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Research Article

Effect of organic nutrients on yield and quality of vegetable cowpea

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ABSTRACT : An investigation was carried out to find out the effect of organic nutrients in vegetable cowpea [*Vigna unguiculata* (L) Walp.] var. Ankur Gomathi during season I (Jan-April 2012) and season II (Aug.-Nov., 2012) at the Deparment of Horticulture, Faculty of Agriculture, Annamalai University. The results indicated that the mean performance with regard to number of pods per plant was favourably enhanced by the treatment FYM @ 25 t ha^{-1} + vermicompost @ 5 t ha^{-1} + panchakvya 3%. The same treatment also recorded the highest cumulative pod yield of 75.00 g $plant^{-1}$ in season I and 74.75 g $plant^{-1}$ in season II as compared to control which recorded 43.65 g $plant^{-1}$ in season I and 43.15 g $plant^{-1}$ in season II, respectively. As regard to nutritional attributes, crude protein content was maximum with application of FYM @ 25 t ha^{-1} + vermicompost @ 5 t ha^{-1} + panchakavya 3 %.

KEY WORDS : Panchakavya, FYM, Sea weed extract, Pod yield, Crude protein

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INTRODUCTION

The cowpea [*Vigna unguiculata* (L.) Walp] is an important food legume in the tropics and sub-tropics of Asia, Central and South America and part of Southern Europe and United states of America. Cowpea is a protein rich crop hence deserves more attention in countries like India, where majority of the people are vegetarian and malnutrition is common among the rural poor. Cowpea is a warm season crop and thrives best between 21-35°C. It can be grown successfully in spring, summer and rainy seasons in the plains. Now a days it is fancy for the breeders to breed new crop varieties. But for most of the vegetable crops the dosage of organic nutrients is not standardized. Hence the present study will help to find out the dosage of organic nutrients to be supplied to vegetable cowpea, in order to increase the quality and yield.

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EXPERIMENTAL METHODS

An investigation was carried out in the vegetable field unit, Department of Horticulture, Faculty of Agriculture, Annamalai University, Annamalai Nagar to study the response of vegetable cowpea to combined application of panchakavya, seaweed extract and farmyard manure during season I (January - April) 2012 and season II (Aug-Nov) 2012. The seeds of bush type vegetable cowpea [*Vigna unguiculta* (L). wap] var. Ankur Gomathi was used for the trial.

Design adopted was Randomized Block design with fifteen treatments and three replications. Treatments were T_1- Absolute control, T_2 - FYM @ 25 t ha^{-1}, T_3 - vermicompost @

5 t ha^{-1}, T_4 - Neem cake @ 5t ha^{-1}, T_5 - FYM @ 25 t ha^{-1} + panchakavya @ 3%, T_6 - vermicompost @ 5 t ha^{-1} + panchakavya @ 3%, T_7 - Neem cake @ 5 t ha^{-1} + panchakavya @ 3%, T_8 - FYM @ 25 t ha^{-1} + sea weed extract @ 3%, T_9 - vermicompost @ 5 t ha^{-1} + seaweed extract @ 3%, T_{10} - Neem cake @ 5 t ha^{-1} + seaweed extract @ 3%, T_{11} - FYM @ 25 t ha^{-1} + vermicompost @ 5 t ha^{-1} + panchakavya @ 3%, T_{12} - FYM @ 25 t ha^{-1} + Neem cake @ 5 t ha^{-1} + panchakavya @ 3%, T_{13} - FYM @ 25 t ha^{-1} + vermicompost @ 5 t ha^{-1} + seaweed extract @ 3%, T_{14} - FYM @ 25 t ha^{-1} + Neem cake @ 5 t ha^{-1} + seaweed extract @ 3%, T_{15} - Recommended dose of NPK @ 70: 25: 25 kg ha^{-1}.

The number of green pods harvested during each picking were recorded and the number of pods from all pickings was assessed to arrive the total number of pods per plant. The pod weight per plant was recorded during each picking and finally total yield per plant was arrived by adding the weight of pods per plant from all the pickings and expressed in grams.

Microkjeldahl method of nitrogen determination as developed by Yoshida (1976) was used for nitrogen assay from dried sample. The crude protein was estimated by multiplying per cent nitrogen with the factor 6.25.

EXPERIMENTAL RESULTS AND ANALYSIS

The data pertaining to number of pods per plant is shown in Table 1. During season I, maximum number of pods per plant (15.00) was noted with T_{11} followed by T_{12} (14.13) and T_{13} (13.93). In contrary to this, the treatment T_1 recorded lowest value (8.73) for this character. In season II, the treatment T_{11} (14.95) followed by T_{12} (14.10) and T_{13} (13.52) recorded maximum number of pods per plant. The minimum value was recorded with T_1 (8.63). The data recorded on pod yield per plant in season I and season II are furnished in Table 2. The treatment T_{11} (75.00 g $plant^{-1}$), followed by T_{12} (70.65 g $plant^{-1}$) and T_{13} (69.65 g $plant^{-1}$) had the maximum pod yield per plant in season I, while minimum pod yield per plant (43.65 g $plant^{-1}$) were observed in the treatment control. In season II, maximum pod yield per plant was recorded in treatment T_{11} (74.75 g $plant^{-1}$), followed by T_{12} (70.50 g $plant^{-1}$) and T_{13} (67.60 g $plant^{-1}$), while the least value of pod yield per plant was recorded in the treatment T_1 (43.15 g $plant^{-1}$). The data recorded on crude protein in season I and II furnished in Table 3. The highest crude protein content was recorded in the treatment T_{11} (25.48 %) followed by T_{12} (25.38 %) and T_{13} (25.15 %). The least value was recorded in treatment T_1 (23.79 %). In season II, the treatment T_{11} (24.76 %), followed by T_{12} (24.75 %) and T_{13} (24.68 %) recorded maximum crude protein. The minimum value was observed in T_1 (22.88 %). Yield in general, is a highly complex parameter influenced by many factors or yield components and the ultimate goal of any crop management practice is to achieve increased yields. Though the yield attributing characters are controlled genetically they are greatly influenced by the availability of nutrients (Sweat *et al.*, 1974).

The increase in number of fruits per plant may be due to the partitioning efficiency *viz.*, increased allocation of photosynthates towards the economic part and also due to

Table 1 : Effect of organic inputs on number of pods per plant in vegetable cowpea

Treatments	Number of pods per plant	
	Season I	Season II
T_1 - Absolute control	8.73	8.63
T_2 - FYM @25 t ha^{-1}	11.87	11.57
T_3 - Vermicompost @ 5 t ha^{-1}	10.20	10.00
T_4 - Neem cake @ 5 t ha^{-1}	10.80	10.72
T_5 - FYM @25 t ha^{-1} + Panchakavya @ 3%	10.67	10.55
T_6 - Vermicompost @ 5 t ha^{-1} + Panchakavya @ 3%	9.33	9.30
T_7 - Neem cake @ 5 t ha^{-1} + Panchakavya @ 3%	10.75	10.55
T_8 - FYM @25 t ha^{-1} + Sea weed extract @ 3%	10.40	10.30
T_9 - Vermicompost @ 5 t ha^{-1} + Sea weed extract @ 3%	10.50	10.20
T_{10} - Neem cake @ 5 t ha^{-1} + Sea weed extract @ 3%	11.13	11.00
T_{11} - FYM @25 t ha^{-1} + Vermicompost @ 5 t ha^{-1} + Panchakavya @ 3%	15.00	14.95
T_{12} - FYM @25 t ha^{-1} + Neem cake @ 5 t ha^{-1} + Panchakavya @ 3%	14.13	14.10
T_{13} - FYM @25 t ha^{-1} + Vermicompost @ 5 t ha^{-1} + Sea weed extract @ 3%	13.93	13.52
T_{14} - FYM @25 t ha^{-1} + Neem cake @ 5 t ha^{-1} + Sea weed extract @ 3%	12.27	12.20
T_{15} - Recommended dose of NPK @ 25:60:60 kg ha^{-1}	10.93	10.55
Mean	11.36	11.20
S.E.±	0.75	0.72
C.D. (P=0.05)	1.55	1.49

the hormonal balance in the plant system as suggested by Rajasekar *et al.* (1995). The average number of pods per plant and pod yield per plant (g) were influenced significantly by the treatment T_{11} (FYM @ 25 t ha^{-1} + vermicompost @ 5 t ha^{-1} + panchakavya 3%) in both the seasons. That is higher level of FYM and vermicompost recorded the highest value. The results of the present study are in conformity with those Swaroop *et al.* (2001), Geetha and Varughese (2001) in cowpea.

Panchakavya is a fermented organic manure with high

Table 2 : Effect of organic inputs on pod yield per plant (g) in vegetable cowpea

Treatments	Pod yield per plant (g)	
	Season I	Season II
T_1 - Absolute control	43.65	43.15
T_2 - FYM @25 t ha^{-1}	59.35	57.85
T_3 - Vermicompost @ 5 t ha^{-1}	51.00	50.00
T_4 - Neem cake @ 5 t ha^{-1}	54.00	53.75
T_5 - FYM @25 t ha^{-1} + Panchakavya @ 3%	33.35	52.75
T_6 - Vermicompost @ 5 t ha^{-1} + Panchakavya @ 3%	46.65	46.50
T_7 - Neem cake @ 5 t ha^{-1} + Panchakavya @ 3%	53.75	52.75
T_8 - FYM @25 t ha^{-1} + Sea weed extract @ 3%	52.00	51.50
T_9 - Vermicompost @ 5 t ha^{-1}+ Sea weed extract @ 3%	52.50	51.00
T_{10} - Neem cake @ 5 t ha^{-1} + Sea weed extract @ 3%	55.65	55.00
T_{11} - FYM @25 t ha^{-1} + Vermicompost @ 5 t ha^{-1} + Panchakavya @ 3%	75.00	74.75
T_{12} - FYM @25 t ha^{-1} + Neem cake @ 5 t ha^{-1}+ Panchakavya @ 3%	70.65	70.50
T_{13} - FYM @25 t ha^{-1} + Vermicompost @ 5 t ha^{-1} + Sea weed extract @ 3%	69.65	67.60
T_{14} - FYM @25 t ha^{-1} + Neem cake @ 5 t ha^{-1}+ Sea weed extract @ 3%	61.35	61.00
T_{15} - Recommended dose of NPK @ 25:60:60 kg ha^{-1}	53.65	52.55
Mean	56.81	56.05
S.E.±	1.26	2.55
C.D. (P=0.05)	2.59	5.22

Table 3 : Effect of organic inputs on crude protein (%) in vegetable cowpea

Treatments	Crude protein (%)	
	Season I	Season II
T_1 - Absolute control	23.79	22.88
T_2 - FYM @25 t ha^{-1}	24.92	23.84
T_3 - Vermicompost @ 5 t ha^{-1}	24.99	23.78
T_4 - Neem cake @ 5 t ha^{-1}	25.01	23.84
T_5 - FYM @25 t ha^{-1} + Panchakavya @ 3%	24.58	24.50
T_6 - Vermicompost @ 5 t ha^{-1} + Panchakavya @ 3%	24.75	24.42
T_7 - Neem cake @ 5 t ha^{-1} + Panchakavya @ 3%	24.80	24.41
T_8 - FYM @25 t ha^{-1} + Sea weed extract @ 3%	24.41	24.23
T_9 - Vermicompost @ 5 t ha^{-1}+ Sea weed extract @ 3%	24.87	24.73
T_{10} - Neem cake @ 5 t ha^{-1} + Sea weed extract @ 3%	24.89	24.15
T_{11} - FYM @25 t ha^{-1} + Vermicompost @ 5 t ha^{-1} + Panchakavya @ 3%	25.48	24.76
T_{12} - FYM @25 t ha^{-1} + Neem cake @ 5 t ha^{-1}+ Panchakavya @ 3%	25.38	24.75
T_{13} - FYM @25 t ha^{-1} + Vermicompost @ 5 t ha^{-1} + Sea weed extract @ 3%	25.15	24.68
T_{14} - FYM @25 t ha^{-1} + Neem cake @ 5 t ha^{-1}+ Sea weed extract @ 3%	24.35	24.31
T_{15} - Recommended dose of NPK @ 25:60:60 kg ha^{-1}	24.09	23.84
Mean	24.76	24.20
S.E.±	0.19	0.22
C.D. (P=0.05)	0.40	0.45

microbial load with effective microorganisms (EMO) and methylotrophs profile bacteria. These EMO in panchakavya would have enhanced the productivity of phytohormones like auxins and gibberellins that might have in return, stimulated *viz.*, plant height, number of branches and total yield as evidenced from the work of Anuja and Archana, (2012).

Organic manures are capable of supplying adequate macro and micro plant nutrients which play major role in quality improvement through desirable enzymatic changes taking place during growth and organic manures in combination had further enhanced the effect on quality (Kalalbandi *et al*., 2007). Application of organic forms of manure showed a definite advantage in improving the quality of fruits over the inorganic fertilizers. The results of the present study which envisaged increased quality attributes due to organic manures are in agreement with the findings of Duraiswamy *et al*. (1999), Prabakaran and James Pitchai (2003).

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