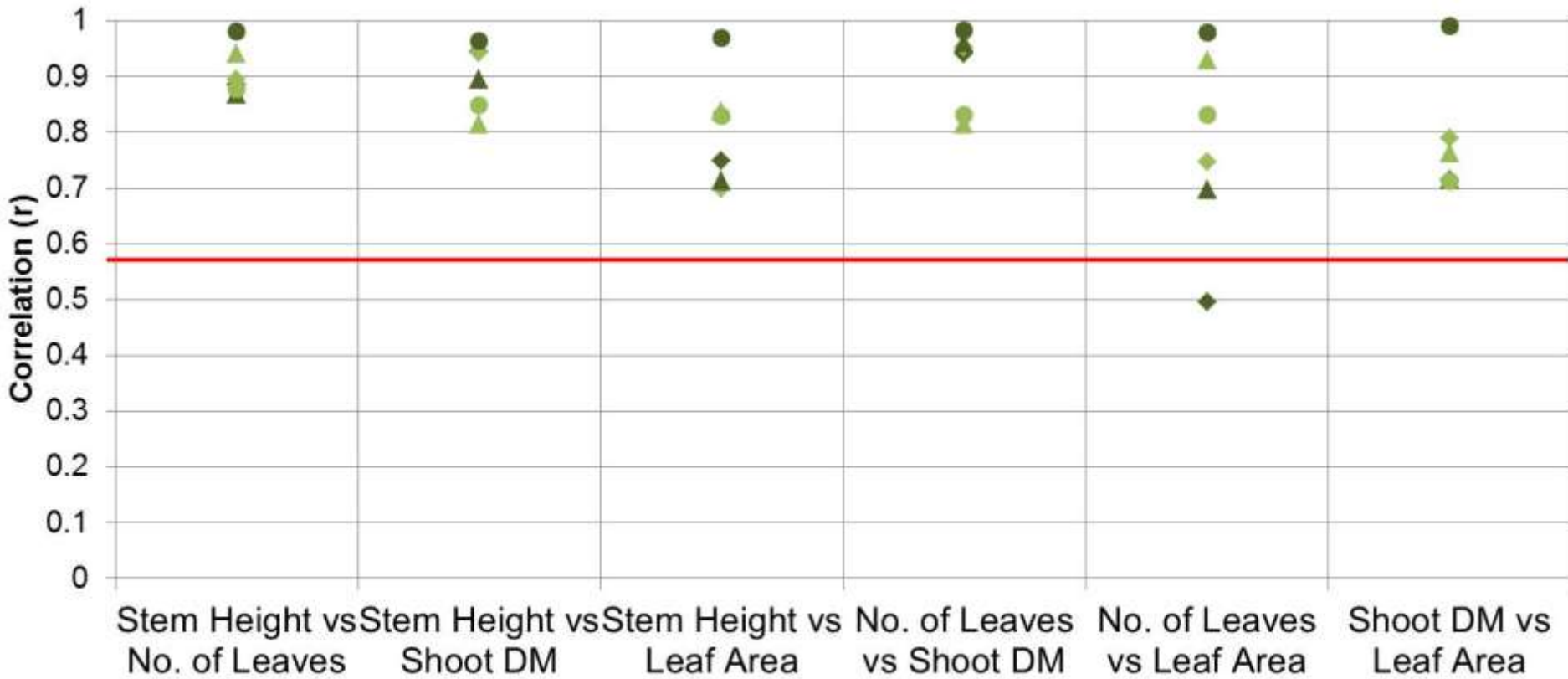


Coated

Non-coated




Results: Correlation (SuperCuf)



 **Municipal water**
180 $\mu\text{S.cm}^{-1}$

 **500 $\mu\text{S.cm}^{-1}$**

 **750 $\mu\text{S.cm}^{-1}$**



Conclusion

- The two cultivars did not respond in the same way to
 - Coating
 - Salinity
- The differences in physio-morphological characteristics likely due to short delays in development
 - The result of osmotic stress or the production of osmoprotectants – temporary resource syncs



Conclusion

- SA Standard: variation in correlation of shoot physio-morphological characteristics
 - mechanism of tolerance is different than SuperCuf
 - between coated and non-coated seed treatments
- SuperCuf: more adapted to saline irrigation
- The conditions created by the treatments were within the tolerance limits of the seedlings.



Acknowledgements

- Advance Seed



Thank you!!



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