CONGRESO casafe BIOLÓGICOS

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ISOLATION AND INTERACTION STUDY OF Zn SOLUBILIZING YEASTS IN RICE (*Oryza sativa L.*)

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SELECTION AND IDENTIFICATION OF Zn SOLUBILIZING MICROORGANISMS WITH LOW TEMPERATURE AND SALINITY TOLERANCE

1 ISOLATION AND PRESELECTION

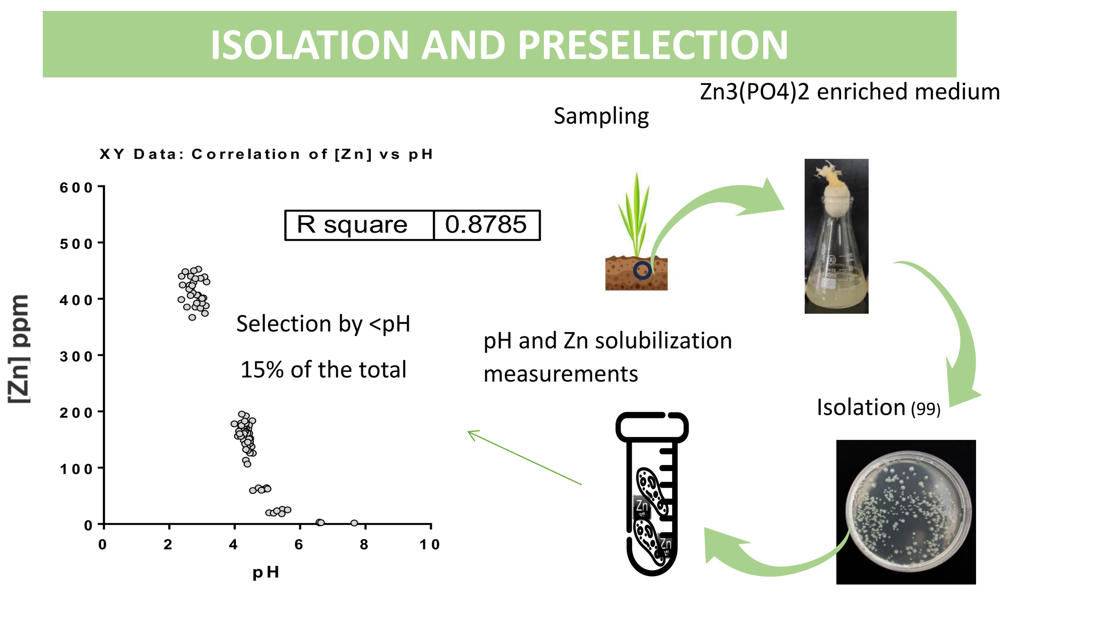

Figure 1: Screening process to select Zn solubilizing bacteria. Right: sampling from rice rhizosphere, enrichement of the medium with $Zn_3(PO_4)_2$ isolation, pH and Zn meditions. Left: Correlation between solubilized Zn and pH.

2 SELECTION BY Zn SOLUBILIZING ABILITY

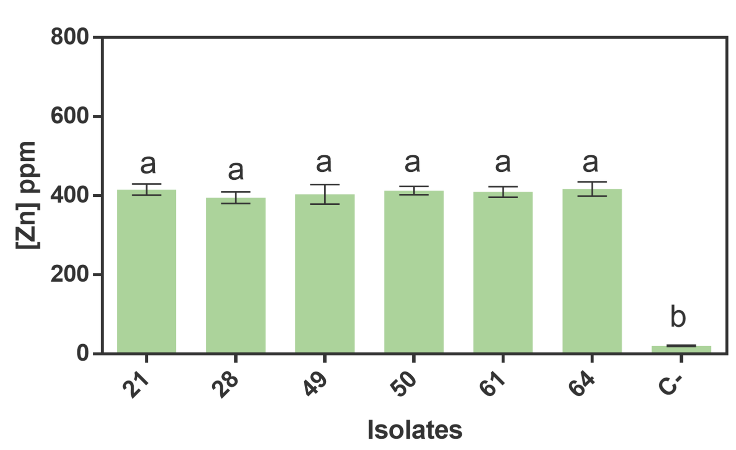

Figure 2: Solubilized Zn (ppm) in liquid medium with $Zn_3(PO_4)_2$ 0.1%, of 6 isolates from rice rhizosphere. Bars represent means ± S.E.

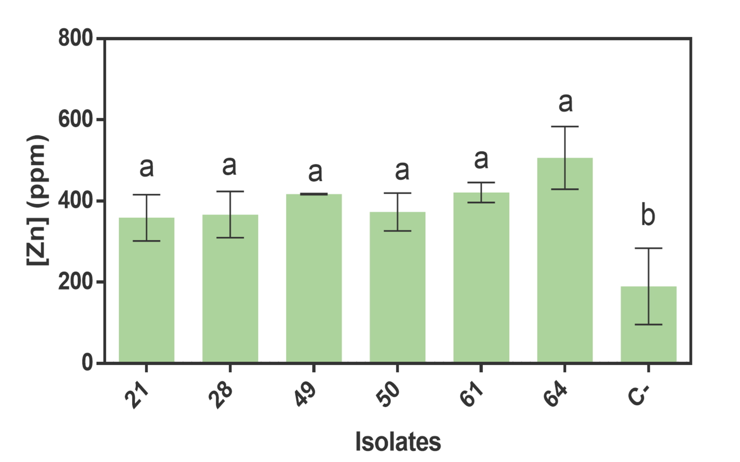

Figure 3: Solubilized Zn (ppm) in liquid medium with ZnO 0.1%, of 6 isolates from rice rhizosphere. Bars represent means ± S.E.

3 PHOSPHORUS SOLUBILIZATION

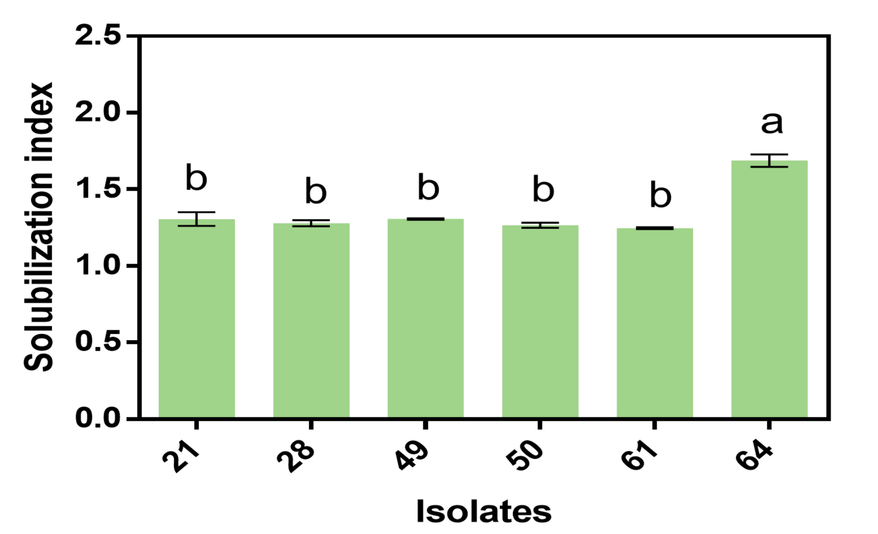

Figure 4: Phosphorus solubilization index (halo area/colony area) in plates with NBRIP, medium of 7 isolated bacteria from rice rhizosphere.

4 SELECTION BY GROWTH IN STRESSFUL CONDITIONS OF INTEREST

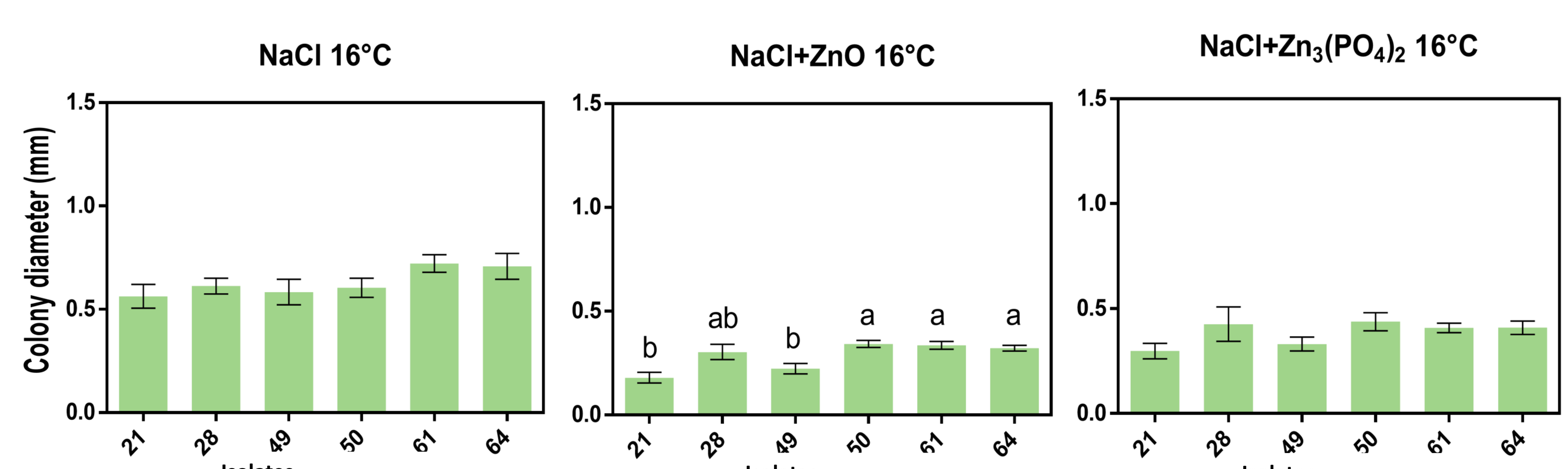

Figure 5: Colony diameter as growth indicator of six selected microorganism in NaCl 0.6M and at 16°C, in two insoluble zinc sources, ZnO (B) and $Zn_3(PO_4)_2$ (C) and without Zn source (A).

5 MOLECULAR IDENTIFICATION

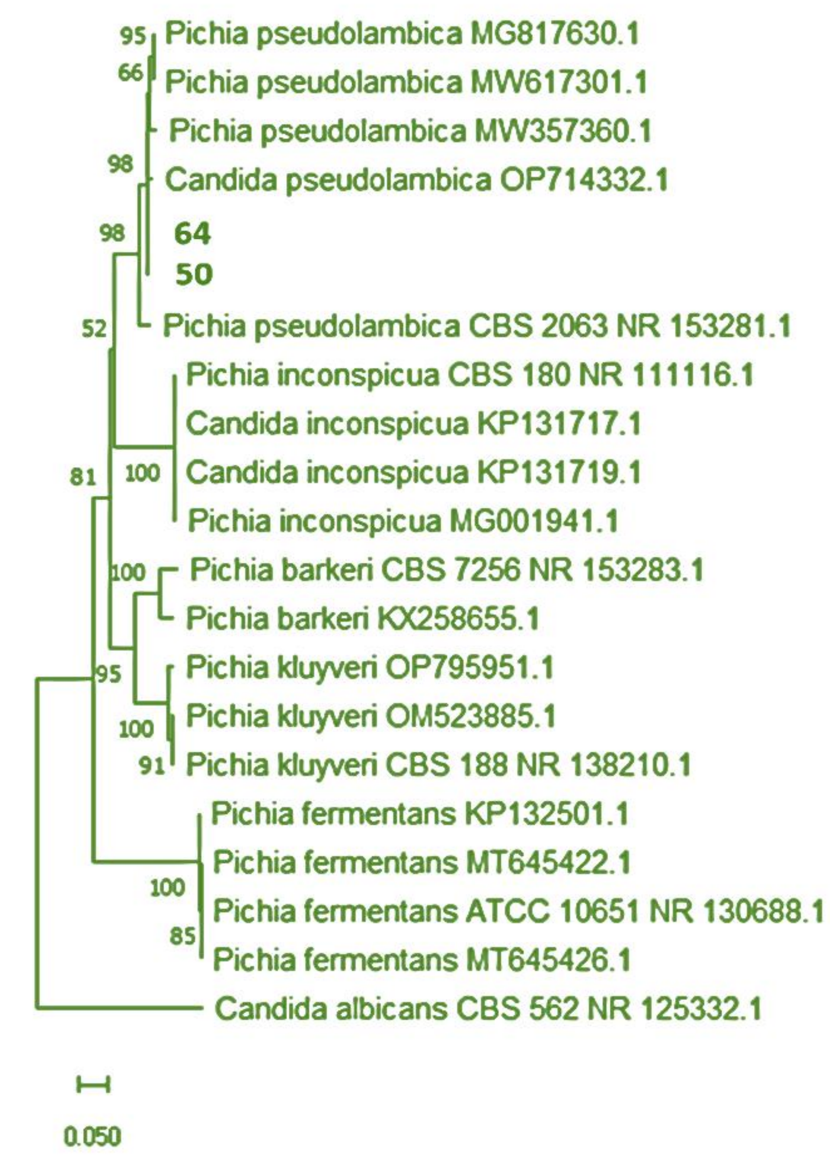

Figure 7: Phylogenetic tree showing the proximity of the ITS region sequences of the two selected isolates to the most closely related species according to the NCBI database.

INTERACTION WITH RICE PLANTS

PATHOGENICITY TEST

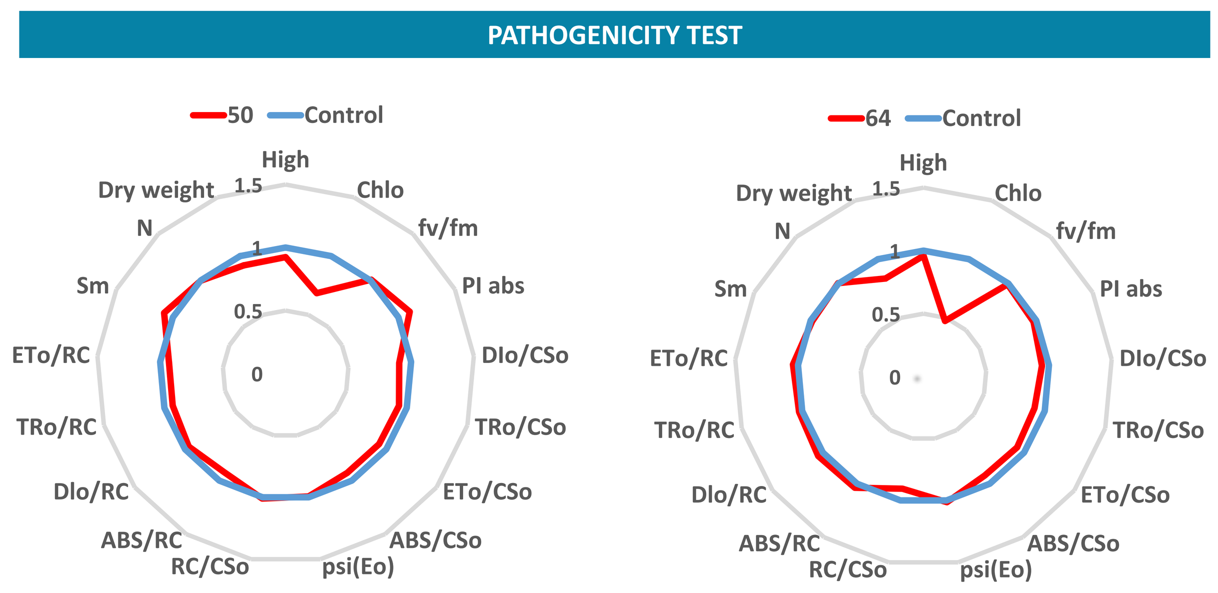

Figure 8: Fluorometric modifications, height and dry weight of rice plants H426-25 with complete substrate, in uninoculated and inoculated plants with strain 50 and 64.

LAB ASSAY

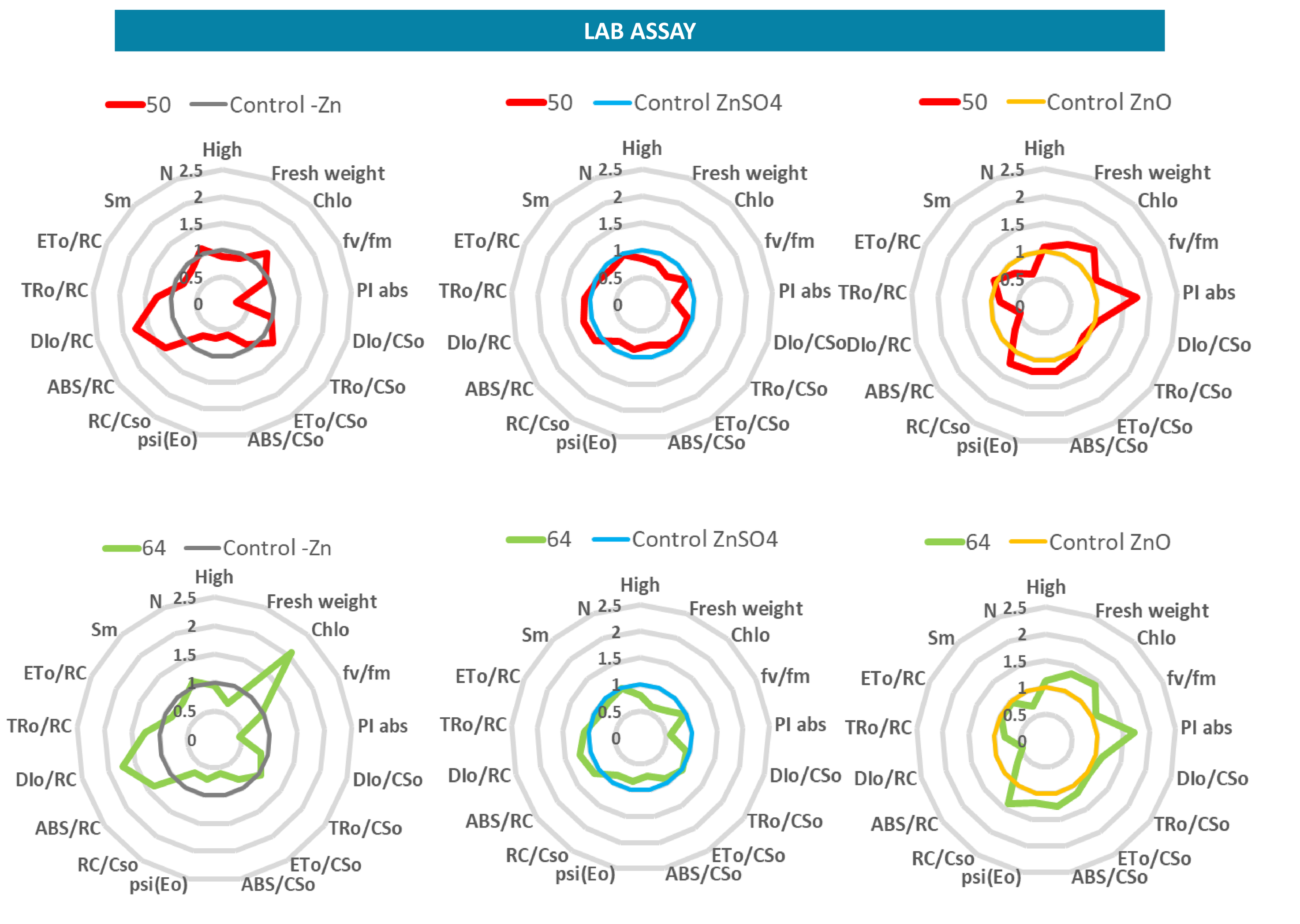

Figure 9: Fluorometric modifications, height and fresh weight of H426-25 rice plants on three different substrates (-Zn, ZnO and ZnSO4) in uninoculated and inoculated plants with strain 50 and 64.

LOCALIZATION TEST

Table 1: Localization of yeasts 50 and 64 in rice plants of variety H 426-25.

Yeast	Leaves surface	Leaves endophyte	Root surface	Root endophyte
50	NO	NO	YES	YES (168-8771 cfu/mg root)
64	NO	NO	YES	YES (3389-3555 cfu/mg root)

FIELD ASSAY

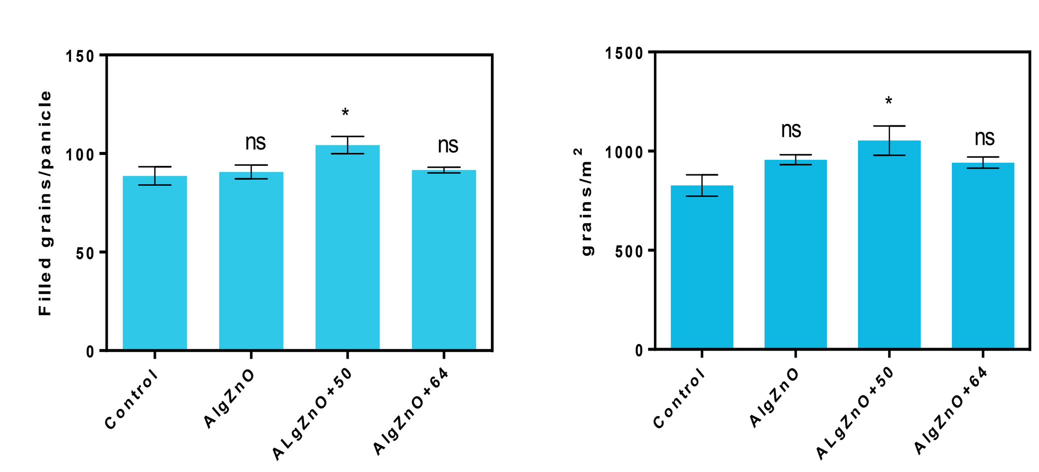

Figure 10: Interaction of yeasts 50 and 64 measured trought filled grains and grains/m²

CONCLUSIONS

1. All six selected isolates exhibited high zinc solubilization capacity with the tested Zn sources
2. Isolate 64 demonstrated greater phosphorus solubilization ability compared to the other strains
3. Strains 28, 50, 61, and 64 showed higher tolerance to low temperatures and salinity than strains 21 and 49.
4. The selected isolates were accurately identified as *Pichia pseudolambica* strains through BLAST analysis of the ITS and 16S regions using the NCBI database
5. Both strains were found to colonize the rhizoplane as well as the internal tissues of rice roots
6. Pathogenicity assays indicated no detrimental effects of the yeasts on rice plants under optimal nutrient conditions
7. The yeasts *Pichia pseudolambica* CdU 50 and CdU 64 exhibited promising biotechnological potential as plant growth-promoting agents in rice under zinc-deficient soils in laboratory conditions
8. *Pichia pseudolambica* CdU 50 significantly increased filled grains per panicle and grains per m² in zinc-deficient soil under field conditions
9. Since the field trial was conducted only once, further studies are recommended to validate the biotechnological potential of the yeasts at this level