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Research Article

Effect of Different types Organic Manure on Growth, Yield and Quality of Garden Pea *(Pisum sativum)*. (Ver. - KASHI NANDHINI)

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ABSTRACT

A study on the effect of different types of organic manure on the growth and yield of pea under organic manure based system was conducted at Research form center, Department of Agriculture Science & Technology, AKS University, Satna (M.P.) to access the potential of these different organic manure in replacing the chemical fertilizer for pea production in research form center. The study area size was carried out in 2.25 m × 2 m with 12 sub-plots for each treatment. The total number of 12 treatment and three replication were applied i.e. vermicompost@ 6 t/ha, mushroom spent@ 3 q/ha, paddy straw @ 5 t/ha, Rice husk @ 5. t/ha, Mushroom spent (25%) + Vermicompost (25%) + Paddy straw (25%) + Rice husk (25%), Mushroom spent (50%) + Vermicompost (50%), Mushroom spent (50%) + Paddy straw (50%), Mushroom spent (50%) + Rice husk (50%), Vermicompost (50%) + Paddy straw (50%), Vermicompost (50%) + Rice husk (50%), Paddy straw (50%) + Rice husk (50%), and control respectively by applying the Randomized Block Design (RBD) in the present study of the one year crop data trail, it was found out that the organic manure vermicompost had marked the influence on the growth parameter like plant height, number of branches, number of pods per plant, number of peas per pod, root length, and pod yield. The plant under vermicompost found out to be the most effective for the marketable yield of pea than the other treatment. The vermicompost treatment gives the highest marketable yield of 52.50 q /ha. So the treatment vermicompost emerged the best for the growth and yield attribute of pea as well as for vermicompost based to suite the environmental condition of Satna region.

Keywords: *Organic manure, Vermicompost, Pea, Growth and Yield.*

INTRODUCTION

Pea (*Pisum sativum* L.) is one of the most important vegetables in the world and ranks among the top 10 vegetable crop. Pea (*Pisum sativum* L.) derives from the Middle East and was first cultivated roughly 10,000 years ago (Mithen, 2003). In India pea covers an area of 5.83 lakh hectares with a production of about 40 lakh tonnes.

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UP is the most Pea growing state; UP alone produces about 46% of total pea produced in India. According to National Horticulture Board Estimates, (NHB, 2013-14). production adapted to local agro-climatic conditions, breeds of animals and plant cultivars with minimal negative effect on the natural environment (Kostadinova, Popov, 2012). Modern agriculture is getting more and more dependent upon the supply of synthetic inputs such as chemical fertilizers, pesticides and herbicides etc. which are inevitable to meet high food demand for growing population in the world. However, excessive, imprudent and imbalanced use of these inputs may throw devastating impacts on the water, air and soil environments. Probably the soil environment is the most vulnerable to the direct effects of these practices in modern agriculture. They could destroy the soil fertility in a long run which compels the scientific community to look for the alternatives like organic farming (Mishra, 2014). But the imbalance and improper use of chemical fertilizers has adverse effect on soil health thereby affecting the yield and sustainability of production, besides causing environmental pollution. Therefore, there is a need for judicious use of fertilizers for sustainable production and better soil health. This will help to sustain crop yield, improve the physical, chemical and biological properties of soil, and increase the efficiency of applied fertilizers (Singh & Biswas, 2000). Super phosphate fertilizers have been widely used to improve crop production. Due to high cost of superphosphate, focus is now on rock phosphate as a source of natural phosphorus (P) because of its relatively low cost and soil of the region being acidic, makes the P from rock phosphate also available. In respect of using micronutrients, Sarkar et al. (2007).

It has now been well realized that agroforestry can solve some of the major land-use problems of rain fed farming systems, and a great deal can be accomplished by improving the indigenous systems. Pea probably originated in south- western Asia, possibly northwestern India, Pakistan or adjacent area of former USSR and Afghanistan and thereafter spread to the temperate zone of Europe (KAY, 1979; & Makasheva, 1983). Based on genetic diversity, four centres of origin, namely. Central Asia, the Near east, Abyssinia and the Mediterranean have been recognized (Gritton, 1980).

Nitrogen nutrition is one of the paramount factors which influence growth and yield potential of many different vegetable crops. Suitable application of nitrogen to the growing pea plants was extensively studied by many investigators to attain favourable enhancing effects on growth, yield and quality. It also aids to soil health and provides quality of fodder for cattle. Multiple nutrient deficiencies are reported due to continuous use of only chemical fertilizers, reduction in production per unit area and deterioration of soil health (Kumpawat, 2010).

MATERIALS AND METHODS

The research work was carry out at Research centre, College, AKS University Technology and Sciences. Satna (M.P) during the period of November 2020 to March 2021. The experiment was carried out in a Randomized Block Design (RBD) with four different types of organic manures and the treatment was replicated three times. Treatment doses were vermicompost@ 6 t/ha, mushroom spent@ 3 q/ha, paddy straw @ 5 t/ha, Rice husk @ 5. t/ha, Mushroom spent (25%) + Vermicompost (25%) + Paddy straw (25%) + Rice husk (25%), Mushroom spent (50%) + Vermicompost (50%), Mushroom spent (50%) + Paddy straw (50%), Mushroom spent (50%) + Rice husk (50%), Vermicompost (50%) + Paddy straw (50%), Vermicompost (50%) + Rice husk (50%), Paddy straw (50%) + Rice husk (50%), and control. During the experimentation, growth and yield were recorded.

RESULT AND DISCUSATION

Plant height (cm)

At 30 DAS, The maximum plant height was found in T1 control with 9.05 cm. The minimum plant height was found in T2

vermicompost with 18.71 cm. At 60 DAS, The maximum plant height was found out in T1 control with 27.61 cm. The minimum plant height was found inT2 vermicompost with 41.96 cm. At 90 DAS, the maximum plant height was found out in T1 control with 36.63 cm. The minimum plant height was found in T2 vermicompost 52.98 cm.

Number of nodules per plant

The perusal of data in table indicated that the number of nodules per plant irrespective of the different treatments increased from 45 DAS and declined afterwards in the experimental period. The number of nodules was highest in the treatment T3 i.e. (Vermicompost) (22.06) and lowest in the treatment T1 control (4.73).

Fresh weight of plant

The highest weight of fresh weight was recorded in the treatment T3 (Vermicompost) (24.30) and lowest with T1 (control) (6.67).

Dry weight of plant

We dry up the arial parts of the plants part by the help of sunlight and hot air oven. After drying we take the weight of dry plant. As the plant size is bigger in T3 (Vermicompost) the weight of the plant also highest in T3 and lowest observed in control. In T3 and T1 we recorded the data was 22.31 gm and 4.69 gm respectively.

Number of pods/ plant.

The maximum number of pods per plant was found in T3 vermicompost with 22.8. The minimum number of pods per plant was found in T1 Control with 7.53 respectively. Sarkar et al. (2007) conducted an experiment and observed that the number of pods were higher with the application of vermicompost compared with the vermicompost.

Grain yield /plot (kg).

An examination of data showed positive effect of different types of organic manure on grain yield per plot of garden pea. The highest grain yield per plot (2.33 kg) was recorded with the application of 100 % vermicompost (T_3) which was significantly better than T_1 (Control, 1.05 kg), while the crop was sown without fertilization. Organic manure treatment of T_3 was found statistically at par with 100 % mushroom spent (T_2) and 100 % paddy straw (T_4) with the respective values of 2.18 kg and 2.06 kg, respectively.

Grain yield (q/ha.).

An examination of data showed positive effect of different types of organic manure on grain yield per hectare of garden pea. The highest grain yield per hectare (19.44 q/ha) was recorded with the application of 100 % vermicompost (T_3) which was significantly better than T_1 (Control, 8.72 q/ha), while the crop was sown without fertilization. Organic manure treatment of T_3 was found statistically at par with 100 % mushroom spent (T_2) and 100 % paddy straw (T_4) with the respective values of 18.19 q/ha and 17.19 q/ha, respectively.

Harvest index %.

An examination of data showed positive effect of different types of organic manure on harvest index of garden pea. The highest harvest index (49.98 %) was recorded with the application of 100 % vermicompost (T_3) which was significantly better than T_1 (Control, 44.59 %), while the crop was sown without fertilization. Organic manure treatment of T_3 was found statistically at par with 100 % mushroom spent (T_2) and Vermicompost (50%) + Mushroom Spent (50%) (T_6) with the respective values of 48.51 % and 48.38 %, respectively.

Quality:

The protein content in grains was calculated by multiplying the per cent of nitrogen in grain of each treatment with a factor 6.25 (A.O.A.C., 1995). The results were expressed as per cent protein content on dry weight basis. Nitrogen per cent was estimated by digesting plant samples with sulphuric acid, using hydrogen peroxide for removing green colour. Sodium hydroxide was added for neutralizing the excess of acid. Sodium silicate solution was used to prevent turbidity. Estimation of nitrogen was done by Colorimetric method, using “Nessler’s” reagent to develop colour (Snell & Snell, 1949). Nitrogen concentration was calculated and expressed in percentage.

Table 1: Effect of Different Type Organic Manures on Growth, Yield and Quality of Garden Pea

S.No.	Plant Hight 30days	P.H. 60days	P.H. 60days	Root Nodules 45 days	Fresh Weight	Dry Weight	No. of pod /plant	Seed yield / plot	Grain yield q/ha	Harvest index	Protein content
1.	9.06	27.16	36.63	4.73	6.67	1.56	7.53	1.05	8.72	44.59	16.26
2.	18.71	41.96	52.98	18.73	24.31	5.98	22.80	2.18	18.19	48.51	24.18
3.	21.21	45.22	54.24	22.07	27.63	7.44	24.40	2.33	19.44	49.98	24.75
4.	18.21	40.58	52.38	15.87	22.90	5.63	18.40	2.06	17.19	47.87	23.63
5.	9.88	27.70	41.20	6.47	11.63	2.06	9.20	1.14	9.50	45.76	18.11
6.	16.94	39.22	50.94	14.13	22.42	5.39	16.93	2.04	16.97	48.38	23.50
7.	14.29	36.82	47.71	12.93	19.15	4.53	15.40	1.71	14.25	47.10	22.39
8.	14.01	36.05	47.09	11.73	18.67	4.23	15.07	1.63	13.61	46.69	21.98
9.	16.13	38.52	50.01	13.53	21.91	4.97	16.13	1.80	15.03	46.52	23.05
10.	14.74	37.02	47.70	11.93	20.39	4.76	15.93	1.74	14.47	46.29	22.69
11.	10.50	33.01	44.13	7.76	12.23	2.86	11.80	1.32	10.97	45.64	19.46
12.	11.95	34.32	45.40	10.27	15.68	3.09	14.27	1.45	12.06	46.07	20.25
Total	175.65	438.04	570.41	150.07	223.60	52.50	187.87	20.45	170.42	563.40	260.25

CONCLUSION

Based upon this experiment it is concluded that application of the 100 % vermicompost recorded the significantly higher grain yield (19.44 q/ha) and maximum net returns (₹ 106978.00 Rs/ ha), while highest B: C ratio of 3.43: 1:1 was obtained with the application of 100 % paddy straw. Hence, application of these nutrient can be adopted in semi-arid eastern plain zone of Madhya Pradesh.

However, these results are only indicative and require further experimentation to arrive at more consistent and final conclusion to be passed on to growers.

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Conflict of Interest

The author(s) declares no conflict of interest.

Author Contribution

All authors contributed equally to establishing the topic of the research and design experiment.

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