

Minor Research Project (UGC): Completion Report Details

- Sanctioning Authority: UGC -WRO, PUNE
- Sanctioned amount: Rs. 200000=00
- Period: March 2013-2015
- F. No.47-509/12 (WRO)
- PI: Dr. Niranjn Prakashrao Patil
- CO-PI: Dr. B.D. Bhole

Project Title : Isolation and ACC deaminase activity based screening of multifunctional Plant Growth Promoting Rhizobacteria (PGPR) and its interaction with *Allium cepa* (Onion) Crop Plant

International Conference Poster presentation:

Niranjn P. Patil, Mayuri Inchanalkar, Daisy Desai & Vishal R. Landge “Screening of ACC (1-aminocyclopropane 1 carboxylic acid) deaminase producing plant growth promoting rhizobacteria from Onion(*Allium cepa*) rhizosphere” Best Poster award (gold) in International Conference ITCPB 2016 organized by AM college Hadapsar, Pune Abstract in Conference Proceeding ISBN: 978-93-84659-28-8

Consolidated findings of first and second year work (Progress report:2013-2014): Summary

Biotic and abiotic stresses when imposed on plants leads to more ethylene production resulting in inhibition of plant growth leading to decrease in crop yield. Certain Plant Growth Promoting Rhizobacteria (PGPR) produces an enzyme 1 Amino Cyclo propane deaminase which metabolizes 1 amino cyclopropane carboxylate-precursor of ethylene to alpha ketobutyrate and ammonia ensuring the reduction in elevated plant ethylene levels. The ACC deaminase activity of PGPR is exploited to relive stress on crop plants so as to improve yields.

In line with this, study was conducted to isolate 61 rhizobacteria from onion rhizosphere. Plant growth promoting traits like Phosphate solublization, Zinc and potash Mobilization, IAA production, Ammonia production, Siderophore production and HCN production were assessed in laboratory condition. Further, the 18 isolates showing Multiple functional traits were screened for ACC deaminase activity. Two isolates V3 and V15 exhibited ACC deaminase activity. The studies on gnotobiotic seed germination and root shoot elongation assay showed significant difference as compare to control seeds of various crops. The isolates may exhibit potential as a bio-inoculant for increasing various crop yields.

Results:

Table 1: PGPR activities of isolates

Isolate No.	ACC deaminase	Phosphate Solubilization	Zinc Solubilization	Ammonia Production	IAA production	HCN production	Siderophore production
V3	+	++	+++	+	+	-	+++
V5	-	+	+++	+	+	-	+++
V10	-	+	-	+	++	-	+
V14	-	+	+++	+	-	++	++
V15	++	+	+	+	+	++	-
V36	-	+	+	+	-	-	+++
NF5	-	+	++	+	+	-	+
NOR3	-	+++	+	+	-	-	-

+: Positive, - : Negative

Conclusions

- ✓ The eighteen multifunctional rhizobacteria isolates were screened in this study for their PGPR and ACC deaminase. It was found that two of the isolates V3 and V15 have multifunctional PGPR activities along with ACC deaminase activity.
- ✓ Significantly higher seed germination and root elongation was observed in isolates V3, V5, V14, V15 and NOR3 treated seeds compared to untreated.
- ✓ These isolates may serve as efficient alternative by reducing the dependence on synthetic fertilizers.

Due to non receipt of second installment, further work(as per plan, identification of isolates and gnotobiotic root shoot elongation assay length, field trials.) could not be entirely performed, and the final report is accordingly prepared and submitted.



(Dr. Niranjana P. Patil)
Principal Investigator



Dr. B.D. Bhole
Co-Investigator



(Dr. S.G. Gupta)
Principal

Principal Investigator

HEAD

MICROBIOLOGY DEPT.