

# Harnessing synergistic PGPR consortia to boost legumes resiliency to salt stress

Amira Hachana<sup>1</sup>, Amir Souissi<sup>2</sup>, Imen Hemissi<sup>1</sup>, Hatem Zgallai<sup>1</sup>, Anissa Riahi<sup>3,4</sup>, Asma Bouatrous<sup>5</sup>, Hanen Arfaoui<sup>1</sup>, Mahamed Annabi<sup>1</sup>

<sup>1</sup> National Institute of Agricultural Research of Tunisia, Laboratory of Agricultural Sciences and Techniques; <sup>2</sup> Swift Current Research and Development Centre, Agriculture and Agri-Food Canada, SK, Canada; <sup>3</sup> National Institute of Agricultural Research of Tunisia, Laboratory of Horticultural Sciences; <sup>4</sup> Higher School of Agriculture of Kef; <sup>5</sup> Higher Institute of Biotechnology of Beja

## INTRODUCTION & AIM

Increasing soil and water salinity in the Mediterranean region threatens agricultural productivity and nutritional security. This study evaluates the potential of a plant growth-promoting rhizobacteria (PGPR) consortium to mitigate salt stress in pea plants.

## METHOD

**Plant material:** Pea (*Pisum sativum* L.) grown under greenhouse conditions.

### Treatments:

Non-saline control (0 mM NaCl)

Progressive salt stress (100, 150, 200 mM NaCl)

Inoculation with a salt-tolerant consortium of *Pseudomonas* sp. and *Bacillus* sp.

**Analyses:** Growth, biomass, physiological and biochemical



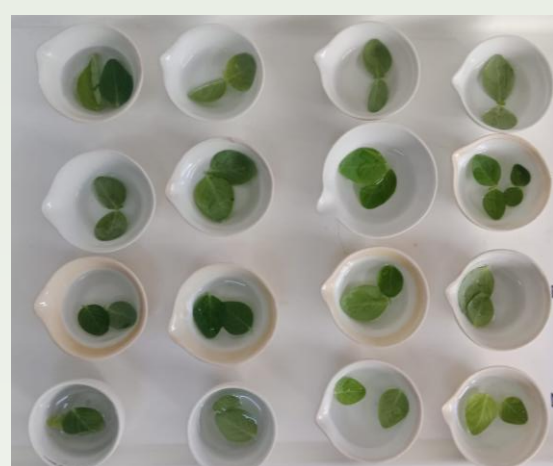
Leaf area mesure



SPAD mesure



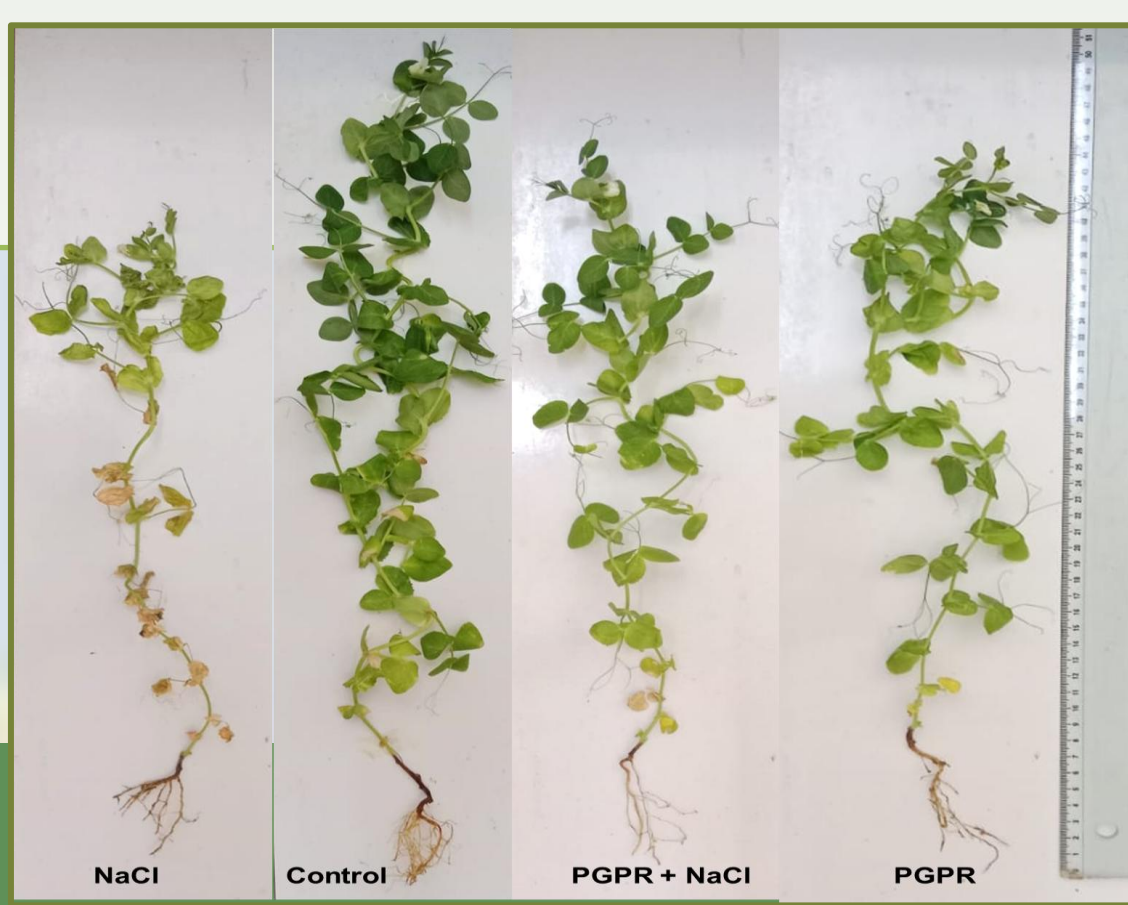
Handy Pea mesure



Leaf water content essay

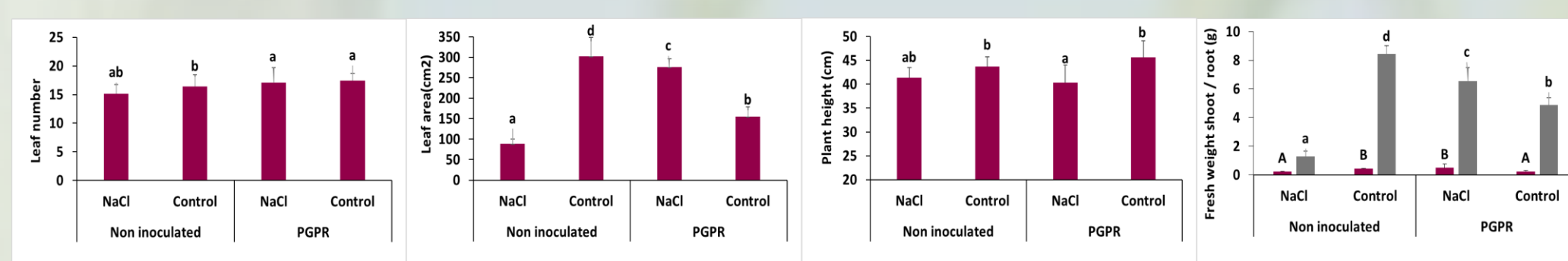


Electrolyte leakage analysis

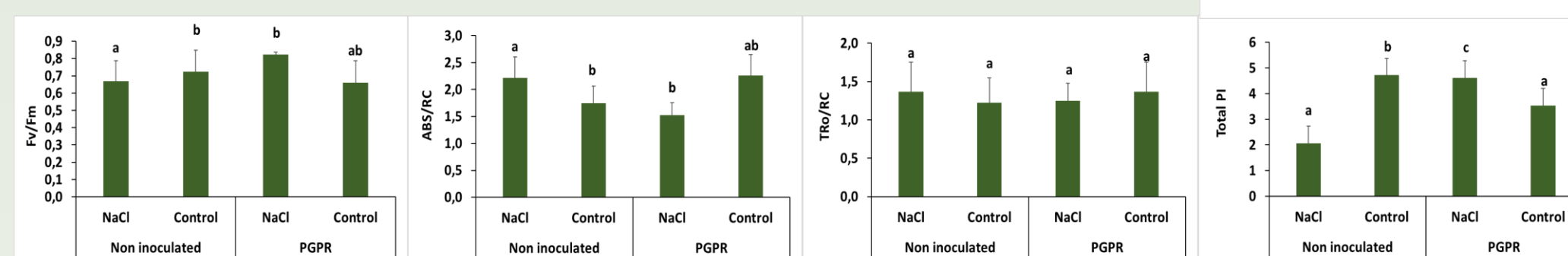


## RESULTS & DISCUSSION

**Growth & Biomass:** PGPR inoculation significantly enhanced leaf number, leaf area shoot and root fresh weight, and total biomass under salt stress compared to non-inoculated controls.



**Photosynthetic Activity:** PGPR inoculation under salt stress maintained higher photosynthetic efficiency, as shown by increased SPAD index, Fv/Fm, reduced ABS/RC, elevated TR0/RC, and enhanced PI, total compared to non-inoculated plants.



Osmotic Regulation:

Membrane Stability:

## CONCLUSION

The synergistic PGPR consortium effectively alleviates salt stress in peas through multi-faceted defense mechanisms, offering a sustainable strategy to enhance legume resilience under saline conditions.

## FUTURE WORK

Field trials under real-world conditions.

Evaluation on other legume species.

Molecular analysis of PGPR-plant interaction mechanisms.