Abstract

Usages of isolated plant growth promoting rhizobacteria as biofertilizer is an effective alternative for the sustainable agricultural practice to expand soil strength and to enhance the crop productivity of selected monocot and dicot plant seedlings. The aim of the present investigation is to explore a plant growth promoting bacteria with further employability of biofertilizer production applying on selected economically important crops (Cumin - *Cuminum cyminum* L., Rice - *Oryza sativa*, Mung - *Vigna radiata* L., Chickpea - *Cicer arietinum* L., and Groundnut-*Arachis hypogaea*) at a seedling stage. Total 75 bacterial isolates were collected from different region of Saurashtra, Gujarat state, India. Among them 41 morphologically different bacterial colonies were isolated and further screened for their PGPR traits. For the primary screening of selected bacterial isolates has been performed; IAA production, phosphate solubilization, siderophore production, HCN production and ammonia production. Among these 100% isolates were positive for ammonia production, 85.36% isolates were positive for IAA production, 31.70% isolates were positive for HCN production, 17.07% isolates were positive for phosphate solubilization, 9.75% isolates were positive for siderophore production at 37°C of incubation period. In primary screening 11 bacterial isolates have showing PGPR properties but in quantitative screening of IAA & ammonia production, out of 11 only 4 bacterial isolates (KS2, KC8, KC9 and KC11) having the potency of PGPR traits. Bio-priming method was used for the seedling analysis. In current study to assess the impact of 4 specific PGPR isolates on seedlings of monocot (Rice, Mung, Cumin) & dicot (Groundnut, Chickpea) plants, we measured parameters like root and shoot length and no. of leaves have been calculated at the interval of 15 days under controlled conditions employing statistical analysis one factor at a time approach/CRD. Potent bacterial PGPR isolates were identified through 16S rRNA sequencing data analysis revealed two genera: *Bacillus sp.* and *Proteus sp.*Biological control agents are eco-friendly to prevent plant pathogens effectively. In the present investigation four potent isolates were examined for their ability to confer disease resistance against *Fusarium sp* induced wilt disease in monocot and dicot plant.*In vitro* technique was employed to inspect the ability of potent bacterial isolates such as KS2, KC8, KC9 and KC11 in order to control *Fusarium sp.* Result revealed by dual culture interaction shows, the colony diameter of *Fusarium sp.* was significantly reduced when KS2,

KC8, KC9 interact with individually and KC11. However, the strain KC9- *Bacillus sp.* **(**OQ654027) had shown an antagonistic activity around 2.8mm found to be higher than other recorded strains in present study, while, KC11 *Proteus Columbae sp.* (OQ652027) had found to be recorded with an antagonistic activity around 2.3 mm against *Fusarium sp.* respectively. The other two strains namely, KS2 (*Proteus Columbae)* and KC8 (*Bacillus sp.)* had documented to show a decreased activity against the same strain as mentioned earlier. The two strains namely KS2 and KC8 although are found to be recorded with plant growth promoting activity but have not shown any significant antagonistic activity. The probable reason for the surprising result for KS2 and KC8 can be due to the fact of absence of ISR which found to be a strong reason for being an antagonistic agent.

Key words: PGPR, biofertilizer, plant growth, cumin seedling, siderophore