Agriways 5 (2) : 75-78 (July - December, 2017)

ISSN: 2321-8614 (Print)
ISSN: 2454-2318 (Online)

EFFECT OF BIOFERTILIZER (RHIZOBIUM) AND VERMI COMPOST ON GROWTH AND YIELD OF GARDEN PEA (*Pisum sativum* L.) SUB SP. HORTENSE ASCH. AND GRABN.

Sanjay Kumar, J. Kumar, Himanshu Kumar[1], Anurag Padhan and Sanjeev Kumar
Dept. of Horticulture C.C.S. University, Meerut (U.P.)
[1]Dept. of Horticulture C.C.R.(P.G.) College, Muzaffarnagar (U.P.)

ABSTRACT

Present study was conduct during winter season of 2010-11 at Horticulture, Chaudhary Charan Singh, University Campus, Meerut Uttar Pradesh (India). The experiment was laid out in factorial randomized Block design (RBD) with three Replications. In present investigation Rhizobium and vermi compost applied through seed treatment or soil application. Result indicated the seed Treatment of Rhizobium @ 300 gm/ha + soil application of vermicompost @50 q/ha were found to be statistically significant and most beneficial in relation to plant height, Number of leave, Number of branches, No. of days taken for flowering, Pod length, green pod yield as compared to control and other treatments.

Keywords :- **Rhizobium, Vermi Compost, Garden Pea.**

At present, India is the second largest producer of the vegetables in world. Garden Pea (*Pisum sativum* L.) belongs to the family Laguminaceae. The goal can be achieved only by increasing the yield per unit area by adopting better and advanced agro-techniques.

Presently, an annual production of garden pea is 3.029 lakh million tones from under an area is about 0.364 lakh million hectare (N.H.B 2009-10) and grown almost in all the agro-climatic zones of India.

Garden pea is grown in the Rabi season. For the nutrition point of view, it is rich source of vit. A, B6, C, E. minerals, minor is fibers & carbohydrates.

Improvement in growth & nodulation of garden pea with application Rhizobium has been reported by Subba Rao (1976). Prasad and Maurya (1989) recorded significant increase in growth and nodulation over control with Rhizobium inoculation. Champawat (1990) reported that dual inoculation of plants with Rhizobium resulted in greater increase in plant height and root nodulation.

Vermi Compost is an eco friendly and an effective way to recycle agricultural wastes. Application of vermi compost not only adds plant nutrients (macro and micro) and growth regulators but also improves the Physical and Chemical Properties of the soil like water retention; Porosity etc. enhance the microbial population and carbon content of the soil.

Material & Methods:-

Investigation on the effect of Biofertilizer (Rhizobium) and vermi compost on growth and yield of garden pea (*Pisum sativum* L. sub sp. Hortense Asch. And garden) was carried out at Horticultural Research farm, Department of Horticulture, Chaudhary Charan Singh University Campus, Meerut during the winter season of 2010-11. Soil texture was sandy loam, soil PH 7.4, low in organic carbon (0.41%) medium in available nitrogen (0.052%) phosphorus (0.0079%) and potassium (0.0202%). The experiment was laid out in factorial Randomized block design with three replication. There were applied a total number of nine treatment including control. The treatment involved in the study were nine in numbers i.e.

V_1R_0 (Vermi Compost @ 40 q/ha & No Rhizobium),

V_2R_0 (Vermi Compost @ 50 q/ha & No Rhizobium)

R_1V_0 (Rhizobium @ 240 gm/ha & No Vermi compost)

R_2V_0 (Rhizobium @ 300 gm/ha & No Vermi compost)

V_1R_1 (Vermi Compost @ 40 q/ha & Rhizobium@ 240 gm/ha)

V_1R_2 (Vermi Compost @ 40 q/ha & Rhizobium @ 300 gm/ha)

V_2R_1 (Vermi Compost @ 50 q/ha & Rhizobium @ 240 gm/ha)

V_2R_2 (Vermi Compost @ 50 q/ha & Rhizobium @ 300 gm/ha)

V_0R_0 (Control).

All the recommended cultural practices were done regularly during crop growth. The plot size for each treatment was 120x60 cm. The plant protection measures were taken up as and when required along with intercultural operations. The Biofertilizer (Rhizobium) were used as seed treatment two different doses i.e. (240 gm/ha +300 gm/ha). Vermi compost were used @ 40 q/ha and 50 q/ha, respectively. The field pea crop was analyzed in various treatments for key characters i.e. plant height, number of leave, number of branches, number of taken for flowering, pod length, Green pod yield were recorded.

Result &Discussion

Effect of Rhizobium:-

A perusal of data presented in table (1) revealed that various growth; parameters were significantly influenced by Rhizobium. The maximum Plant height (41.00 cm) branches per plant (6.50) & leave per plant (17.60) was recorded under Rhizobium @ 300 gm/ha and minimum in Rhizobium @ 240 gm/ha. This improvement in vegetative growth of plant may be accounted for significant role of Rhizobium in metabolism of leguminous plants. Similar findings were also observed by Kanaujia et al. (2003) and laguerre et al. (2007) in garden pea. The data presented in table 1 revealed that the significant by Rhizobium. The maximum length of pod (7.96 cm) and green pod yield (79.66 q/ha) were recorded at higher rate application of Rhizobium @ 300 gm/ha, while early flowering 40.00 days) was observed at lower rate application of Rhizobium @ 240 gm/ha. Similar results were obtained by Drew et al. (2007), Kumar et al., (2008) and Wani et al., (2008) in garden pea.

Effect of Vermi Compost:-

The data presented in Table 1 also showed that the various growth parameters were significantly influenced by vermi compost. The maximum plant height (40.00 cm), branch per plant (6.00) and leaves per plant (14.23) were recorded under higher rate application of vermi compost @ 50 q/ha in comparison to lower rate application of vermi compost @ 40 q/ha. Flowering &yield character were also significantlyinfluenced by the vermi compost. The maximum length of pod (7.10 cm) and green pod yield (76.34 q/ha) were recorded at higher rate application of vermi compost @ 50 q/ha). While early flowering (44.33) days was observed at lower rate application of vermi compost @ 40 q/ha. Increase in yield parameters of garden pea might be due that vermi compost rich in nutrients & enhance the soil moisture retention capacity, while early flowering at lower rate application may be due to that low availability of nutrients and plant entered in reproductive phase. Similar results were obtained by suryaman et al., (2006) and Tsvetkova et al., (2007) in garden pea.

Interaction effect of Rhizobium and vermi compost:

The interaction between Rhizobium and vermi compost data presented in Table 2 also showed that growth. Flowering & yield Parameters. The maximum plant height (45.00 cm) number of branches per plant (9.16) and number of leaves per plant (18.70) were recorded under combined application of rhizobium and vermi compost at higher rate R_2V_2 (Rhizobium @ 300 gm/ha + vermi

compost @ 50 q/ha), The maximum length of pod (9.90 cm) and green pod yield (107.33 q/ha) were recorded under combined application of Rhizobium and vermi compost at higher rare R_2V_2 (Rhizobium @ 300 gm/ha + vermi compost @ 50 q/ha), while flowering (36.00 day) was the recorded under the treatment R_1V_1 (Rhizobium @ 240 gm/ha + vermi compost @ 40 q/ha). Increasment in yield parameters might be due to the combined effect of vermi compost & rhizobium. Similar result was obtained by solanke et al, (2007) and Chaudhary et al. (2008) in pea crop.

Interaction effect of Rhizobium and vermi compost under the treatment R_2V_2 (300 gm/ha +V_2 50 q/ha) show the better result on plant height, number of branches plant, number of leaves per plant after sowing, length of pod & green pod yield in comparison to other interaction as well as individual application of rhizobium & vermi compost at various rates. Earliest flowering was recorded under treatment R_1V_1 (240 gm/ha + 40 q/ha) in experiment.

Conclusion:

Based on the results it may be concluded that combined application of rhizobium and vermi compost under the treatment R_2V_2 (R_2 @ 300 gm/ha + vermi compost @ 50 q/ha) is the ideal combination for obtaining the higher yield in garden pea.

Plant height (cm), Number of branches per plant. Number of leaves per plant, Number of days taken to flowering, Length of Pod (cm) and Green Pod yield (q/ha) as influenced by different treatments.

Table- 1

Treatment	Plant Height(cm)	No. of Branches per plant	No. of leaves per plant	No. of days taken to flowering	Length of Pod (cm)	Green Pod yield q/ha
Rhizobium						
R_1 (Rhizobium @ 240 gm/ha)	38.00	5.60	14.00	40.00	5.23	77.33
R_2 (Rhizobium @ 300 gm/ha)	41.00	6.50	17.60	48.00	7.96	79.66
Vermi Compost						
V_1 (Vermi Compost @ 40 q/ha)	39.00	5.16	12.66	44.33	6.63	71.66
V_2 (Vermi Compost @ 50 q/ha)	40.00	6.00	14.23	45.00	7.10	76.34
Control	35.00	4.10	9.33	54.00	4.10	47.66
CD at 5%	**2.152**	**0.202**	**1.191**	**2.650**	**0.386**	**4.802**

Table- 2 Interaction Effect of Plant height (cm), Number of branches per plant. Number of leaves per plant, Number of days taken to flowering, Length of Pod (cm) and Green Pod yield (q/ha) as influenced by different treatments.

Interaction (RxV)	Plant Height(cm)	No. of Branches per plant	No. of leaves per plant	No. of days taken to flowering	Length of Pod (cm)	Green Pod yield q/ha
T_1 (R_1V_1)	40.33	5.73	14.10	36.00	6.86	81.00
T_2 (R_1V_2)	41.00	7.40	13.93	39.66	7.40	86.33
T_3 (R_2V_1)	42.00	8.10	18.10	38.00	8.10	91.00
T_4 (R_2V_2)	45.00	9.16	18.70	38.10	9.90	107.33
Control (R_0V_0)	35.00	4.10	9.33	54.00	4.10	47.66
SE (m) ±	0.650	0.131	0.650	0.653	0.060	1.69
CD at 5%	2.150	0.443	2.152	2.154	0.197	6.29

REFERENCES

Champawat RS (1990). Effect of dual inoculation of Rhizobium and vesicular arbuscular microrhizal fungi on garden pea *pisum sativam*. Folia Microbiol. **35** (3) :236-239.

Chaudhary RL, Chaudhary AA, Khawal VS, Potakile SN, and More SR (2008). Nutrient management studies in chick pea (Cicer arietinum). *Journal of soils and crops*, **2**(18) : 174-177.

Drew EA, Gupta VSR and Roget DK (2007). Herbicide use, Productivity, and nitrogen fixation in field per (*Pisum stivum*).*Australian Journal of Agricultural Research,* **58**(12) :1204-1214.

Kanaujia SP and Arayan R (2003). Effect of phosphorus potassium and Rhizobium inoculation on day matter accumulation and nutrient uptake by garden pea. Applied *Biological Research*, **5**(1/2) 32-35.

Kumar V and Gupta P (2008). Efficiency of fly-ash based Rhizobium on growth and incidence of powdery mildew in pea. *Annuals of plant Protection Science,* **16**(1) :248-249.

Laguerre G, Depret G, Bourion V and Duc G (2007). Rhizobium leguminosarum cv. Viciae genotype interact with pea plants in developmental responses of nodules, roots and shoots. *New philologist*, **176** (3) : 680-690.

Prasad and Maurya (1989). Interaction effect of Rhizobium, Phosphorus and gibberellic acid on nodulation of garden pea cv. *Arkel. Scientific Hort.* **6** :133-135.

Solonke RS, Dhumal AV and Kashirsagar D (2007). Effect of organic manures and inorganic fertilizers on growth and yield of garden pea (*Pisum sativum* L.).*Asian Journal of soil science*, **2**(2) : 153-155.

Subba Rao NS (1976). Field response of legumes in India to inoculation and fertilizers application *International Bio Programme*. **7** : 255-268.

Tsvetkova GE and Georgiev GI (2007). Charge in phosphate fractions extracted from different organs of phosphorus starved nitrogen fixing pea plants. Journal of plant Nutrition, **30** (10/12) : 2129-2140.

Wani PA, Khan MS and Zaidi A (2008). Effect of Metal- tolerant Plant growth-promoting Rhizobium on the performance of pea grown in metal-amended soil. Archives of Environmental/ contamination and Toxicology, **55**(1) : 33-42.