

# Alleviation of salt-affected soils using plant growth promoting rhizobacteria (pgpr): agro-ecological perspectives and crop responses

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## Introduction

- Salt-affected soils management and sustainability is of vital importance under climate change for food security.
- Plant growth promoting rhizobacteria (pgpr) thru the direct effects provide phytonutrients thru ecosystem services and thus support plant growth and health.
- The PGPRs can regulate phytohormone including auxins, cytokinins, gibberellins, abscisic acid, and ethylene (1-3).
- PGPRs can influence various aspects of plant growth, such as root and shoot development, flowering, and stress tolerance<sup>61-3</sup>.
- Polyhydroxyalkanoates (PHAs) are aliphatic polyesters accumulated intracellularly by numerous bacteria as carbon and energy reserves under conditions of nutrient limitation and carbon excess.
- Rice under cultivation is about 164 Mha with a production of 510 mmt where global intake was 502 mmt during 2020–21.

## Methodology

### PGPR isolation:

- Pigeon pea rhizospheric soil from chandi village post-maida jari bajar ,prayagraj (allahabad), (212106) district- uttar pradesh,india:
- Location:** latitude 25.17°35 longitude 81.79°73.

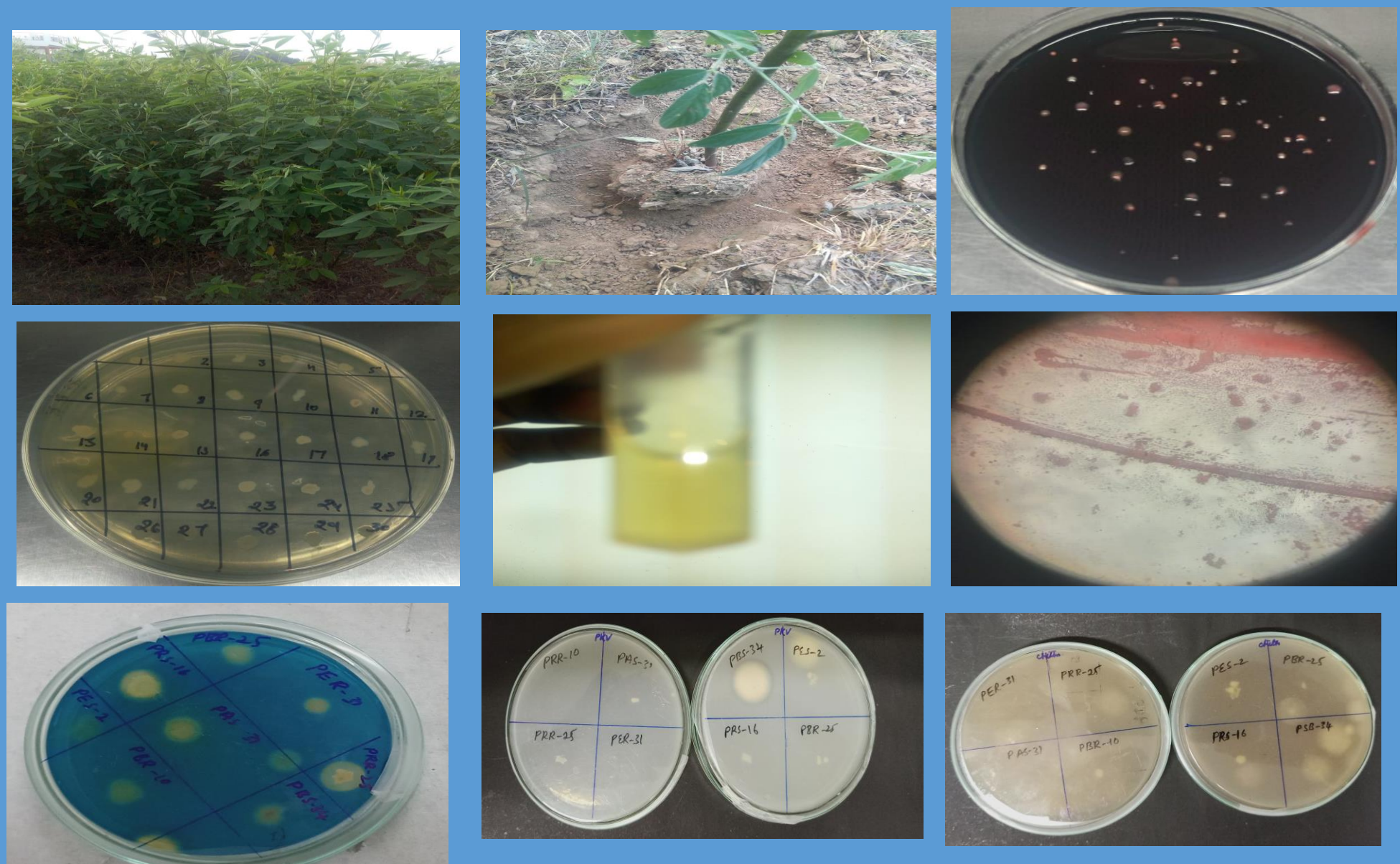
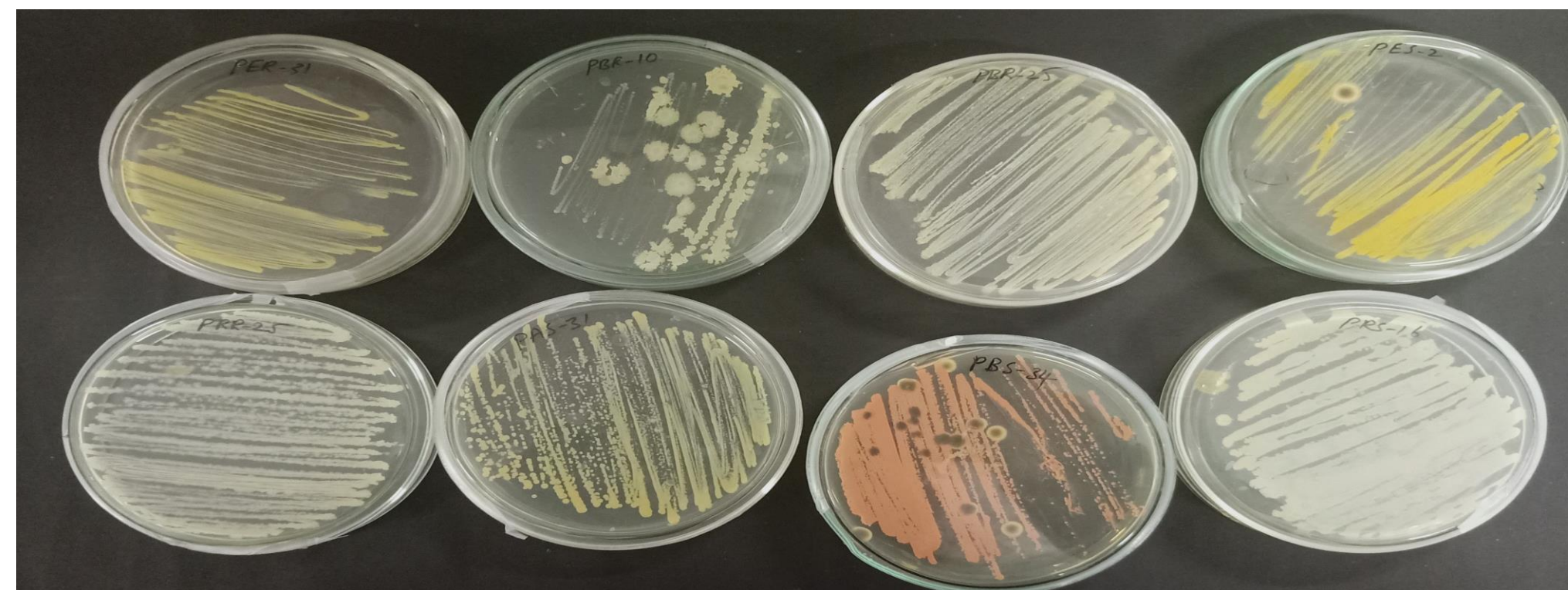


Figure 1pgpr Isolation and traits

### Isolation

Hetrotroph (nutrient agar media), pseudomonas (citrimide media), colifrom (maccon keys media), azotobacter (ash byx media), rhizobium (yema)



### PGP traits :

Oxidase,  $\text{NH}_4^+$  , Catalase, Phosphatase solubilizing, Chitinase Test

**Special characters :** Siderophore PHB

- Rice : CSR -36
- NaCl stress: 10% (EC:146.79 ds m<sup>-1</sup>)
- PEG :-2 bars (11.9 g/100ml)
- Seedling traits :Vigor ,root, shot traits

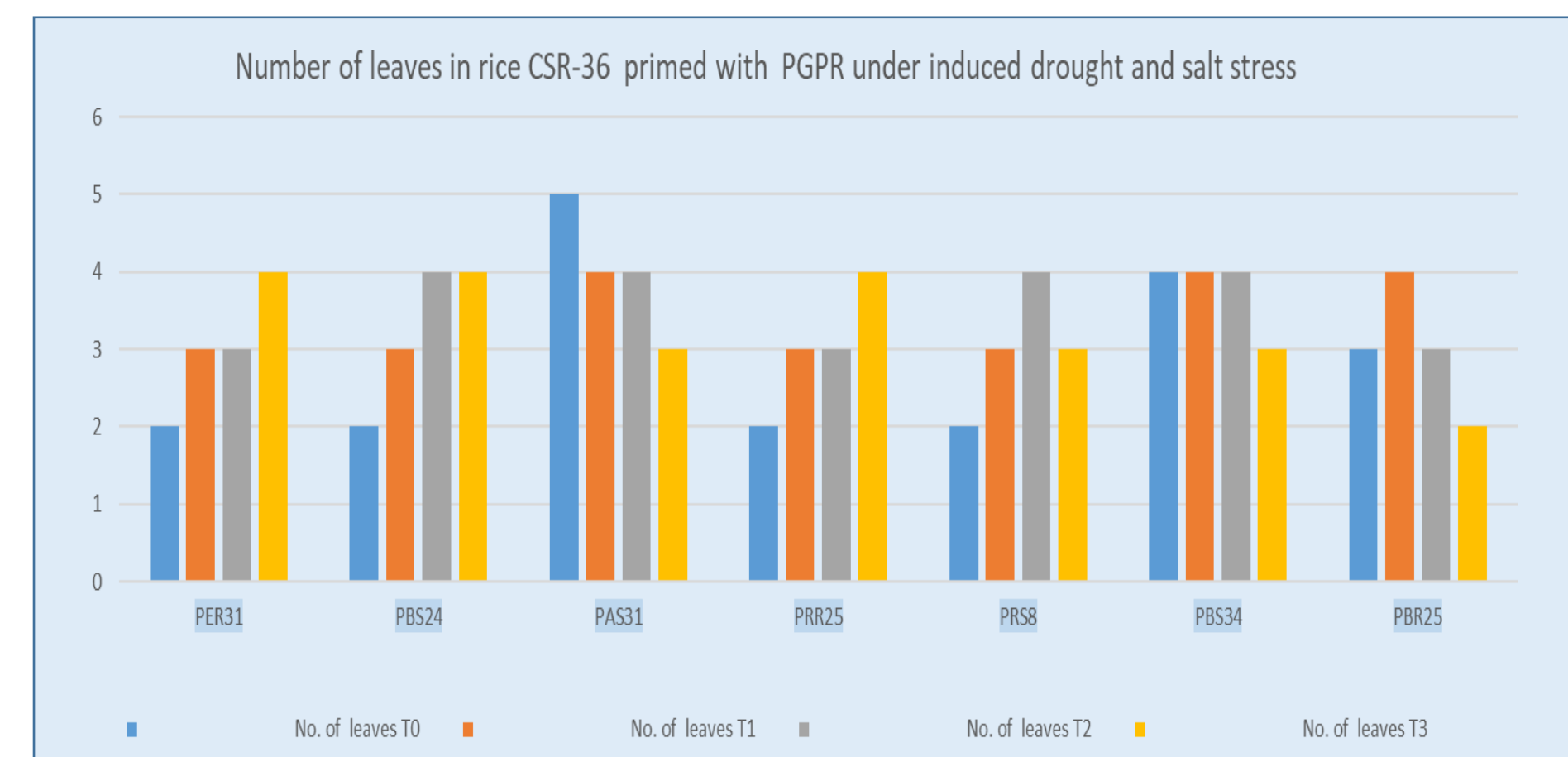
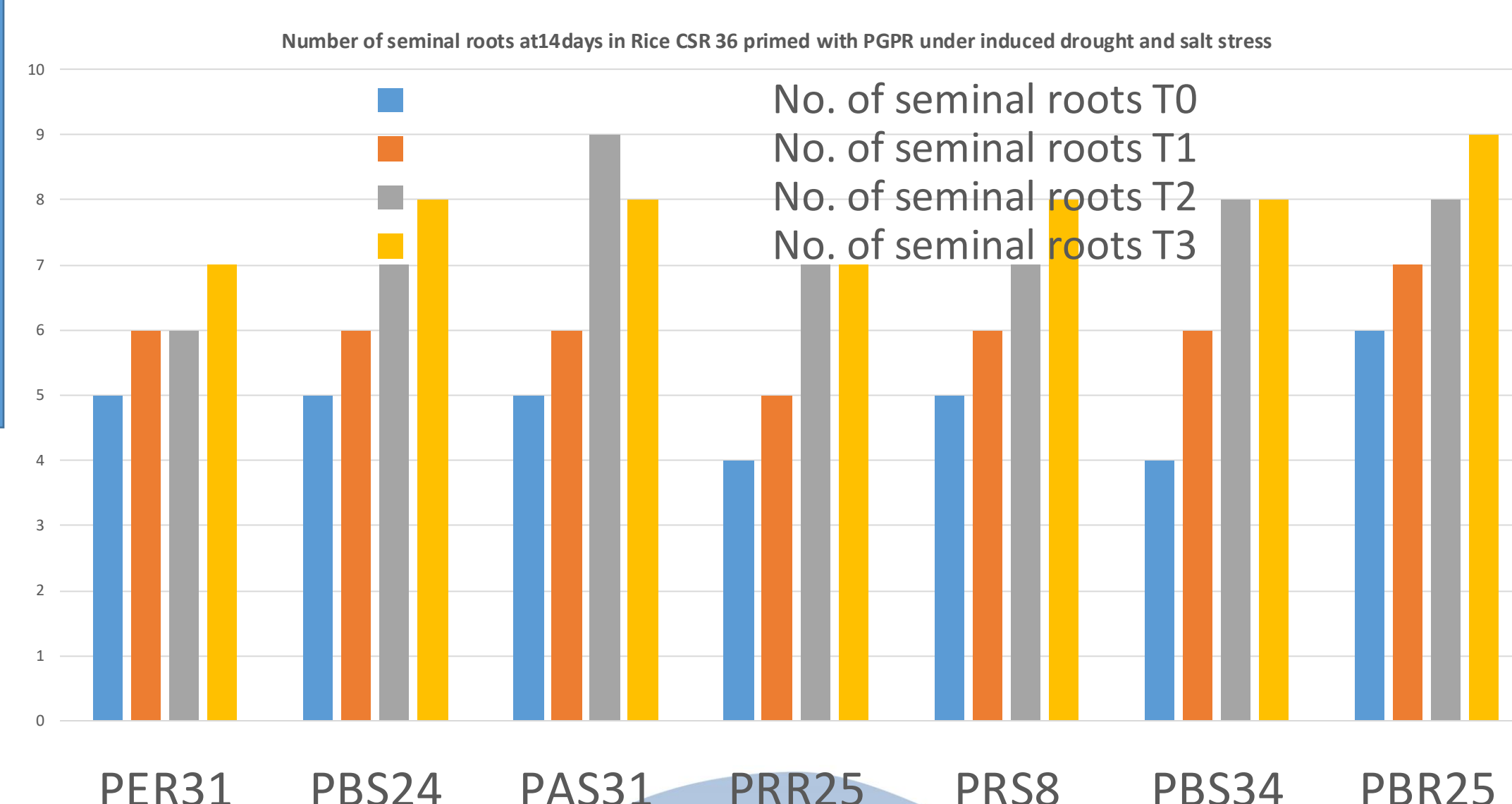
## Results and Discussion

Table 1 Pigeon pea rhizosphere :pgpr

Bacteria	Colonizing Rhizobacterial population CFUx10-6	
	Rhizosphere	Endophyte root
Hetrotrophs	36	35
Total Coliforms	31	32
Azotobacter	32	33
Rhizobium	32	31

- % of germination was high (PBS34)

Bacteria	Germination (%)			
	T0	T1	T2	T3
PER31	40	70	90	80
PBS24	50	80	80	80
PAS31	50	70	90	90
PRR25	30	80	80	80
PRS8	40	70	80	90
PBS34	50	80	90	90
PBR25	40	70	80	80



Vigor index of Rice CSR-36 primed with PGPR under induced drought and salt stress

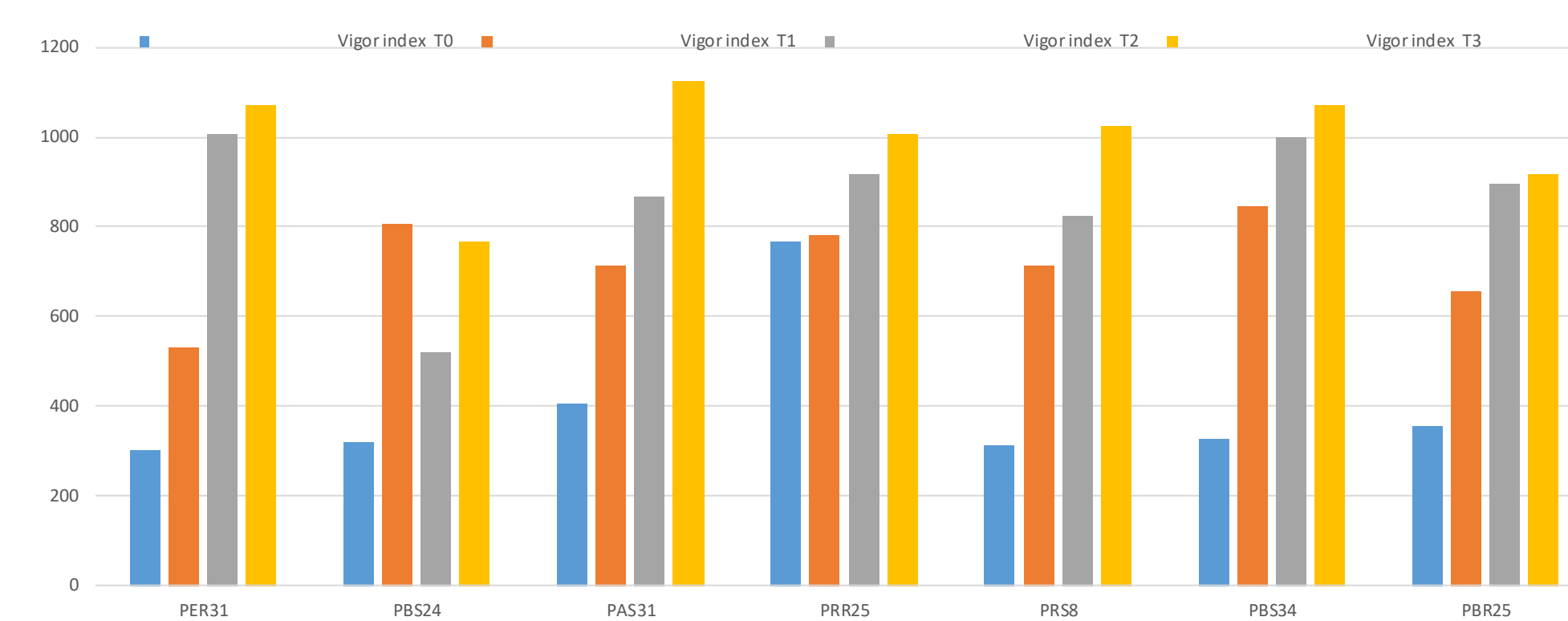


Figure 3: Figure caption

## Conclusions:

The pgpr isolates increased seed vigour index PAS-31(1125),PER-31 (1072),PBS -34 (1071),PRS -8 (1026) under PEG stress (-2bars) and also PGPR isolates with vigor index PER -31 (1008),PBS-34 (1000) PRR 25 (920) PBR 25 (896)under 10 %NaCl stress (EC147.76) evolved as superior strains in alleviation of drought and salt stress in rice cv CSR-36.

## References

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Salt-affected soils: threats and potentials

