



E-ISSN: 2278-4136

P-ISSN: 2349-8234

www.phytojournal.com

JPP 2020; Sp 9(4): 478-480

Received: 14-05-2020

Accepted: 16-06-2020

Kinnari M Patel

Department of Agronomy, N. M.
College of Agriculture Navsari
Agricultural University, Navsari,
Gujarat, India

RM Pankhaniya

Department of Agronomy, N. M.
College of Agriculture Navsari
Agricultural University, Navsari,
Gujarat, India

SK Parmar

Department of Agronomy, N. M.
College of Agriculture Navsari
Agricultural University, Navsari,
Gujarat, India

Influence of integrated nutrient management on quality, nutrient uptake and soil status in fodder cowpea

Kinnari M Patel, RM Pankhaniya and SK Parmar

Abstract

The experiment was carried out at the college Farm, N. M. College of Agriculture, Navsari Agricultural University, Navsari (Gujarat) during the summer season of 2016 on heavy black soil. An experiment result was found that application of vermicompost @ 2.0 t/ha realized significantly highest value for protein content and protein yield and lowest value for crude fibre content than bio compost @ 2.0 t/ha. Application of vermicompost @ 2.0 t/ha significantly improved content and uptake of nitrogen, phosphorus and potassium by fodder cowpea than bio compost @ 2.0 t/ha. Available nitrogen, phosphorus and potassium status in soil after harvest of crop was significantly increased with application of vermicompost @ 2.0 t/ha than bio compost @ 2.0 t/ha. In case of inorganic fertilizers significantly higher protein content, protein yield and less crude fibre content was found under application of the 100% RDF (20:40:00 N:P:K kg/ha). Nutrient N and K content were observed significantly higher with F₃ (100% RDF) which remained at par with F₂ (75% RDF) where P₂O₅ content was significantly highest with F₃ (100% RDF). Nutrient uptake of N, P₂O₅, and K were found significant with treatment F₃ over F₂ and F₁ but remained at par under F₂. In case of bio fertilizer, protein yield was found significantly highest with B₂: *Rhizobium* + PSB (10 ml each kg/seed) over B₁ (No Bio fertilizers). Protein content, crude fibre content, nutrient content (N, P₂O₅ and K) were found non-significant effect under biofertilizer treatment. Nutrient uptake of N, P₂O₅, K of fodder cowpea were found significantly highest under treatment B₂: *Rhizobium* + PSB (10 ml each kg/seed). Soil status of N and K₂O were found statistically not differ with biofertilizer treatment but P₂O₅ was found significantly highest with application of *Rhizobium* + PSB (10 ml each kg/seed) over No Bio fertilizers.

Keywords: INM, uptake, soil status, bio fertilizer, bio compost

Introduction

Green fodder and grazing resources in the country has made the livestock to undergo consistently with malnourishment resulting in their production potentiality at sub optimal level as compared to many developed nations. India is having the affluent livestock population of 520 million heads, which is about 20 per cent of the world's livestock population. India supports 55, 16, 20 and 5 per cent of world's buffaloes, cattle, goats and sheep population, respectively. But, the country has only 4.4 per cent of the cultivated area under fodder crops with an annual total forage production of 833 m t (390 m t green and 443 m t dry). Whereas, the annual forage requirement is 1594 m t (1025 m t green and 569 m t dry) to cater to the existing livestock population. Cowpea is an important annual leafy leguminous fodder crop due to its high nutritional value and short duration. Vermicompost and bio compost has been advocated as good organic manure for maintain the soil fertility and to supply plant nutrients in balanced proportion. Application of balanced inorganic fertilizers is helpful for better yield and quality of the fodder cowpea crop. Among different bio fertilizers rhizobium inoculation can increase the yield of pulse crops to the tune of 10 to 15 per cent. Judicious combination of organic manures, chemical fertilizers and bio fertilizers maintain the soil fertility as well as productivity. This may ultimately cause a reduction in use of inorganic fertilizers. The present field investigation entitled, "Integrated nutrient management in fodder cowpea (*Vigna unguiculata* L.) under south Gujarat condition" planned to evaluates the effect of organic manures, inorganic and biofertilizers on fodder cowpea.

Materials and methods

A field experiment was carried out at the college farm, N. M. College of Agriculture, Navsari Agricultural University, Navsari during summer season 2016. Experimental field was clayey in texture and showed low, medium and high rating for available nitrogen (218.24 kg/ha), phosphorus (30.87 kg/ha) and potassium (340.55 kg/ha). Experimental design is Factorial

Corresponding Author:

Kinnari M Patel

Department of Agronomy, N. M.
College of Agriculture Navsari
Agricultural University, Navsari,
Gujarat, India

Randomized Block Design keeping twelve treatment combination *viz* two levels of organic manures (O_1 :Bio compost @ 2 t/ha, O_2 :Vermicompost @ 2 t/ha), three levels of inorganic fertilizer (F_1 : 50% RDF, F_2 :75% RDF, F_3 :100% RDF) and two levels of biofertilizers (B_1 : No Bio fertilizers, B_2 : *Rhizobium* + PSB (10 ml each kg/seed)) with three replications, on 5th march, the fodder cowpea variety EC 4216 shown and harvested on 17th may 2016.

Results and discussion

Quality parameters

Data represented in Table-1 shown that protein content and protein yield were significantly highest and crude fibre content was lowest under O_2 : vermicompost @ 2 t/ha over bio compost @ 2 t/ha. In case of inorganic fertilizer result found that protein content and protein yield were significantly highest under 100% RDF (20:40:00 N:P:K kg/ha). Crude fibre content was found significantly less with application of 100% RDF. In case of bio fertilizer, protein content and crude fibre content was found non significant under bio fertilizer treatment. Protein yield was found significantly highest with application of *Rhizobium* + PSB (10 ml each kg/seed) over application of no biofertilizer. This was due to favorable

effects of organic manures, inorganic manures and biofertilizer on growth and yield attributes which ultimately resulted in highest quality parameters. Interaction effect was found non significant effect. The findings are in accordance with those of Menon *et al.* (2010)^[8] and Khan *et al.* (2015)^[5]

Nutrient content and uptake

Data in Table-1 described that nutrient content and uptake of N, P₂O₅ and K were found significantly highest under O_2 : vermicompost @ 2 t/ha. Nutrient content of N and K was found significantly higher with application of 100% RDF which remained at par with application of 75% RDF. P₂O₅ content was significantly highest with 100% RDF. Nutrient uptake was found significantly highest with treatment F_3 :100% RDF (20:40:00 N:P:K kg/ha). In case of bio fertilizer nutrient content of N, P₂O₅ and K were found non significant effect with use of biofertilizer as seed treatment. Nutrient uptake of N, P₂O₅ and K were found significantly highest under treatment B_2 : *Rhizobium* + PSB (10 ml each kg/seed) over B_1 : No Bio fertilizers. Interaction of different treatment were found non significant. The findings are in accordance with those of Mathur *et al.* (2009)^[7] and Chavan *et al.* (2015)^[3].

Table 1: Quality parameters nutrient content and nutrient uptake of fodder cowpea as influenced by different treatment

Treatment	Protein content (%)	Protein yield (q/ha)	Crude fibre content (%)	N content (%)			N uptake (kg/ha)		
				N	P ₂ O ₅	K	N	P ₂ O ₅	K
Organic manure									
O_1 :Bio compost @ 2 t/ha	19.34	10.25	30.09	3.094	0.446	0.811	164.09	23.67	43.03
O_2 :Vermicompost @ 2 t/ha	19.64	11.36	29.62	3.143	0.454	0.829	181.96	26.36	48.05
S.Em. \pm	0.10	0.34	0.15	0.016	0.003	0.006	5.51	0.80	1.56
C.D. (0.05)	0.30	1.01	0.45	0.048	0.007	0.017	16.16	2.36	4.58
Inorganic fertilizer									
F_1 : 50% RDF	19.15	9.80	30.32	3.064	0.428	0.806	156.93	21.96	41.30
F_2 :75% RDF	19.49	10.68	29.86	3.118	0.450	0.820	170.95	24.68	45.00
F_3 :100% RDF (20:40:00 N:P:K kg/ha)	19.83	11.94	29.39	3.173	0.472	0.835	191.20	28.44	50.33
S.Em. \pm	0.13	0.42	0.19	0.020	0.003	0.008	6.75	0.98	1.91
C.D. (0.05)	0.37	1.24	0.55	0.059	0.009	0.022	19.80	2.89	5.61
Bio fertilizer (Seed treatment)									
B_1 : No Bio fertilizers	19.35	10.28	30.07	3.096	0.446	0.811	164.64	23.79	43.18
B_2 : <i>Rhizobium</i> + PSB (10 ml each /kgseed)	19.64	11.33	29.64	3.141	0.454	0.829	181.40	26.24	47.90
S.Em. \pm	0.10	0.34	0.15	0.016	0.002	0.006	5.51	0.80	1.56
C.D. (0.05)	NS	1.01	NS	NS	NS	NS	16.16	2.36	4.58
Interactions									
O X F	NS	NS	NS	NS	NS	NS	NS	NS	NS
O X B	NS	NS	NS	NS	NS	NS	NS	NS	NS
F X B	NS	NS	NS	NS	NS	NS	NS	NS	NS
O X F X B	NS	NS	NS	NS	NS	NS	NS	NS	NS
C. V.%	2.23	13.56	2.18	2.24	2.44	3.29	13.51	13.66	14.55

Soil status

In Table-2 data indicated that N, P₂O₅ and K₂O were found significantly highest with application of vermicompost @ 2 t/ha over Bio compost @ 2 t/ha. Treatment F_3 :100% RDF was found significantly higher on available N were P₂O₅ and K₂O, which remained at par with application of 75% RDF. In case of bio fertilizer N and K₂O were found non significant with

use of biofertilizer as seed treatment whereas P₂O₅ observed significantly highest with B_2 : *Rhizobium* + PSB (10 ml each kg/seed) over no bio fertilizers. This may be due to more solubilisation of soil phosphorus. Interaction effect of different treatment was found non significant effect. Similar result obtained by Patel *et al.*, (2013)^[9].

Table 2: Soil status after harvest of fodder cowpea as influenced by different treatment

Treatment	N (kg/ha)	P ₂ O ₅ (kg /ha)	K ₂ O (kg /ha)
Organic manure			
O ₁ :Bio compost @ 2 t/ha	218.78	32.28	328.58
O ₂ :Vermicompost @ 2 t/ha	235.88	34.61	350.53
S.Em. ±	4.84	0.63	6.74
C.D. (0.05)	14.20	1.85	19.75
Inorganic fertilizer			
F ₁ : 50% RDF	214.47	31.64	322.46
F ₂ :75% RDF	227.33	33.44	339.55
F ₃ :100% RDF (20:40:00, N,P ₂ O ₅ ,K ₂ O)	240.18	35.25	356.65
S.Em. ±	5.93	0.77	8.24
C.D. (0.05)	17.40	2.27	24.19
Bio fertilizer (Seed treatment)			
B ₁ : No Bio fertilizers	220.29	32.46	330.08
B ₂ : <i>Rhizobium</i> + PSB (10 ml each /kgseed)	234.37	34.43	349.02
S.Em. ±	4.84	0.63	6.74
C.D. (0.05)	NS	1.85	NS
Interactions			
O X F	NS	NS	NS
O X B	NS	NS	NS
F X B	NS	NS	NS
O X F X B	NS	NS	NS
C. V.%	9.04	8.01	8.42
Initial	218.24	30.87	340.55

Conclusion

On the basis of this one year field experimentation, it is concluded that better quality, more nutrient uptake and improved soil status in fodder cowpea can be obtained by fertilizing the crop with vermicompost @ 2.0 t/ha (over biocompost @ 2.0 t/ha), 100%RDF (over 50% and 75% RDF) with seed inoculation of *Rhizobium* + PSB (10 ml each/kg seed) in south Gujarat heavy rainfall Agro-ecological situation III (AES-III)

References

- Anonymous. 19th Livestock Census-2012. All India Report, 2014. Dahd.nic.in/default files/Livestock/pdf.
- Ahmad A, Erma N, Tomar GS. Effect of different doses of phosphorus on quality of fodder cowpea (*Vigna unguiculata* L.). Journal of crop research. 2012; 44(1-2):63-67.
- Chavan BL, Vedpathak MM, Pirgonde BR. Effects of organic and chemical fertilizers on cluster bean. European Journal of Experimental Biology. 2015; 5(1):34-38.
- Dekhane SS, Khafi HR, Raj AD, Parma RM. Effect of bio fertilizer and fertility levels on yield, protein content and nutrient uptake of cowpea (*Vignaunguiculata* (L.) Walp.). Legume Research. 2011; 34(1):51-54.
- Khan VM, Manohar RS, Verma HP. Effect of vermicompost and biofertilizer on symbiotic efficiency and yield of cowpea in arid zone of Rajasthan. Asian Journal of Bio Science. 2015; 10(1):113-115.
- Kumar D, Arvadiya LK, Kumawat AK, Desai KL, Patel TU. Yield, protein content and uptake of chickpea (*Cicer arietinum* L.) as influenced by graded level of fertilizer and bio fertilizers. Research journal of chemical and Environmental science. 2014; 2(6):60-64.
- Mathur N, Singh J, Bohra A, Solanki R, Vyas A. Effect of vermicompost, Rhizobium and DAP on growth, yield and nutrient uptake by motbean. J. Arid. Legumes. 2009; 6(10):57-59.
- Menon M, Reddy D, Prameela P, Krishnakutty J. Seed production in vegetable cowpea (*Vigna unguiculata* L.).

under integrated nutrient management. Journal of legume research. 2010; 33(4):299-301.

- Patel AR, Patel DD, Patel TU, Patel HM. Nutrient management in summer greengram (*Vignaradiate* L.). International journal of applied and pure science and agriculture. 2013; 02:134-142.
- Verma HP, Chovatia PK, Sanwal RC. Effect of nitrogen and phosphorus levels on uptake by cowpea (*Vigna unguiculata* (L.) Walp) and residual N, P and K content in soil. An Asian Journal of Soil Science. 2015; 10(1):173-175.