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Response of vermicompost and inorganic fertilizers on physico-chemical properties of soil, growth and yield attributes of cowpea (*Vigna unguiculata* L.) var. Kashi Kanchan

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Abstract

The details of the materials used and technologies adopted during the courses for present investigations entitled "Response of vermicompost and inorganic fertilizers on physico-chemical properties of soil, growth and yield attributes of cowpea (*Vigna unguiculata* L.) var. Kashi Kanchan". This experiment was conducted during kharif season 2018 on crop research farm of Soil Science and Agricultural Chemistry, Naini, SHUATS. The experiment was conducted in randomized block design with three replication consisting of nine treatments. The observation were recorded viz., plant height (cm), number of leaves per plant, number of pods per plant at 45 days, weight of pods per plant (kg) harvesting after 5 days and pods yield (q ha⁻¹). Data on different aspects of cowpea crop were subjected to statistical analysis as per the procedure of randomized block design (Panse and Sukhatme, 1967). To achieve higher growth and yield of rainy cowpea variety Kashi Kanchan application of T₅ (I₂F₃) @ 50% (N,P,K) + @ 100% vermicompost was found equally effective under Prayagraj conditions..

Keywords: NPK, vermicompost, growth, yield and cowpea

Introduction

Cowpea [*Vigna unguiculata* (L.) Walp] belonging to family Leguminosae, chromosome No. (2n = 22 or 24) also known as southern pea and black eye pea, is one of the most important vegetable'. It is cultivated for its long, green or purplish pods to be cooked as vegetable or for dry seeds used as pulse. Its foliage is also used as fodder or green manure, producing 20-30cm elongated kidney shaped, 8-12mm long seeds. In India cowpea has been known, since the Vedic period and it is grown almost throughout the country. It is fairly an inexpensive source of vegetables protein. Hence it deserves to get a place in every farms and kitchen gardens. Legumes are rich sources of protein (Singh 2002, Parrek and Chandra 2003) [12, 9] that is required for growth and maintenance of body. According to Aykroyd (1941) [2] fresh green pods of cowpea contains about 24.6% protein and vitamin B 500 mg per 100g green pods. Protein content in the cowpea seeds varies from 23.09 to 28.75 % (Singh, 1972) [13]. So it has got potential to solve the protein problems

Organic manures provide many nutrients, substrate for the growth of microorganisms, reduce the soluble and exchangeable aluminum temporarily by forming complexes and or chelates with organic substances in acidic soils and providing favorable environment for plant growth and also improved physical, chemical and biological properties (Chettri and Bandhopadhaya, 2005) [3].

Organic manure vermicompost help in the improvement of soil structure, aeration and water holding capacity of soil. Further, it stimulates the activity of microorganisms that makes the plant to get the macro and micro-nutrients through enhanced biological processes, increase nutrient solubility, alter soil salinity, Sodicity and pH. (Alabandan *et al.*, 2009) [1]. Though, they contain relatively low concentrations of nutrients and handling them is labour intensive, there has been large increase in their use over inorganic fertilizers as nutrient source (Kannan *et al.*, 2005) [6].

Materials and Methods

The details of the materials used and technologies adopted during the courses for present

investigations entitled “Response of vermicompost and inorganic fertilizers on physico-chemical properties of soil, growth and yield attributes of cowpea (*Vigna unguiculata* L.) var. Kashi Kanchan” The experiment was conducted during kharif season 2018 on crop research farm of the department of Soil Science and Agricultural Chemistry, Naini, SHUATS. It is positioned at 25.57⁰N Latitude and 81.5⁰E latitude and about 98m above sea level. The experiment was conducted in randomized block design with three replication, consisting of nine treatments T₀ = Control, T₁ (I₁F₂) = @ 0% (N,P,K) + @ 50% vermicompost, T₂ (I₁F₃) = @ 0% (N,P,K) + @ 100% vermicompost, T₃ (I₂F₁) = @ 50% (N,P,K) + @ 0% vermicompost, T₄ (I₂F₂) = @ 50% (N,P,K) + @ 50% vermicompost, T₅ (I₂F₃) = @ 50% (N,P,K) + @ 100% vermicompost, T₆ (I₃F₁) = @ 100% (N,P,K) + @ 0% vermicompost, T₇ (I₃F₂) = @ 100% (N,P,K) + @ 50% vermicompost and T₈ (I₃F₃) = @ 100% (N,P,K) + @ 100% vermicompost. The observation were recorded viz., plant height (cm), number of leaves per plant, number of pods per plant at 45 days, weight of pods per plant (kg) harvesting after 5 days and pods yield (q ha⁻¹). Data on different aspects of cowpea crop were subjected to statistical analysis as per the procedure of randomized block design. Significance of difference between means for different factors was tested through ‘F’ test and least significant differences were calculated whenever variance ratio was found significant at five percent level for treatment effect (Panse and Sukhatme, 1967) [8].

Results and Discussion

The plant height number of leaves per plant, number of pods per plant, weight of pods per plant and pods yield (q ha⁻¹) increase significantly with the increase in the different levels

of vermicompost and inorganic fertilizers also showed significant results. the maximum plant height of cowpea at different days after sowing (DAS) at 30 DAS found in T₅ (I₂F₃) @ 50% (N,P,K) + @ 100 % vermicompost which was (72.16cm) and the minimum plant height (64.88cm) was found in T₀ control. The maximum number of leaves per plant of cowpea at different days after sowing (DAS) at 45 DAS found in T₅ (I₂F₃) @ 50% (N,P,K) + @ 100% vermicompost which was (31.17) and the minimum number of leaves per plant (26.13) was found in T₀ control. The maximum number of pods per plant of cowpea at 1st harvest at 45 days found in T₅ (I₂F₃) @ 50% (N,P,K) + @ 100% vermicompost which was (10.87) and the minimum number of pods per plant (7.97) was found in T₀ control. The maximum weight of pods per plant of cowpea at 1st harvest at 45 days found in T₅ (I₂F₃) @ 50% (N,P,K) + @ 100% vermicompost which was (1.27kg) and the minimum weight of pods per plant (0.47kg) was found in T₀ control. The application of @ 50% (N,P,K) + @ 100% vermicompost recorded statistically at par values of plant height at various stages of observation. An observed improvement in overall vegetative growth of the crop with an application of N,P,K in this investigation is in conformity with those of Rajkhowa *et al.* (2002) [10], Ramesh *et al.* (2006) [11] and (Tanwar *et al.*, 2010) [15].

The mean pods yield (q ha⁻¹) of cowpea was found significant at vermicompost and inorganic fertilizers. The maximum pods yield (70.45q ha⁻¹) of cowpea was found in @ 50% (N, P, K) + @ 100% vermicompost which was and the minimum pods yield (51.70q ha⁻¹) was found in T₀ control. Similar results were also reported due to application of @ 50% (N,P,K) + @ 100% vermicompost by Shukla and Dixit (1996), Rajkhowa *et al.* (2002) [10], Goud *et al.* (2010) [5], Chandramohan and Chandragiri (2007) [4] and Maheshbabu *et al.* (2008) [7].

Table 1: Response of vermicompost and inorganic fertilizers on physico-chemical properties of soil, growth and yield attributes of cowpea var. Kashi Kanchan

Treatment Symbol	Treatment combination	Plant height (cm)	Number of leaves per plant	Number of pods per plant at 45 Days	Weight of pods per plant (kg)	Pods yield (q ha ⁻¹)
T ₀	Control	64.88	26.13	7.97	0.47	51.70
T ₁ (I ₁ F ₂)	@ 0% (N,P,K) + @ 50% vermicompost	66.83	28.30	8.63	0.63	53.45
T ₂ (I ₁ F ₃)	@ 0% (N,P,K) + @ 100% vermicompost	70.63	26.15	9.83	1.23	53.73
T ₃ (I ₂ F ₁)	@ 50% (N,P,K) + @ 0% vermicompost	67.30	24.97	8.83	1.00	55.53
T ₄ (I ₂ F ₂)	@ 50% (N,P,K) + @ 50% Vermicompost	66.17	35.84	9.83	1.05	57.83
T ₅ (I ₂ F ₃)	@ 50% (N,P,K) + @ 100 % vermicompost	72.16	31.17	10.87	1.27	70.45
T ₆ (I ₃ F ₁)	@ 100% (N,P,K) + @ 0% vermicompost	68.16	29.30	10.53	0.93	62.54
T ₇ (I ₃ F ₂)	@ 100% (N,P,K) + @ 50% vermicompost	68.53	27.88	10.20	1.03	63.45
T ₈ (I ₃ F ₃)	@ 100% (N,P,K) + @ 100%vermicompost	66.30	26.98	10.14	0.70	66.50
	F-test	S	S	S	S	S
	C.D. at 0.05%	3.54	3.831	1.780	0.492	2.95
	S.Ed.	1.67	1.807	0.840	0.232	1.39

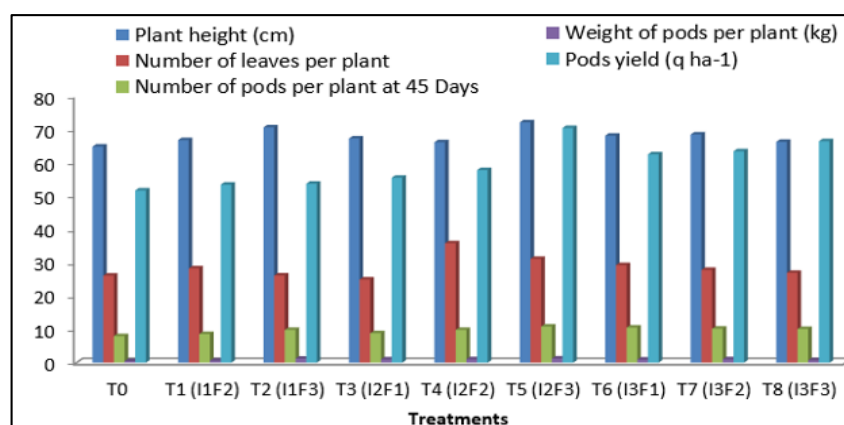


Fig 1: Response of vermicompost and inorganic fertilizers on physico-chemical properties of soil, growth and yield attributes of cowpea var. Kashi Kanchan

Conclusion

It was found from the trial that higher growth and yield of rainy cowpea variety Kashi Kanchan gave the best results in T₅ - [(I₂F₃) @ 50% (N P K) + @ 100% vermicompost] was equally effective for all parameters studied.

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