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RESEARCH ARTICLE

A study on effect of organic manures on pigeonpea [*Cajanus cajan* L.]

Alka Pandey, C. Tiwari and S. K. Singh

SUMMARY

The experiment was conducted at the Rajaula Agricultural Research farm of the Faculty of Agricultural Sciences, Mahatma Gandhi Chitrakoot Gramodaya Vishwavidyalaya, Chitrakoot – Satna (Madhya Pradesh) during *Kharif*, 2018-19. The objective was to find out the best treatment comprising of poultry manure and vermicompost on growth and yield of pigeonpea. In this investigation nine treatments were tested in Randomized Block Design with three replications. Randomly five plants were selected to record the observations on different seven characters. Significantly maximum seed yield/plot (1368.33 g) was recorded under T_8: P_2V_1 (4.0 q/ha Poultry manure +5.0 q/ha Vermicompost) followed by 1328.33-g T_7 P_2V_0 (4.0 q/ha poultry manure +0 q/ha Vermicompost) and over control.

Key Words : Pigeonpea, Poultry manure, Vermicompost, Number of pods, Number of nodules, Seed yield/plant, Yield attributes

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Pigeonpea is one of the important pulse crops of India and 91 per cent of the world's pigeonpea is produced in India. The productivity of pigeonpea in India (799 kg ha^{-1}) is far below the average productivity (848 kg ha^{-1}) of world. In India, it occupies an area of about 4.09 million hectares producing 3.27 million tonnes with an average productivity of 799 kg per hectare (Anonymous, 2011). The longer duration coupled with heavy incidence of pests during flowering and pod formation stage is detrimental to the productivity of pigeon The low yield of pigeonpea is mainly attributed to their cultivation on poor soils with inadequate and imbalanced nutrient application, nil application of organic manures and micronutrients like zinc. Since the soils are low in organic matter content, use of organic manures plays a

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vital role in improving soil physical condition, provides vital plant nutrients and maintains long term productivity of the soil. A process related to composting which can improve the beneficial utilization of organic wastes is vermicomposting. It is a non-thermophilic process by which organic materials are converted by earthworms and micro-organisms into rich soil amendments with greatly increased microbial activity and nutrient availability. Vermicompost's are products derived from the accelerated biological degradation of organic wastes by earthworms and micro-organisms. Earthworms consume and fragment the organic wastes into finer particles by passing them through a grinding gizzard and derive their nourishment from microorganisms that grow upon them.

Poultry manure is the faces of chickens used as an organic fertilizer, especially for soil low in nitrogen. Of all animal manures, it has the highest amount of nitrogen, phosphorus and potassium. Chicken manure is sometimes pelletized for use as a fertilizer and this product may have additional phosphorus, potassium or nitrogen added.

Poultry waste comprises waste feed, solid and liquid dropping, litter, eggshell, diseased and dead birds, culled birds, feathers and the wastes from poultry sheds. Poultry waste management is highly complex and challenging because of associated problems like nitrate and heavy metal contamination in soil, crops, surface and ground water, air quality and odor, disposal of dead and diseased poultry and food safety. Poultry manure is good source of nutrients, particularly manure is good source of nutrients, particularly for vegetable.

MATERIAL AND METHODS

The present investigation was conducted at Chitrakoot, Satna (M.P.) during the *Kharif*, 2018-19. The objective was to find out the best treatment comprising of poultry manure and vermicompost on growth and yield of pigeonpea, for this region. In this investigation nine treatments *viz.,* T_1= P_0V_0 (Control), T_2= P_0V_1 (0 q/ha poultry manure +5.0 q/ha vermicompost), T_3=P_0V_2 (0 q/ha poultry manure +7.5 q/ha vermicompost), T_4=P_1V_0 (2.0 q/ha poultry manure +0 q/ha vermicompost), T_5=P_1V_1 (2.0 q/ha poultry manure +5.0 q/ha Vermicompost), T_6=P_1V_2 (2.0 q/ha poultry manure +7.5 q/ha vermicompost), T_7= P_2V_0 (4.0 q/ha poultry manure +0 q/ha vermicompost), T_8= P_2V_1 (4.0 q/ha poultry manure +5.0 q/ha vermicompost), T_9= P_2V_2 (4.0 q/ha poultry manure +7.5 q/ha vermicompost), were tested in Randomized Block Design with three replications. randomly five plants were selected to record the observations on different characters *viz.*, plant height, No. of branches, No. of pod per plant, No. of nodules per plant, seed yield per plant (g), seed yield per plot (g). Soil samples were collected separately from each plot of the experimental field to a depth of 0-15 cm prior to sowing of green gram crop. The soil of experimental site was sandy loam in texture, low in organic carbon, nitrogen and phosphorus and medium in available potassium.

The average rainfall in this area is approximately 60 – 80 cm, with maximum concentration during the monsoon *i.e.*, July to September, with a few occasional showers during the winter months and found that the integrated fertilizer levels application of FYM @ 5 t/ha + 100% RDF + seed inoculation of biofertilizers recorded significantly higher pigeonpea yield (15.74 q/ha). Pigeonpea equivalent yield (18.29 q/ha), gross returns (43930/ha), net returns (34650/ha) and B:C ratio (3.72) over other 1 NM practices but it was found to be on par with application of FYM @ 5 t/ha + 50% RDF + seed inoculation of biofertilizers (15.38q/ha, 17.83q/ha, 42847/ha, 34032/ha and B:C ratio 3.85, respectively) Sharma *et al.* (2012).

RESULTS AND DISCUSSION

The result presented in Table 1 revealed that significantly higher plant height (18.03 cm) and number of branches/plants (2.93 nos) was recorded in T_8 (P_2V_1 (4.0 q/ha poultry manure +5.0 q/ha vermicompost) at 30 DAS, respectively. Significantly maximum number of pod/plant (8.0 nos and 17.53 nos) at 90 DAS and 120 DAS and number of nodules/plant (27.27 nos) at 90 DAS was also recorded in the same treatment (T_8) (P_2V_1 (4.0 q/ha poultry manure +5.0 q/ha vermicompost), respectively. Highest number of branches/plant (12.93nos and 26.73nos) at 60 DAS and 90 DAS and number of nodules/plant (16.27) at 60 DAS was significantly higher in (T_4) P_1V_0 (2.0 q/ha poultry manure +0 q/ha Vermicompost) and highest plant height (54.46 cm) at 90 DAS was significantly higher in (T_6) P_1V_2 (2.0 q/ha poultry manure +7.5 q/ha vermicompost) and highest plant height (36.53 cm) at 60 DAS was recorded in (T_2) P_0V_1 (0 q/ha poultry manure +5.0 q/ha vermicompost). Data further revealed that significantly highest 1000 seed weight (8.85 g) and highest seed yield/plant (9.31 g) and seed yield/plot (1368.33 g) was also recorded in the same

Table 1 : Pigeonpea characters affected by organic manure

Sr. No.	Treatments	Plant height (cm) 30 DAS	Plant height (cm) 60 DAS	Plant height (cm) 90 DAS	Number of branches/plants 30 DAS	Number of branches/plants 60 DAS	Number of branches/plants 90 DAS	Number of pod per plants 90 DAS	Number of pod per plants 120 DAS	Number of nodules per plant 60 DAS	Number of nodules per plant 90 DAS	1000 seed weight (g)	Seed yield/ plant (g)	Seed yield/plot (g)
1.	T_1	16.77	34.95	51.21	2.67	12.13	25.27	6.87	15.27	13.67	24.47	8.38	6.28	1213.33
2.	T_2	17.99	36.53	53.67	2.8	12.6	25.87	7.47	16.13	15	25.8	8.73	6.75	1253.33
3.	T_3	17.2	34.26	52.01	2.67	11.73	25.53	7.2	15.6	14.93	24.27	8.35	8.47	1258.33
4.	T_4	16.51	36.06	54.24	2.73	12.93	26.73	7.67	16.8	16.27	25.67	8.77	7.37	1291.67
5.	T_5	16.58	34.14	51.93	2.73	11.6	24.27	6.4	15.87	14.4	24.33	8.43	8.09	1290.00
6.	T_6	16.77	35.23	54.46	2.73	12.73	26.4	7.2	17.27	15.8	25.87	8.81	8.3	1308.33
7.	T_7	17.71	33.92	52.97	2.8	11.93	24.93	7.27	15.27	14.67	24.73	8.49	7.28	1328.33
8.	T_8	18.03	36.4	54.43	2.93	12.33	26.33	8	17.53	16.07	27.27	8.85	9.31	1368.33
9.	T_9	13.94	29.26	43.61	2.6	11.2	21.13	3.93	13	10.53	20.6	8.5	7.46	1078.33
Maximum		18.03	36.53	54.46	2.93	12.93	26.73	8	17.53	16.27	27.27	8.85	9.31	1368.33
Minimum		13.94	29.26	43.61	2.6	11.2	21.13	3.93	13	10.53	20.6	8.35	6.28	1078.33
Average		16.68	34.23	51.51	2.75	12.12	24.94	6.72	15.75	14.38	24.62	8.6	7.72	1257.87
S.E.±		0.6	0.91	0.98	0.13	0.55	0.47	0.22	0.38	0.19	0.69	0.159	0.71	32.55
C.D. (P=0.05)		1.8	2.72	2.94	0.4	1.66	1.42	0.66	1.14	0.56	2.08	N/A	0.21	97.60
C.V.		6.19	4.56	3.26	8.34	7.9	3.25	5.55	4.14	2.2	4.85	3.197	1.57	4.45

treatment *i.e.* (T_8) (P_2V_1 (4.0 q/ha poultry manure +5.0 q/ha vermicompost). The above finding is broadly in agreement with report of Saad and Sharma (2003) and Menaria *et al.* (2003), Hamed (2003), Gawai *et al.* (2006), Singh *et al*. (2010) and Ali *et al*. (2010).

For going results and inferences revealed that presence of wide spectrum of exploitable variability in the material studied with respect the treatment combination T_8 showed maximum seed yield per plot (g) using vermicompost and poultry dung combination. Number of branches per plant and plant height has high values for different genetic parameters projecting thereby, immense scope for genetic upgradation in pigeonpea.

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