

New indicators for the selection of plants adapted to saline environments: combining High-Throughput digital Plant Phenotyping with morpho-physiological and biochemical analyses in sustainable water management

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Experimental set-up

- model plant: *Lactuca sativa* L.
- saline Irrigation Waters (IWs)



Control

IW1

IW2

IW3

NaCl (g L ⁻¹)	0.04	12.0	12.0	12.0
CaCl ₂ (mg L ⁻¹)	39.5	39.5	443.1	443.1
ZnCl ₂ (mg L ⁻¹)	< ql	< ql	20.0	20.0
CuSO ₄ (mg L ⁻¹)	< ql	< ql	< ql	51.6
EC (mS cm ⁻¹)	0.7	17.4	17.5	18.0
pH	8.2	7.9	7.4	7.5

Measurements

Phenotyping



Morphological parameters:

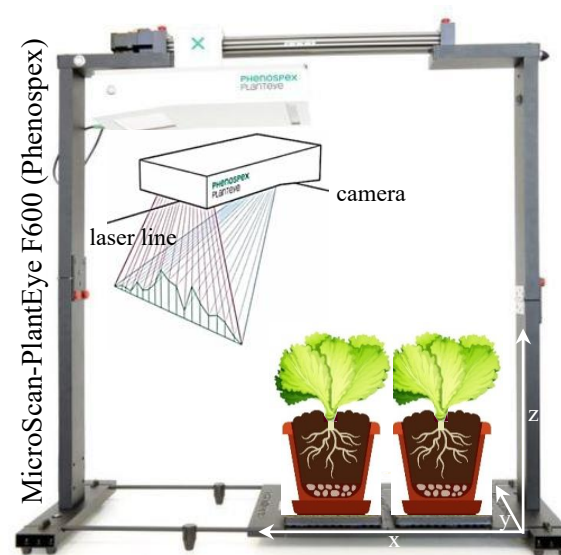
3D Leaf Area, Digital Biomass, Light Penetration Depth, Plant Height

Multispectral parameters:

NDVI, PSRI, NPCI, GLI

Technical parameters:

Hue, convex hull area, voxel volume, lightness



Plant trait measurements



Physiological traits:

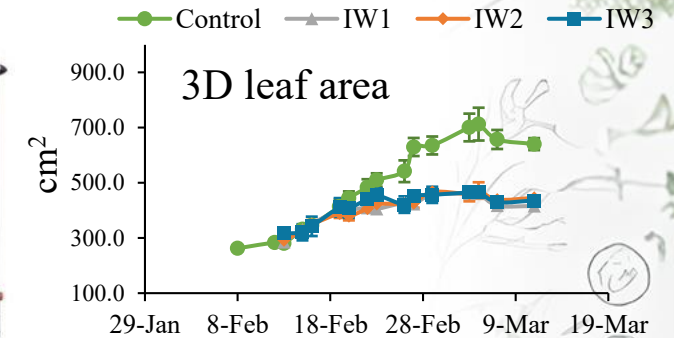
Growth analysis, chlorophyll fluorescence

Biochemical:

Pigments, minerals content

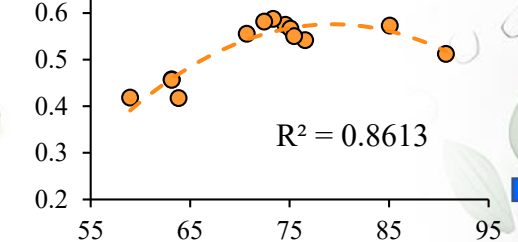
Results and Conclusions

Real time monitoring

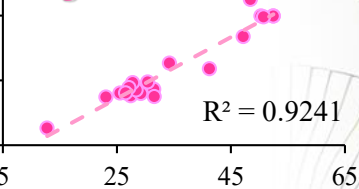


Validation-prediction

Zn (apical leaves) vs. NDVI

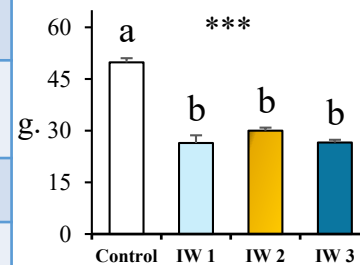


Shoot FW vs. Digital Biomass

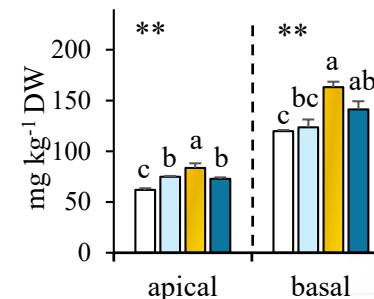


Specific relationships-
new combined indices

shoot FW



Leaf Zn



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