World Academy of Science, Engineering and Technology
International Journal of Agricultural and Biosystems Engineering
Vol:12, No:02, 2018

Efficacy of DAPG Producing Fluorescent Pseudomonas for Enhancing Nutrient Use Efficacy, Bio-Control of Soil-Borne Diseases and Yield of Groundnut

Authors : Basavaraj Yenagi, P. Nagaraju, C. R. Patil

Abstract : Groundnut (Arachis hypohaea L.) is called as “King of oilseeds” and one of the most important food and cash crops in Indian subcontinent. Yield and quality of oil are negatively correlated with poor or imbalanced nutrition and constant exposure to both biotic and abiotic stress factors. Variety of diseases affect groundnut plant, most of them are caused by fungi and lead to severe yield loss. Imbalanced nutrition increases the concerns of environmental deterioration which includes soil fertility. Among different microbial antagonists, Pseudomonas is common member of the plant growth promoting rhizobacteria microflora present in the rhizosphere of groundnut. These are known to produce a beneficial effect on groundnut due to their high metabolic activity leading to the production of enzymes, exopolysaccharides, secondary metabolites, and antibiotics. The ability of pseudomonas lies on their ability to produce antibiotic metabolites such as 2, 4-diacetylphloroglucinol (DAPG). DAPG can inhibit the growth of fungal pathogens namely collar rot and stem rot and also increase the availability of plant nutrients through increased solubilization and uptake of nutrients. Hence, the present study was conducted for three consecutive years (2014 to 2016) in vertisol during the rainy season to assess the efficacy of DAPG producing fluorescent pseudomonas for enhancing nutrient use efficacy, bio-control of soil-borne diseases and yield of groundnut at University of Agricultural Sciences, Dharwad farm. The experiment was laid out in an RCBD with three replications and seven treatments. The mean of three years data revealed that the effect of DAPG-producing producing fluorescent pseudomonas enhanced groundnut yield, uptake of nitrogen and phosphorus and nutrient use efficiency and also found to be effective in bio-control of collar rot and stem rot incidence leading to increase pod yield of groundnut. Higher dry pod yield of groundnut was obtained with DAPG 2(3535 kg ha-1) closely followed by DAPG 4(3492 kg ha-1), FP 98(3443 kg ha-1), DAPG 1(3414 kg ha-1), FP 86(3361 kg ha-1) and Trichoderma spp. (3380 kg ha-1) over control(3173 kg ha-1). A similar trend was obtained with other growth and yield attributing parameters. N uptake ranged from 8.21 percent to FP 86 to 17.91 percent with DAPG 2 and P uptake ranged between 5.56 percent with FP 86 to 16.67 percent with DAPG 2 over control. The first year, there was no incidence of collar rot. During the second year, the control plot recorded 2.51 percent incidence and it ranged from 0.82 percent to 1.43 percent in different DAPG-producing fluorescent pseudomonas treatments. The similar trend was noticed in the third year with lower incidence. The stem rot incidence was recorded during all the three years. Mean data indicated that the control plot recorded 2.65 percent incidence and it ranged from 0.71 percent to 1.23 percent in different DAPG-producing fluorescent pseudomonas treatments. The increase in net monetary benefits ranged from Rs.5975 ha-1 to Rs.11407 ha 1 in different treatments. Hence, as a low-cost technology, seed treatment with available DAPG-producing fluorescent pseudomonas has a beneficial effect on groundnut for enhancing groundnut yield, nutrient use efficiency and bio-control of soil-borne diseases.

Keywords : groundnut, DAPG, fluorescent pseudomonas, nutrient use efficiency, collar rot, stem rot
Conference Title : ICAB 2018 : International Conference on Agriculture and Biotechnology
Conference Location : Melbourne, Australia
Conference Dates : February 01-02, 2018