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Effects of PSB (Phosphate Solubilizing Bacteria) on morphological characters of *Lens culinaris Medic.*

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ABSTRACT : An experiment was conducted during winter seasons on morphological characters of Lentil (*Lens culinaris Medic.*) enoculated with PSB. PSB (10gm, 20gm and 30gm) in 2Kg of soil and one control. In variety NDL-92 with the application of PSB plant height/plant increases from control. In JL-3 variety plant Height/Plant increases with the treatment of PSB as compared to control number of Branches/Plant in NDL-92 variety increases with the inoculation of PSB and in control number of Branches/Plant are less than of JL-3 variety with the increase of PSB number of Branches per plant increase as compared to control. Number of Flowers per plant is more in both variety JL-3 and NDL-92 inoculated with PSB as compared to control. Number of Pods per plant are more in both varieties JL-3 and NDL-92 inoculated as compared to control. Dry weight/plant is more in inoculated JL-3 and NDL-92 plants as compared to control.

Keywords : PSB, *Lens culinaris*, JL-3 and NDL-92

INTRODUCTION

Biofertilizers are gaining importance as they are ecofriendly, non-hazardous and non-toxic (Sharma et al; 2007). A substantial number of bacterial species, mostly those associated with the plant rhizosphere, may exert a beneficial effect upon plant growth (Valverde et al., 2006). Biofertilizers include mainly the nitrogen fixing, phosphate solubilizing and plant growth promoting microorganism (El-Khawas, 2003; Geol et al., 1999). Phosphate transformation is influenced by soil microorganisms and thus influence the subsequent availability of phosphate to plant roots (Richardson, 2001). Biofertilizers are useful to reduce the pollution rate of soil and water (El-Assiouty and Abo Sedera, 2005). Phosphorous is abundant in soil both organic and inorganic forms it is frequently major or a prime factor for plant growth (Sahi et al., 2007). Numbers of bacterial species are able to make beneficial effort upon plant growth. Phosphate solubilizing bacteria e.g. *Pseudomonas*, *Bacillus*, *Enterobacter*, *Azospirillum* and *Rhizobium* etc. are called Rhizobacteria because they are related to rhizosphere of the plant. Rhizobacteria are bacteria that aggressively colonize the plant roots (Antoun, 2003). Plant growth promoting rhizobacteria (PGPR) are a very small portion of rhizobacteria (2-5%) that promote plant growth (Antoun and Kloepper, 2001). Seed pods and test weight were also significantly higher with *Rhizobium* inoculation over no inoculation Kumawat et al., 2003). According to Vasu and Hasan (2009) the treatment of radiomimetic agents like EMS and MMS increases plant height and number of pods per plant in *Trigonella*.

Lentil crops are able to fix atmospheric nitrogen and enrich the soil with nitrogen when include in different crop rotations practices by farmer (Shah et al., 2000). Crops of phosphorus yield higher when their needs for phosphorus met judiciously (Singh et al., 1991). India contributing 25% of global production of pulses (Ali and Kumar, 2005). In 1998-99, Lentil was grown over an area of 3.404 million hectares in the world, 35.25 % being occupied by India (Anonymous, 1997, Sahi et al., 2000). This crop is valued as a high protein source and for its residues (Hoque et al., 2002) Phosphorous is added to pulses to ensures good symbiotic performance and overall plant growth (Deol et al., 2005). Lentil is an important pulse crop of Indian continent (Solanki and Sharma, 2002). This crop is valued as a high protein source residues are used for animal feedings (Mishra et al., 2001).

MATERIAL AND METHOD

Lens culinaris seeds of known varieties NDL-92 and JL-3 of central India procured from Seed Corporation of India, New Market Bhopal. Five hundred dry healthy seeds with average moisture content of each variety selected from macrosperma Lentil.

Bio-fertilizers. In this study Biofertilizer PSB is used. Biofertilizer was took from Agro Industries in Inderpuri, Bhopal (M.P.) about 10 gm, 20 gm and 30 gm of PSB mixed with 2Kg soil was used in these three treatment and one control will be taken for the morphological characters.

Treatment with Phosphate Solubilizing Bacteria

Soil is treated with PSB in two years 100 seeds are sown in the inoculated soil with 10 gm, 20 gm and 30gm of PSB.

Seeds will be sown in the pots with treated soil to study the morphological characters.

RESULTS AND DISCUSSION

Table-1 and Table-2 data showed the morphological characters of *Lens Culinaris* Medic. By the treatment of biofertilizer PSB (Phosphate solubilizing bacteria) in different doses to NDL-92 and JL-3 varieties

Table 1 : Different morphological characters of *Lens culinaris* variety NDL-92 as influenced by the different levels of PSB (Phosphate Solubilizing Bacteria).

Treat-ment	Concen-tration	Height/plant after 70 days of sowing	Branches/Plant after 70 days of sowing	Flowers/Plant after 70 days of sowing	Pods/Plant after 70 days of sowing	Dry wt./ Plant (gm) after maturation
PSB	10gm	21.2	12	9	9	0.50
PSB	20gm	21.7	13	13	20	0.58
PSB	30gm	23.3	14	20	21	0.63
Control		19.7	11	8	12	0.45

Table 2 : Different morphological characters of *Lens culinaris* variety JL-3 as influenced by the different levels of PSB (Phosphate Solubilizing Bacteria).

Treat-ment	Concen-tration	Height/plant after 70 days of sowing	Branches/Plant after 70 days of sowing	Flowers/Plant after 70 days of sowing	Pods/Plant after 70 days of sowing	Dry wt./ Plant (gm.) after maturation
PSB	10gm	22.7	14	10	16	0.51
PSB	20gm	23.4	15	15	21	0.59
PSB	30gm	23.9	16	21	23	0.65
Control		19.9	12	8	14	0.47

Morphological characters of variety NDL-92. In variety NDL-92 height/plant with inoculation of 10 gm, 20 gm and 30gm.of PSB showed 21.2 cm, 21.7 cm and 23.3 cm respectively and control showed 19.7 cm Number of primary Branches/plant with inoculation of PSB 10 gm, 20 gm, and 30 gm of PSB showed 12, 13 and 14 respectively and control showed 11. Number of Flowers/plant with inoculation of PSB 10 gm, 20 gm and 30gm Of PSB showed 9, 13 and 20 respectively and control showed 8. Number of Pods/plant with inoculation of PSB 10 gm, 20 gm and 30gm showed 9, 13 and 20 respectively and control showed 12. Dry weight/ plant with inoculation of PSB 10 gm, 20 gm and 30gm showed 0.50gm, 0.58 gm and 0.63 gm respectively and control showed 0.45 gm.

Morphological characters of variety JL-3. In variety JL-3 Height/plant with inoculation of 10 gm, 20 gm and 30gm of PSB showed 22.7 cm, 23.4 cm and 23.9 cm respectively and control showed 19.9 cm. Number of primary Branches/ plant with inoculation of PSB 10 gm, 20 gm and 30gm of PSB showed 14, 15 and 16 respectively and control showed 12. Number of Flowers/plant with inoculation of PSB 10 gm, 20 gm and 30gm of PSB showed 10, 15 and 21 respectively and control showed 8. Number of Pods/plant with inoculation of PSB 10 gm, 20 gm and 30gm showed 16, 21 and 23 respectively and control showed 14. After maturation Dry weight/plant with inoculation of PSB 10 gm, 20 gm and 30gm showed 0.51 gm, 0.59gm and 0.65gm respectively and control showed 0.47 gm.

Results shows that the morphological characters (Height/Plant, Branches/Plant, Flowers/Plant, Pods/Plant, Dry weight/Plant) are increases in JL-3 as compared to NDL-92 with the increase in the concentration of PSB.

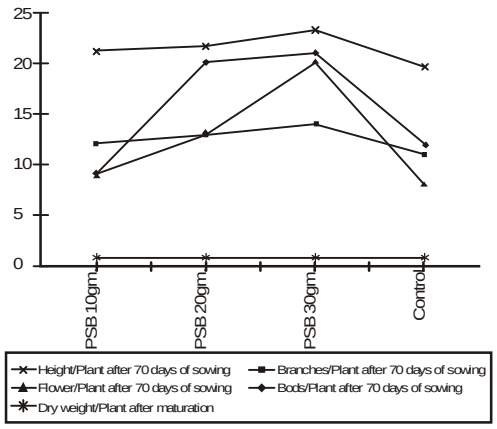

Fig. 1. Different morphological characters of Lens culinaris variety NDL-92 as influenced by the different levels of PSB (Phosphate Solubilizing Bacteria).

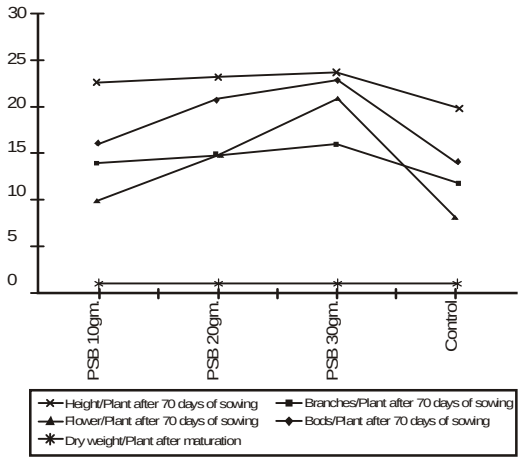

Fig. 2. Different morphological characters of *Lens culinaris* variety JL-3 as influenced by the different levels of PSB (Phosphate Solubilizing Bacteria).

These characters are increases in both varieties and these are observed least in case of the control of both varieties.

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