

Exploring valuable traits in beneficial rhizobacteria for development of bio-inputs in Argentina.

A Sustainable solution to enhance crop productivity in drylands.

Experts Meeting on Promoting Sustainable Agriculture
Development in Drylands

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Julia García and Eduardo Trumper



Ministerio de Agricultura,
Ganadería y Pesca
Argentina

Presentation contents



Research at INTA

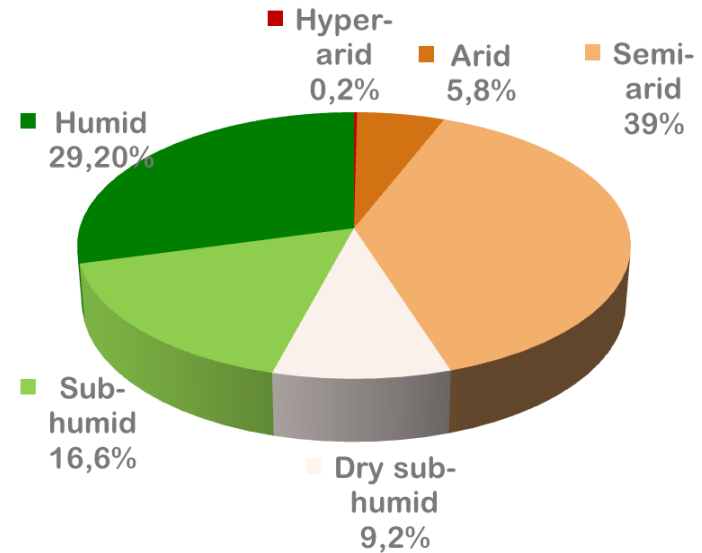
- Plant Protection Program
- Project: “Bioprospection and characterization of beneficial microorganisms for crops protection and production”.
- Main goal:
 - ✓ Expand knowledge on **green technologies**
 - ✓ Bio-inputs
 - ✓ Decrease agrochemicals.
- The Project is structured through 3 disciplinary research lines:
 - ✓ Bio-insecticides
 - ✓ Bio-fungicides
 - ✓ Bio-fertilizers

Argentine environmental regions

Aridity Index Map



54% of the country's surface are Drylands



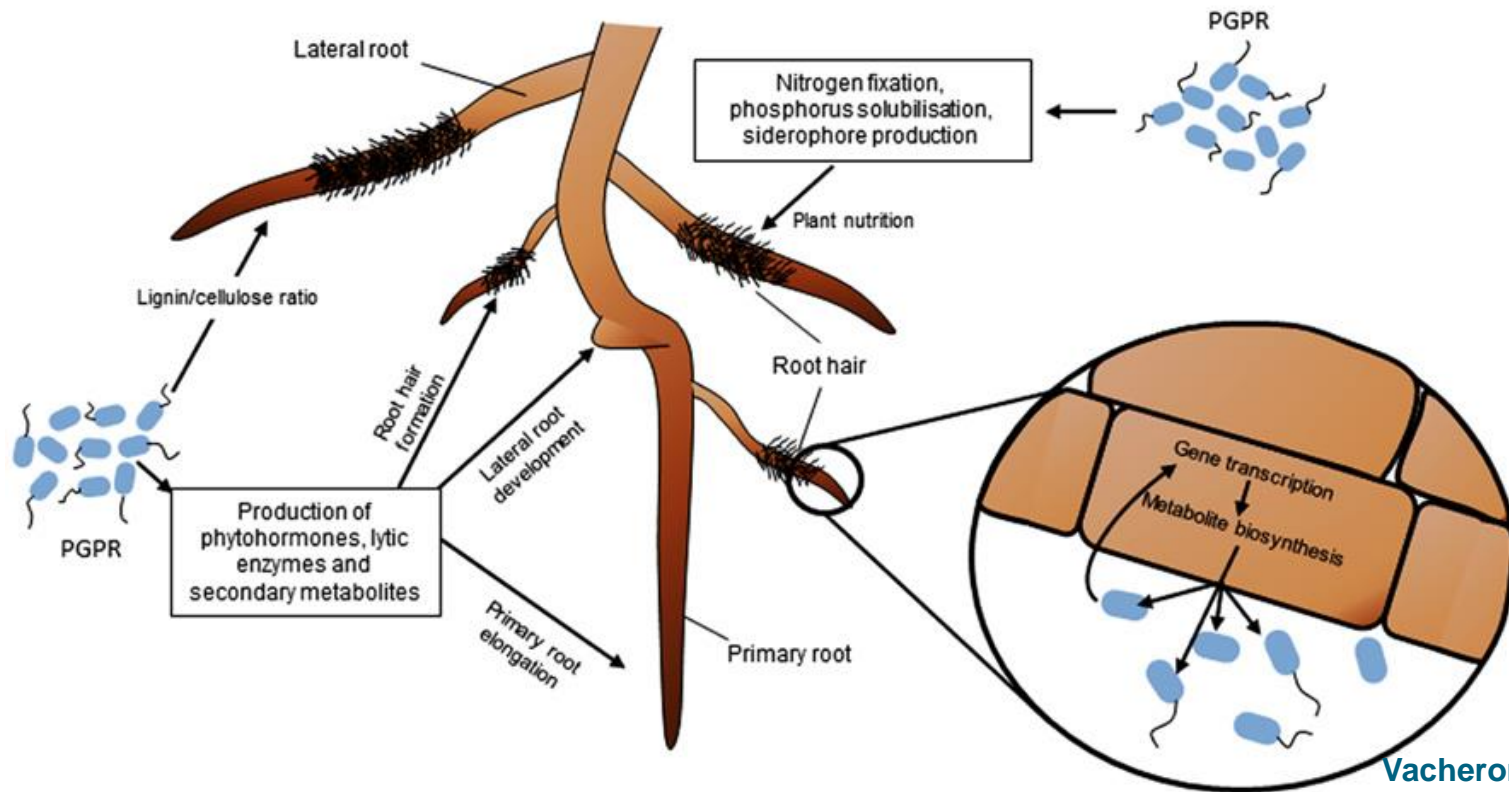
In Argentina's drylands

- 50% of the agricultural production
- 47% of the livestock production
- almost one-third of the country's total population lives in them

Soria et al. (2014)

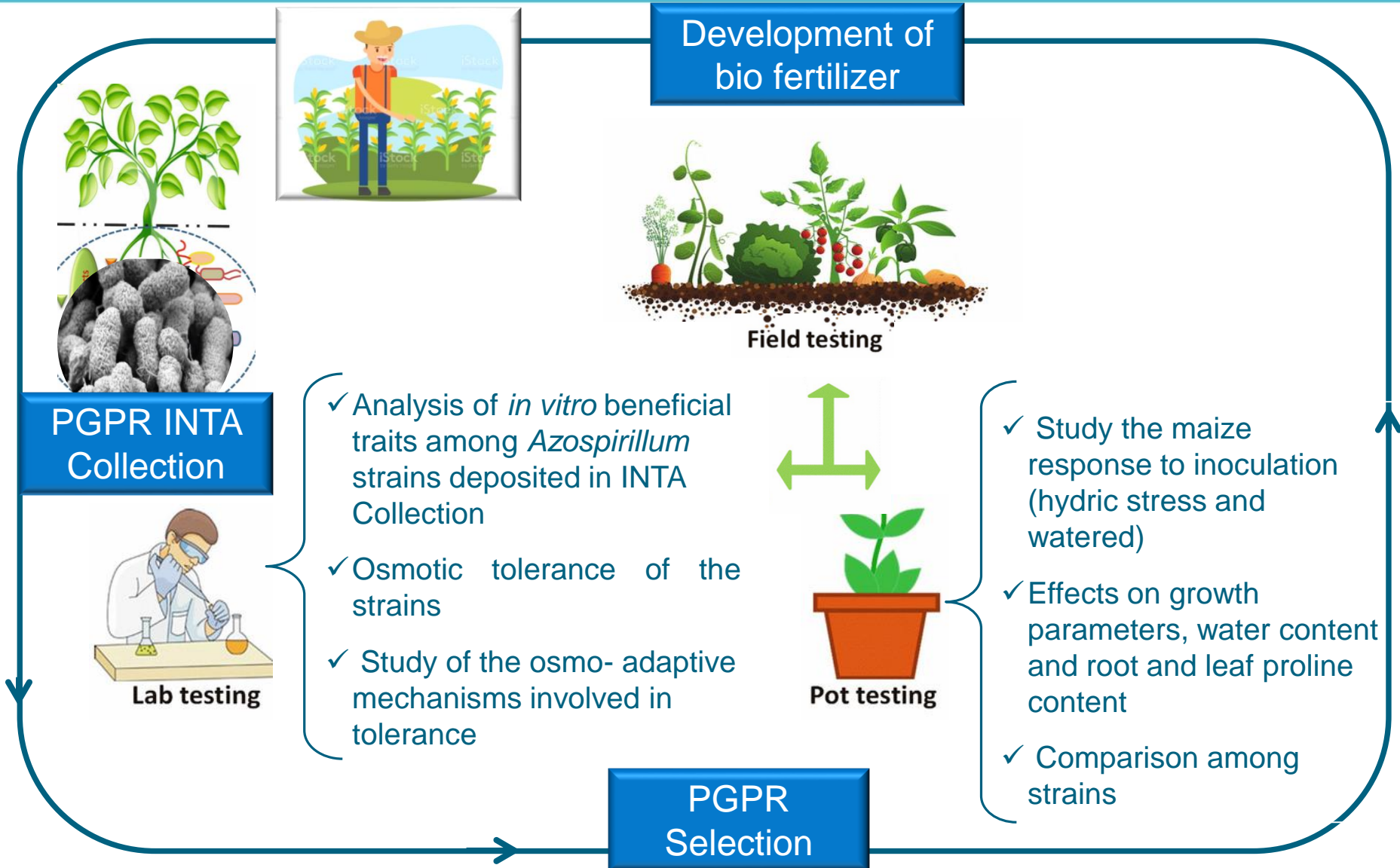
Plant Growth Promoting Rhizobacteria (PGPR)

- ✓ Soil borne Bacteria (*Azospirillum*, *Azotobacter*, *Pseudomonas*, *Bacillus*, etc).
- ✓ Actively colonize plant root and/or rhizosphere.
- ✓ Improve plant growth.
- ✓ Enhance plant tolerance to abiotic stress.



RHIZOSPHERE= roots + soil + microorganisms

A case study: Innovative solution for drought in maize



Lab testing: PGPR traits and osmo-tolerance evaluation

PGPR traits

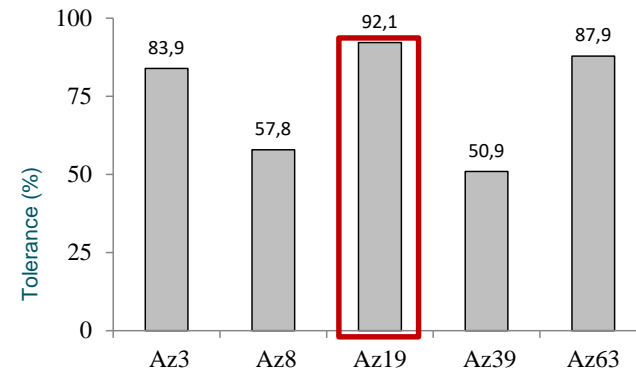
P solubilization, Siderophore production, N fixation, Phytohormone production, ACC deaminase activity



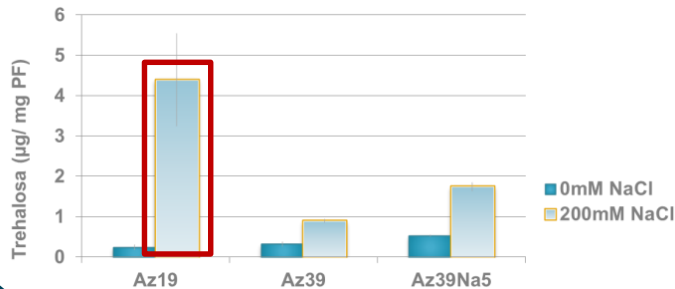
- ✓ All strains have similar PGPR activities to the reference strain *A. brasilense* Az39.

In vitro osmotic tolerance

(PEG, NaCl and sorbitol)



- ✓ Strain *A. brasilense* **Az19** had the best performance under osmotic stress.



Trehalose production

- ✓ Strain *A. brasilense* **Az19** accumulated 5-fold more intracellular trehalose than Az39 under saline stress.

Inoculation effects on maize growth

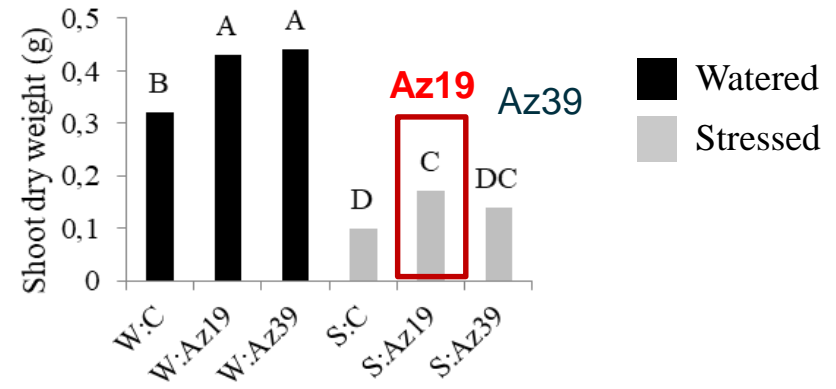


Watered
PGPR-

Watered
PGPR+

Stressed
PGPR-

Stressed
PGPR+



- ✓ *A. brasilense* **Az19** better performance than Az39 under hydric stress.
- ✓ Effects on growth, hydric status, proline content, percentage of fertile plants and yield.

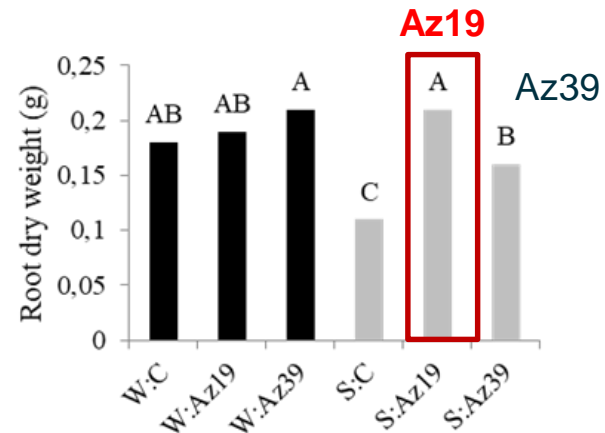


Watered
PGPR -

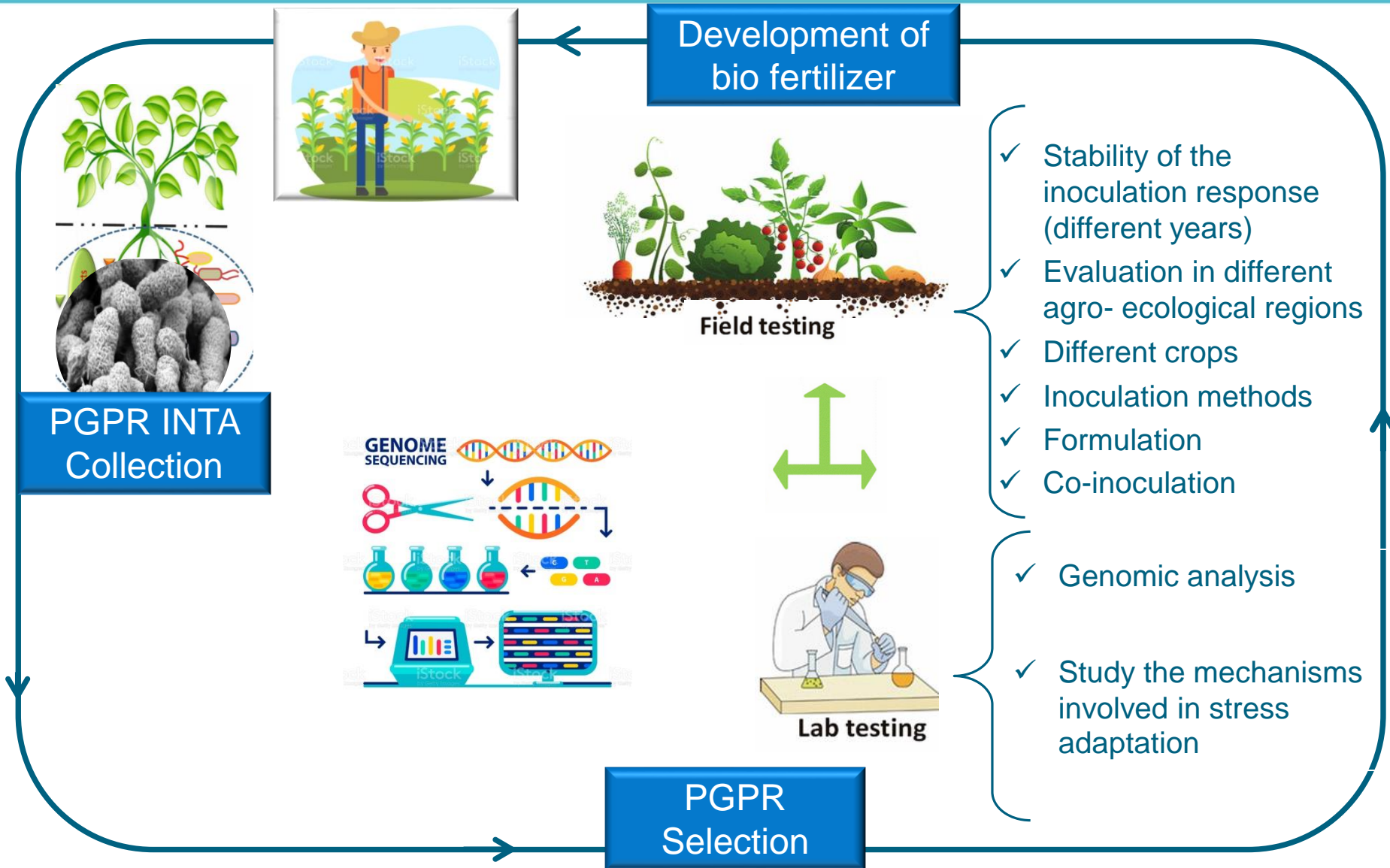
Watered
PGPR +

Stressed
PGPR-

Stressed
PGPR+



Future research



THANKS FOR YOUR
ATTENTION



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