Response of vermi-compost on Growth and Yield of Pea (*pisum sativum* L.) cv. Arkel

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Abstract: The present investigation "Response of vermi-compost on growth and yield of pea (*Pisum sativum* L.) cv. Arkel'' comprised of seven treatments consisting of three level of vermi-compost, three level of vermi-compost with NPK, and one level of FYM + NPK. During the experimentation, growth character and yield characters were recorded. The germination of pea cv. Arkel, Seeds became faster with T_4 (vermi-compost-10 t/ha+NPK) treatment but there after the germination occurred at slower rate and days taken for completion of germination increased progressively. The T_4 (vermi-compost-10 t/ha + NPK) treatment exhibited the maximum nodule formation and yield. A comparative study of the present findings led to the conclusion that sowing of pea with the application of vermi-compost @ 10 t/ha and NPK @ 25:60:50 kg/ha was found most effective to best growth of pea crop under Srinagar valley condition of Garhwal region of Uttrakhand state. [Nature and Science 2010;8(4):18-21].ISSN:1545-0740).

Keywords: *Pisum sativum,* vermi-compost, FYM, NPK

1. Introduction

Pea (*Pisum sativum* L.) is one of the most important ancient vegetable and belongs to the family Leguminaceae. It ranks third or fourth in world wide production, amongst the grain legumes (Farrington, 1974). The pea generally called as legumes (pod bearing plants). Because, they are characterized by the pods with a single cavity ovary which splits along two margins when dry, legumes thus have ability to improve the soil fertility and structure.

The plants of pea are 35-60 cm tall. The plant is short leaved, herbaceous annual, glaucous which climbs by leaf let tendrils. The stem is slender, circular and weak. The root system is not strongly developed except taproot. Peas are grown particularly on all types of soil from light sandy to heavy clay. Frequent irrigation tends to increase vegetative growth at the expense of pod formation (Singh and Joshi, 1970). Pea have specific requirement in respect of seasonal changes in temperature during their growth cycle.

The "Vermi-compost" (The compost made from organic matter with the use of earth worm) has gained impetus in organic farming to boost agricultural production to its important multifarious features such as being rich in nutrients, vitamins, growth regulators, free from pathogen and containing immobilized micro flora.

2. Material and Methods

The present investigation entitled "Response of vermi-compost on growth and yield of pea (*Pisum sativum* L.) cv. Arkel'' was carried out during 2006-2007 at Horticultural Research Centre, Chauras Campus, HNB Garhwal University, Srinagar (Garhwal) to standardize the optimum dose of vermi-compost for obtaining best growth, flowering and production. The Horticultural Research Centre of HNB Garhwal University, Srinagar (Garhwal) is situated in the Alaknanda valley which lies between 78^0 47′ 30" E longitude and 30^0 13' 0" N latitude, right in the heart of Garhwal region at an elevation of 540 m above MSL, in the lesser Himalayan region. The minimum and maximum temperature, relative humidity and rainfall vary between 6.7 to 36.5^0 C, 55.45 to 95.23% and 3.05 to 324.28 mm, respectively.

The experiment comprised of seven treatments consisting of three level of vermi-compost, three level of vermi-compost with NPK, and one level of FYM + NPK was laid out in randomized block design with three replication. The treatments are as, 10 t/ha Vermi-compost (T_1), 15 t/ha Vermi-compost (T_2), 20 t/ha Vermi-compost (T_3), 10 t/ha Vermi-compost + 25kg/ha N +60kg/ha P +50kg/ha K (T_4), 15 t/ha Vermi-compost + 25kg/ha N + 60kg/ha P + 50kg/ha K (T_5), 20 t/ha Vermi-compost + 25kg/ha N + 60kg/ha P + 50kg/ha K (T_6), 20 t/ha FYM+25 Kg/ha N + 60kg/ha P + 50kg/ha K (T_7). Basal application of ½ dose of N in the form of urea, full dose of P in the form of single super phosphate (S.S.P.) and K in the form of murate of potash, and vermi-compost with broad cast method was done.

Rest half dose of N was applied 30 days after germination.

During the experimentation, Five plants under each treatment combination were randomly selected and tagged for recording the observation on growth and yield characters (whenever required).

Growth Characters

1. Days taken to germination
2. Number of nodules per plant
3. Fresh weight of nodules per plant
4. Dry weight of nodules per plant
5. Plant height

Yield Characters

1. Days taken to first flowering
2. Number of pods per plant
3. Number of grains per pod
4. Fresh weight of 100 grains
5. Yield per plant
6. Yield per plot
7. Yield per hectare

After sowing, each plot was regularly watched to record the number of days taken for full germination (about 75% germination was considered full germination). Five plants were randomly uprooted carefully along with soil from each treatment at flower bud initiation. The roots of plants were dipped in water for some time to facilitate the removal of soil from the roots without damage. The number of nodules present on the roots counted under each treatment and then averaged. The nodules of five plants under each treatment were carefully removed with the help of forceps. Weighted on the electronic top loading balance for getting their accurate fresh weighs and finally averaged. Freshly weighted nodules from five plants were put in oven for drying at 60^0C for 72 hrs. The nodules were again weighted on electronic top loading balance and averaged. Height of the selected plants were recorded from ground level to the tip of apical buds at last picking stage and then averaged to get mean heights.

Days taken for appearance of first flower from the date of sowing were recorded on randomly selected and tagged plants under each treatment. Then average days required for flowering were calculated. Number of pods from randomly selected plants under each treatment were counted after each picking and then summed up to get average. After each picking, ten pods were randomly collected from each treatment and grains inside per pod were counted. The average number of grains per pod was worked out. A composite sample of seeds was drawn from five tagged plants and then weight of 100 seeds were recorded for the purpose. After each picking green pods per plant, pods per bed were weighed under each treatment to work out cumulative total which was then converted into yield q/ha.

3. Results and Discussion

The germination of pea cv. arkel. Seeds became faster with T_4 (vermi-compost-10 t/ha+NPK) treatment but there after the germination occurred at slower rate and days taken for completion of germination increased progressively. The T_4 (vermi-compost-10 t/ha) treatment exhibited the maximum nodule formation. The performance of pea with respect to germination and nodulation was influenced by the temperature, rainfall, humidity etc. Lopes *et al*.(1996) reported that an increase in levels of vermi-compost upto 10 t/ha significantly increased nodulation and dry matter yield of cowpea over rest of the treatments.

Here, under Srinagar valley condition, the vermi-compost-10 t/ha showed the best growth of pea cv. Arkel. These findings were agreed with Lopes *et. al.* Plant height of pea was significantly increased by different Vermi-compost levels over control. Under the present investigation, the maximum, significant plant height was recorded under T_4 (vermi-compost-10 t/ha+NPK) treatment. The maximum growth of pea with the application of Vermi-compost 10 t/ha. Reddy *et. al.* (1998) also recorded maximum plant height at harvest, days to first flowering and branches per plant with the application of Vermi-compost – 10 t/ha and recommended dose of NPK 27.5:60:50 kg/ha in garden pea.

Data recorded on Growth characters have been presented in table-1.

Table 1: Effect of vermi-compost on days taken to germination, No. of nodules/plant, Fresh weight of Nodules and Dry weight of nodules.

T	DTG	N/P	FWN (in gm)	DWN (in gm)
T_1	14.66	4.55	0.040	0.131
T_2	12.66	4.52	0.056	0.202
T_3	11.33	4.24	0.060	0.171
T_4	11.26	4.25	0.023	0.073
T_5	14.00	4.36	0.051	0.158
T_6	13.66	3.37	0.031	0.111
T_7	15.00	4.10	0.046	0.144

Acronym used: T = Treatment, DTG=Days taken to Germination, N/P= No. of Nodules/Plants, FWN=

Fresh weight of nodules, DWN= Dry weight of nodules

Data recorded on plant height have been presented in table-2. Data indicate that the maximum significant height (47.42cm) was produced by T_4 (vermi-compost-10 t/ha+NPK) treatment.

Table 2:-Effect of vermi-compost on plant height

T	15 Days	30 Days	45 Days	P
T_1	19.56	31.91	46.29	47.33
T_2	20.32	26.39	39.46	41.43
T_3	18.86	29.27	43.77	46.07
T_4	17.93	31.10	40.97	47.42
T_5	18.94	27.73	40.11	45.58
T_6	16.52	27.38	39.54	46.05
T_7	19.62	31.36	38.95	41.06

Acronym used: T = Treatment, P = Picking

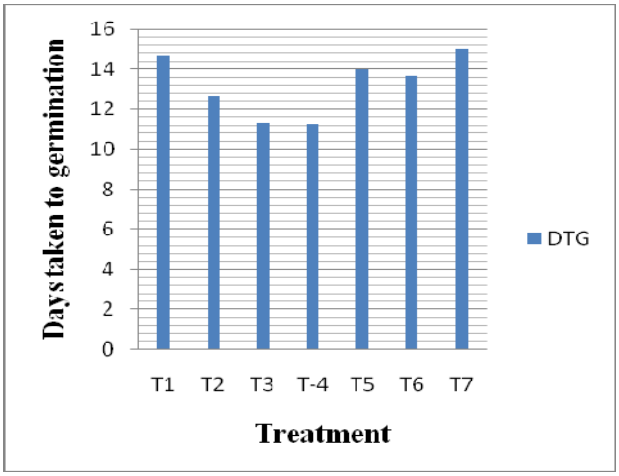

Fig 1:- Effect of vermi-compost on days taken to germination

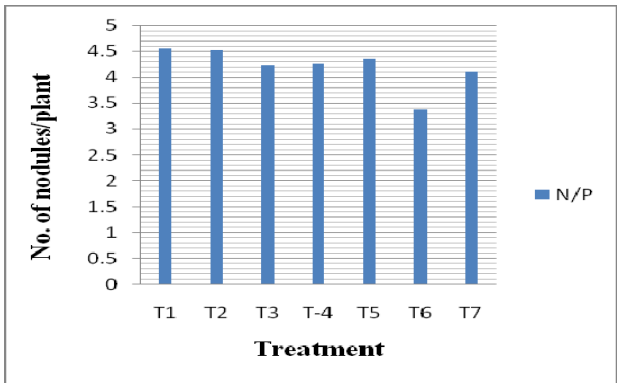

Fig 2:- Effect of vermi-compost on no. of nodules per plant

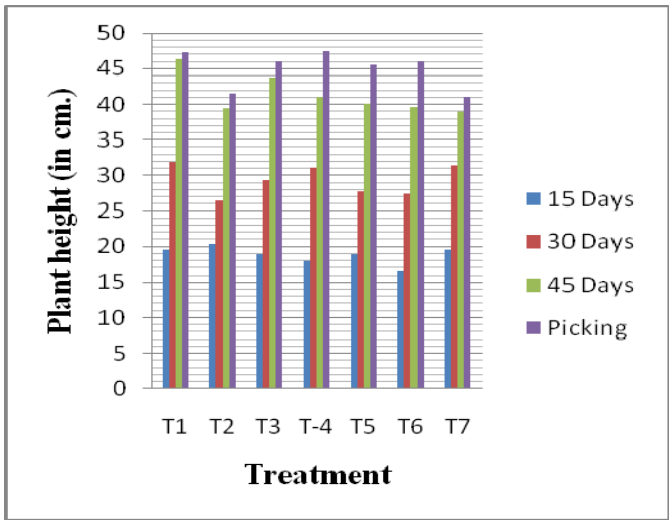

Fig3:- Effect of vermi-compost on plant height

Table3:-Effect of vermi-compost on yield characters of Pea

T	DTF	No. P/P	No. G/P	F W 100 G (in gm)	Y/P	Y/Pt (kg)	Y q/ha
T_1	16.46	6.00	6.36	50.33	2.10	14.94	81.11
T_2	17.80	6.46	6.33	46.00	2.76	12.25	64.48
T_3	19.00	7.00	6.33	40.33	3.95	9.70	75.41
T_4	19.40	6.46	6.73	50.66	7.55	15.21	85.73
T_5	18.53	7.46	6.63	41.00	2.40	14.24	62.98
T_6	18.86	5.66	6.03	47.00	3.70	13.21	63.45
T_7	18.93	6.93	6.72	41.33	2.30	11.20	60.16

Acronym used: T = Treatment, DTF = Days taken to first flowering, No. P/P = Number of pods per plant, No. G/P = Number of grains per pod, F W 100 G =

Fresh weight of 100 grains, Y/P = Yield per plant, Y / Pt= Yield per plot, Y = Yield per hectare

Data recorded on yield characters are presented on table- 3 data indicate that, Vermi-compost levels also influenced the number of pods per plant. The highest pod number was obtained with T_5 (Vermi-compost- 15 t/ha + NPK 25:60:50 kg/ha) treatment under the present study. An increasing trend in number of grains per pod was observed in pea with increasing levels of Vermi-compost, and the maximum being under T_4 (Vermi-compost- 10 t/ha+NPK, 25:60:50 kg/ha) level. Vermi-compost doses significantly increased the yield per hectare over control. Having produced the maximum yield per hectare found under T_4 (Vermi-compost- 10 t/ha+NPK, 25:60:50 kg/ha) treatment obtained the top rank.

A comparative study of the present findings led to the conclusion that sowing of pea with the application of vermi-compost @ 10 t/ha and NPK @ 25:60:50 kg/ha was found most effective to best growth of pea crop under Srinagar valley condition of Garhwal region of Uttrakhand state.

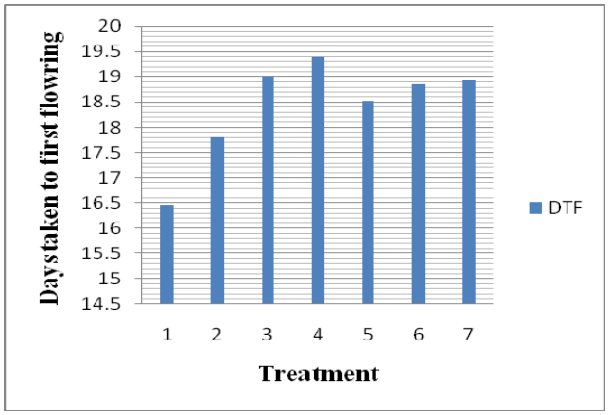

Fig4:- Effect of vermi-compost on days taken to first flowering

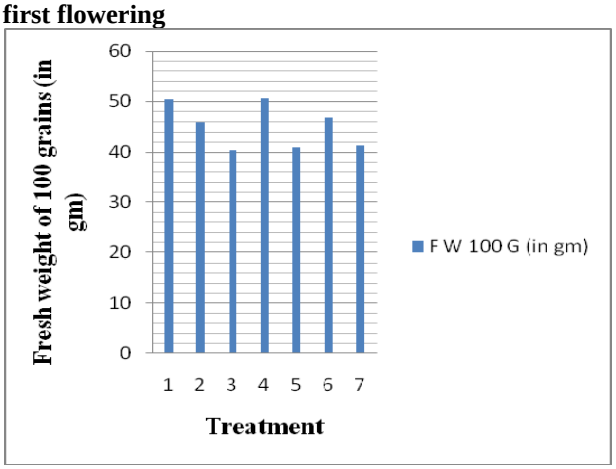

Fig 5:- Effect of vermi-compost on fresh weight of 100 grains

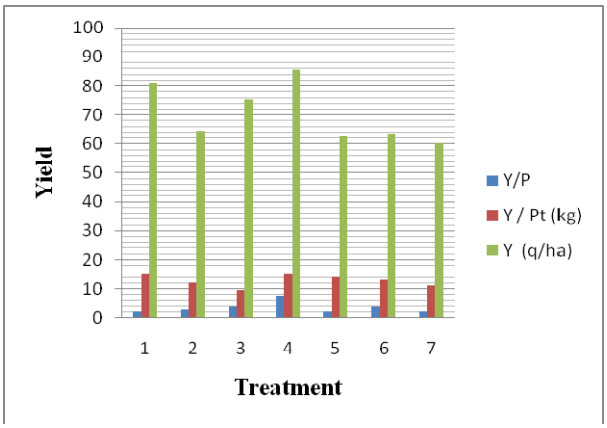

Fig. 6:- Effect of vermi-compost on yield per plant, yield per plot & yield per hectare

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