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Effect of Different Organic Inputs for Growth and Yield Characteristics of Pea (*Pisum sativam* L.) cv. Kashi Nandini

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ABSTRACT: The present investigation different organic inputs for growth and yield parameters was executed at Agricultural Research Centre, Department of Horticulture, Rabindranath Tagore University, Raisen (U.P.) during the year 2022-23 with twelve treatment and three replication. The plant population was not affected significantly by integrated nutrient management practices. The highest plant population, plant height, number of primary and secondary branches, number of leaves, fresh weight and dry weight of plant was recorded under (T_{10}) FYM+ Vermi-vash + Panchgavya + Jeevamrit followed by Mycorrhiza + vermi-vash + Jeevamrit. The yield attributes *viz*., number of pod/plant, pod length, number of seed/pod, yield/plant, green pod yield/ha and test weight were recorded highest with the application FYM + Vermi-vash + Panchgavya + Jeevamrit which was significantly superior over all the treatments. The lowest yield attributes was recorded under control treatment.

Keywords: Pea, FYM, Panchgavya, Jeevamrit, Mycorrhiza, Vermi-vash.

INTRODUCTION

The pea (*Pisum sativam* L.) is a common nutritious vegetable as well as pulse crop belongs to papelionacae family of dicotiledonous sub division of plant kingdom. The pea is grouped as *Pisum sativam* sub species *hortiense*. It's origin can be traced back to stone age, Ethopia is probably the main center of origin to pea. Pea probably originated in western Asia, north-western India, Pakistan or adjacent areas of former USSR and Afghanistan and therefore spread to the related zones of Europe (Kay, 1979; Makasheva *et al*., 1983) non-pigment peas used as a vegetable, was grown in United Kingdom in the middle ages.

The total area under pea cultivation in India is 540500 hectares with a production of about 5422100MT and productivity 10MT/Ha during 2018 (Anonymous, 2018). Major pea growing States are Uttar Pradesh, Madhya Pradesh, Punjab, Jharkhand, Himachal Pradesh, West Bengal, Chhattisgarh and Haryana. Madhya Pradesh occupies an area of 94990 hectares with a production of about 961550MT having the productivity of 10.2MT/Ha during 2018 (Anonymous, 2018). Pea is one of the important vegetables in the world and ranks among the top 10 vegetable crops. Pea is commonly used in human diet throughout the world and it is rich in protein (21-25 %), carbohydrates, vitamin A and C, Ca, phosphorous and has high levels of amino acids lysin and trypophan (Bhat *et al*., 2013).

Organic manures are basic sources of nutrients and play a vital role in increasing the efficiency of fertilizer. The high cost of fertilizers and very poor purchasing capacity of peasants restricts the use fertilizer under the conditions of escalating energy crisis. The high use of inorganic fertilizer can be reduced and at the same time soil health and environment pollution can be maintained through integrated use of organic sources of nutrients (Lokanath and Parameshwarappa 2006). Panchagavya has played a significant role in providing resistance to pests and diseases, resulting in increased overall yields. Spraying of panchgavya induces early flowering, high seed setting percentage and also it increases the growth and yield components with growth promoting activity and it is a low cost technology (Sireesha, 2013).

MATERIALS AND METHODS

The present experiment was conducted during the *Rabi* season of the year 2022-23. The experiment was laid out in randomized block design with twelve treatments and three replications. The land was prepared in the second fourth night of October and stubbles of previous crop and weeds were collected followed by harrowing and coarse seed bed is obtained which is most suited for pea crop. Seeds were treatment by trichoderma and after that seed sown @ 100 kg ha^{-1}. Sowing was undertaken by drilling method keeping 45 cm distance between two rows while plant to plant distance maintained was 10 cm after moistening the field with irrigation. The following parameter were studied: growth and yields attributes traits viz. Plant population/sq.m, Plant height (cm), Number of

branches plant^{-1}, Number of leaves plant^{-1}, Fresh weight plant^{-1}, Dry weight plant^{-1}, Number of pods plant^{-1}, Pod length (cm), Number of seed pod^{-1}, Yield plant^{-1} (kg), Green pod yield (kg ha^{-1}) and Test weight (g). The data collected during the course of present investigation were statistically analyzed by adopting standard methods known as 'Analysis of Variance' (Panse and Sukhatme 1969).

RESULTS AND DISCUSSION

The data presented in Table 1 revealed that plant population and plant height was affected significantly due to various treatments. The maximum plant population was recorded under the application (T_{10}) FYM+ Vermi-vash + Panchgavya + Jeevamrit (45.41) which was significantly at par with application (T_{11}) Mycorrhiza + vermi-vash + Jeevamrit (43.98) respectively. The minimum plant population was chronicled in treatment (T_1) Control (28.12) followed by treatment (T_8) Panchgavya (32.19) and (T_9) Jeevamrit (33.22) respectively.

Plant height a measure of growth was recorded periodically at an interval of 30 DAS, 60 DAS and 90 DAS. These data indicate that the maximum plant height were found in the treatment of (T_{10}) FYM+ Vermi-vash+ Panchgavya + Jeevamrit (24.02 cm), (39.10 cm) and (74.84 cm) respectively, which was significantly at par with treatments (T_{11}) Mycorrhiza + vermi-vash + Jeevamrit (24.02 cm), (39.10 cm) and (74.84 cm) and also treatment (T_{12}) Sagrica (Granule) + Sagrica liquid + Jeevamrit (23.21cm), (38.74 cm) and (74.36 cm) respectively.

Number of branches per plant and number of leave per plant a measure of growth was recorded periodically at an interval of 30 DAS, 60 DAS and 90 DAS. The data related to number of branches per plant and number of leave per plant at successive growth stages of the crop are given in Table 2. These data indicate that the maximum number of branches per plant was found in the treatment of (T_{10}) FYM+ Vermi-vash+ Panchgavya + Jeevamrit (2.64), (4.47) and (6.21) respectively, which was significantly at par with treatments (T_{11}) Mycorrhiza + vermi-vash + Jeevamrit (2.60) and (6.18) at 30 and 90 DAS respectively. At 30, 60 and 90 DAS, treatment (T_{10}) FYM+ Vermi-vash + Panchgavya + Jeevamrit recorded maximum number of leave per plant (30.07), (58.46) and (96.56) respectively. The minimum number of leave per plant at 30, 60 and 90 DAS was chronicled in treatment (T_1) Control (24.56), (49.98) respectively.

The data revealed that highly significant difference for fresh weight per plant and dry weight per plant at 60 DAS give in Table 3. At 60 DAS, treatment (T_{10}) FYM+ Vermi-vash + Panchgavya + Jeevamrit recorded maximum fresh weight per plant (76.21 g). The minimum fresh weight per plant at 60 DAS was chronicled in treatment (T_1) Control (62.34 g) followed by treatment (T_2) FYM + Jeevamrit (63.91 g) respectively. At 60 DAS, treatment (T_{10}) FYM+ Vermi-vash + Panchgavya + Jeevamrit recorded maximum dry weight per plant (4.38 g). The minimum dry weight per plant at 60 DAS was chronicled in treatment (T_1) Control (3.28 g) followed by treatment (T_2) FYM + Jeevamrit (3.70 g) respectively.

The increase in plant growth attributed to the increase availability of nutrients with the application of inorganic fertilizer, continuous supply of macro and micro nutrients from FYM and vermicompost, which helped in acceleration of various metabolic processes viz., photosynthesis, energy transfer reaction and symbiotic biological N – fixation process. These results are in close agreement with the findings of Chaudhury *et al.* (2005); Bahadur *et al.* (2006); Negi *et al.* (2006); Susheela *et al*. (2007); Mishra *et al.* (2010).

The data revealed that highly significant difference for number of pod per plant and pod length give in Table 3. The number of pod maximum was found treatment (T_{10}) FYM+ Vermi-vash + Panchgavya + Jeevamrit (11.58) followed by (T_{11}) Mycorrhiza + vermi-vash + Jeevamrit (11.11) and (T_{12}) Sagrica (Granule) + Sagrica liquid + Jeevamrit (10.92) respectively. The pod length maximum was found treatment (T_{10}) FYM+ Vermi-vash + Panchgavya + Jeevamrit (10.84 cm) followed by (T_{11}) Mycorrhiza + vermi-vash + Jeevamrit (10.56 cm) and (T_{12}) Sagrica (Granule) + Sagrica liquid + Jeevamrit (10.18 cm) respectively. The minimum number of pod per plant and pod length was chronicled in treatment (T_1) Control followed by treatment (T_2) FYM + Jeevamrit (7.92 cm) and (T_3) Vermi-compost + Jeevamrit respectively.

The data presented in Table 4 revealed that number of seed per pod, yield per plant, grain pod yield per hectare and test weight was affected significantly due to various treatments. The maximum number of seed per pod was recorded under the application (T_{10}) FYM+ Vermi-vash + Panchgavya + Jeevamrit (8.53) and minimum was chronicled in treatment (T_1) Control (6.29). The maximum yield/plant was recorded under the application (T_{10}) FYM+ Vermi-vash + Panchgavya + Jeevamrit (0.280 kg) followed by with application (T_{11}) Mycorrhiza + vermi-vash + Jeevamrit (0.273 kg) and (T_{12}) Sagrica (Granule) + Sagrica liquid + Jeevamrit (0.261 kg) respectively. The minimum yield/plant was chronicled in treatment (T_1) Control (0.165 kg) followed by treatment (T_8) Panchgavya (0.192 kg) and (T_9) Jeevamrit (0.200 kg) respectively.

The maximum green pod yield/ha was recorded under the application (T_{10}) FYM+ Vermi-vash + Panchgavya + Jeevamrit (157.13 q.) followed by with application (T_5) Mycorrhiza+Vermi-compost + Jeevamrit (141.23 q.) and (T_6) Vemi-compost +Vermivash (136.57 q.) respectively. The minimum green pod yield/ha was chronicled in treatment (T_1) Control (45.00 q.) followed by treatment (T_9) Jeevamrit (70.00 q.) respectively. The maximum test weight was recorded under the application (T_{11}) Mycorrhiza + vermi-vash + Jeevamrit (102.12g) which was significantly at par application (T_{10}) FYM+ Vermi-vash+ Panchgavya + Jeevamrit (102.00g), (T_{12}) Sagrica(Granule) + Sagrica liquid + Jeevamrit (100.29g), (T_2) FYM + Jeevamrit (100.54g) and (T_3) Vermi-compost + Jeevamrit (98.20g), respectively. The minimum green pod yield/ha was chronicled in treatment (T_1) Control (80.41g) followed by treatment (T_9) Jeevamrit (94.00g), respectively.

Enhancement in yield attributes might be because of an

ideal condition for soil microflora with the application of FYM and vermicompost and good tilth and there by better availability of nutrients and hence such response. The results are in close agreement with the findings of Chaudhury *et al.* (2005); Bahadur *et al.* (2006); Negi *et al.* (2006); Susheela *et al*. (2007); Mishra *et al.* (2010).

Table 1: Effect of organic nutrients on plant population (sq.m) and plant height (cm).

Treatment No.	Treatments	Plant population (sq.m)	Plant height (cm)		
		30 Days	30 DAS	60 DAS	90 DAS
T1	Control	28.12	20.10	36.21	72.31
T2	FYM + Jeevamrit	34.88	20.98	36.32	72.45
T3	Vermi-compost + Jeevamrit	37.36	22.13	37.26	73.03
T4	Mycorrhiza+ FYM + Jeevamrit	39.20	22.16	38.30	73.28
T5	Mycorrhiza+Vermi-compost + Jeevamrit	40.32	23.14	38.45	73.87
T6	Vemi-compost +Vermivash	34.45	22.56	37.90	73.91
T7	Panchgavya + Jeevamrit	37.36	22.20	37.32	74.09
T8	Panchgavya	32.19	21.93	36.91	72.76
T9	Jeevamrit	33.22	21.70	37.10	72.91
T10	FYM+ Vermi-vash+ Panchgavya + Jeevamrit	45.41	24.02	39.10	74.84
T11	Mycorrhiza + vermi-vash + Jeevamrit	43.98	23.86	38.92	74.67
T12	Sagrica(Granule) + Sagrica liquid + Jeevamrit	42.49	23.21	38.74	74.36
SEd ±		**0.52**	**0.39**	**0.66**	**1.30**
CD at 5%		**1.55**	**1.18**	**2.02**	**3.95**

Table 2: Effect of organic nutrients on number of branches/plant and number of leave/plant.

Treatment No.	Treatments	Number of branches/plant			Number of leaves /plant		
		30 DAS	60 DAS	90 DAS	30 DAS	60 DAS	90 DAS
T1	Control	1.29	3.07	4.91	24.56	49.98	90.68
T2	FYM + Jeevamrit	1.32	3.12	4.97	24.98	50.05	91.00
T3	Vermi-compost + Jeevamrit	1.36	3.45	5.20	25.32	50.72	91.35
T4	Mycorrhiza+ FYM + Jeevamrit	1.49	3.60	5.52	28.32	54.30	94.57
T5	Mycorrhiza+Vermi-compost + Jeevamrit	2.06	3.64	5.61	28.63	54.90	94.23
T6	Vemi-compost +Vermivash	2.18	3.69	5.76	29.02	55.69	93.79
T7	Panchgavya + Jeevamrit	1.99	3.27	5.29	26.81	52.87	93.40
T8	Panchgavya	1.71	3.39	5.49	27.10	51.25	92.05
T9	Jeevamrit	1.86	3.42	5.60	27.54	51.97	92.64
T10	FYM+ Vermi-vash+ Panchgavya + Jeevamrit	2.64	4.47	6.21	30.07	58.46	96.56
T11	Mycorrhiza + vermi-vash + Jeevamrit	2.60	4.15	6.18	29.84	57.83	95.34
T12	Sagrica(Granule) + Sagrica liquid + Jeevamrit	2.41	4.03	5.98	29.41	56.18	95.10
SEd ±		**0.03**	**0.06**	**0.10**	**0.48**	**0.93**	**1.65**
CD at 5%		**0.09**	**0.19**	**0.29**	**1.46**	**2.83**	**4.01**

Table 3: Effect of organic nutrients on fresh weight/plant (g), dry weight/plant (g), number of pod/plant and pod length (cm).

Treatment No.	Treatments	Fresh weight/plant (g)	Dry weight/plant (g)	Number of pod/plant	Pod length (cm)
		60 DAS	60 DAS		
T1	Control	62.34	3.28	7.30	7.88
T2	FYM + Jeevamrit	63.91	3.70	7.97	7.92
T3	Vermi-compost + Jeevamrit	64.23	3.87	8.10	8.25
T4	Mycorrhiza+ FYM + Jeevamrit	69.71	4.15	9.91	9.71
T5	Mycorrhiza+Vermi-compost + Jeevamrit	70.67	4.21	10.34	9.98
T6	Vemi-compost +Vermivash	71.82	4.28	10.85	10.16
T7	Panchgavya + Jeevamrit	65.47	3.99	9.45	9.55
T8	Panchgavya	65.93	4.03	8.56	8.87
T9	Jeevamrit	66.28	4.11	9.09	9.02
T10	FYM+ Vermi-vash+ Panchgavya + Jeevamrit	76.21	4.38	11.58	10.84
T11	Mycorrhiza + vermi-vash + Jeevamrit	74.86	4.36	11.11	10.56
T12	Sagrica(Granule) + Sagrica liquid + Jeevamrit	73.50	4.31	10.92	10.18
SEd ±		**1.19**	**0.07**	**0.19**	**0.16**
CD at 5%		**3.62**	**0.21**	**0.59**	**0.49**

Table 4: Effect of organic nutrients on number of seed /pod, yield/plant (kg), green pod yield/ha and test weight (g).

Treatment No.	Treatments	Number of seed /pod	Yield/plant (kg)	Green pod yield/ha. (q)	Test weight (g)
T1	Control	6.29	0.165	45.00	80.41
T2	FYM + Jeevamrit	7.04	0.232	103.43	100.54
T3	Vermi-compost + Jeevamrit	7.45	0.243	132.38	98.20
T4	Mycorrhiza+ FYM + Jeevamrit	7.99	0.231	104.82	97.447
T5	Mycorrhiza+Vermi-compost + Jeevamrit	8.10	0.220	141.23	95.23
T6	Vemi-compost +Vermivash	8.10	0.235	136.57	94.903
T7	Panchgavya + Jeevamrit	7.87	0.210	105.25	96.27
T8	Panchgavya	7.53	0.192	102.23	94.01
T9	Jeevamrit	7.69	0.200	70.00	94.00
T10	FYM+ Vermi-vash+ Panchgavya + Jeevamrit	8.53	0.280	157.13	102.00
T11	Mycorrhiza + vermi-vash + Jeevamrit	8.47	0.273	111.45	102.12
T12	Sagrica(Granule) + Sagrica liquid + Jeevamrit	8.31	0.261	100.01	100.29
SEd ±		**0.13**	**0.005**	**2.12**	**1.39**
CD at 5%		**0.41**	**0.010**	**4.42**	**4.12**

CONCLUSIONS

Based on one year study, the application FYM+ Vermi-vash + Panchgavya + Jeevamrit followed by with application Mycorrhiza + vermi-vash + Jeevamrit and Sagrica (Granule) + Sagrica liquid + Jeevamrit recorded highest yield as well as net return (Rs/ha). The farmers are advised that among the organic nutrient management practice FYM+ Vermi-vash + Panchgavya + Jeevamrit was the best application for enhance the productivity of pea.

FUTURE SCOPE

The farmer used different types of organic inputs for improve of soil fertility and structural integrity. The subject's organic compounds are blended together at the proper moment and in the proper amount for this. More output may be obtained from the crop if employed. Additionally, the Indian government promotes the usage of new organic inputs in crops while also preparing numerous organic and encouraging farmers to adopt organic agricultural practices. Because of all these aspects organic materials have the potential to both protect crops and generate cash.

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