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Nutrient management for rainfed greengram (Vigna radiata)

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Abstract: A field experiment was conducted during Rabi season of 2001 to study the effect of NPK along with composted coirpith on biometric observations, yield and nutrient content of greengram. Application of NPK at 12.5:25:25 kg ha^{-1} along with CCP at 12.5 t ha^{-1} increased the yield attributes, dry matter, grain yield and 100 seed weight. Nitrogen content was significantly increased in P applied plot along with CCP. Application of K at 12.5 kg ha^{-1} significantly increased P and K content in grain.

Key words : Greengram, Biometric observations, Yield, Nutrient content.

Introduction

Pulses occupy a significant place in India especially for vegetarian people as it is considered as rich source of protein. In our country, pulse crops are primarily grown under rainfed condition and on low fertility neglected soils. Even then, India is the largest producer and consumer of pulses in the world, accounting for 33 per cent of the world's area and 22 per cent of world's production (Singhal, 1999). But its productivity is far below that of other agricultural advanced countries. Among the pulses, greengram (*Vigna radiata*) occupies 10.2 lakh hectares (4.3% of total) with the production of 4.96 lakh t (3.6% of total) in India. Proper nutrient management is an important factor to be considered for sustaining pulse productivity. An attempt has been made to emphasize the production factors independently and collectively by major nutrients and composted coirpith (CCP) for increasing the pulse productivity.

Materials and Methods

A field experiment was conducted during rabi season of 2001 at Tamil Nadu Agricultural University Farm, Coimbatore. The soil was clay loam having pH 8.0; EC 0.16 dSm^{-1}; bulk density 1.25 mg m^{-3}; particle density 2.5 mg m^{-3}; pore space per cent of 50; organic carbon 4.08 g kg^{-1}; $KMnO_4$-N 71.4 mg kg^{-1}; Olsen's P 4.65 mg kg^{-1} and NH_4OAC-K 188.9 mg kg^{-1}. The experiment was laid out in a randomized block design with four replicatio The treatments are as follows: T_1= 12.5:2 kg NPK ha^{-1}; T_2 - 12.5:25:12.5 kg N ha^{-1}; T_3=12.5:25:25 kg NPK ha^{-1}; T_4= 12.5:25: + CCP @ 12.5 t ha^{-1}; T_5 = 0:25:0 + C @ 12.5 t ha^{-1}. Greengram (*Vigna radiata*) v CO-4 was sown at a spacing of 30 cm 10 cm and 470 mm rainfall was received duri crop period.

Soil samples were collected after harve of the crop and analyzed for organic carbo $KMnO_4$-N, Olsen's P and NH_4OAC-K. Th biometric observations, yield of haulm and grai were recorded. The content of N, P and were analysed as per the standard procedure

Results and Discussion

Germination percentage

It could be observed that the CCP treate plot recorded very low germination per ce (44-48%) and it required gap filling (Fig.1 It might be due to roughness of coirpith th inhibit the emergence of plumule. In later stage due to high water holding capacity and nutrie content of CCP (NPK = 1.45%, 0.19% an 1.50%), yield of greengram increased significantl

Biometric attributes and yield of haulm and grai

Potassium application significantly increase the DMP on 30th day. Composted coir pit

Table 1. Biometric characters on 30th day and 60th day

Treatments	30th day					60th day					
	Root length (cm)	Shoot length (cm)	No. of branches	No. of leaves	DMP (g plant^{-1})	Root length (cm)	Shoot length (cm)	No. of branches	No. of leaves	No. of clusters	No. of flowers
12.5 : 25 : 0 NPK kg ha^{-1}	13.0	86	1	11	9.09	15.3	61.2	1.5	25	2.3	5.7
12.5 : 25 : 12.5 NPK kg ha^{-1}	11.7	8.4	1	10	11.05	16.1	62.6	1.8	24	4.3	6.7
12.5 : 25 : 25 NPK kg ha^{-1}	13.2	9.8	1	11	12.09	15.6	58.9	1.7	25	3.5	6.4
12.5 : 25 : 25 + CCP @ 12.5 t ha^{-1}	13.1	9.1	1.5	11	10.90	17.0	54.4	2.5	33	6.4	10.9
0 : 25 : 0 + CCP @ 12.5 t ha^{-1}	13.0	8.4	1	12	10.47	22.5	55.5	1.9	30	5.3	9.7
CD (P=0.05)	NS	NS	NS	NS	1.58	NS	NS	0.66	NS	2.13	1.82

Table 2. Yield attributes and yield of greengram

Treatments	No. of branches	No. of leaves	No. of pods plant^{-1}	No. of grain pod^{-1}	Filled grain	Haulm yield (kg ha^{-1})	Grain yield (kg ha^{-1})	100 seed weight (g)
12.5 : 25 : 0 NPK kg ha^{-1}	2.8	7.5	2.3	4.5	1.0	5012	310	4.11
12.5 : 25 : 12.5 NPK kg ha^{-1}	4.0	16.8	2.0	6.5	1.8	5112	396	4.17
12.5 : 25 : 25 NPK kg ha^{-1}	3.8	13.0	3.3	5.0	2.0	5300	418	4.39
12.5 : 25 : 25 + CCP @ 12.5 t ha^{-1}	4.5	21.0	15.3	9.3	5.0	5468	473	4.43
0 : 25 : 0 + CCP @ 12.5 t ha^{-1}	3.0	12.8	6.3	5.5	1.3	4985	351	3.93
CD (P=0.05)	1.99	7.08	5.71	4.37	3.47	NS	34.49	0.03

along with N,P and K significantly influenced the number of leaves, clusters and flowers on 60th day after sowing (Table 1). Yield attributes significantly increased by the application of NPK with CCP and it was reflected in the yield (Table 2). The same result was earlier reported by Jain *et al.* (1987).

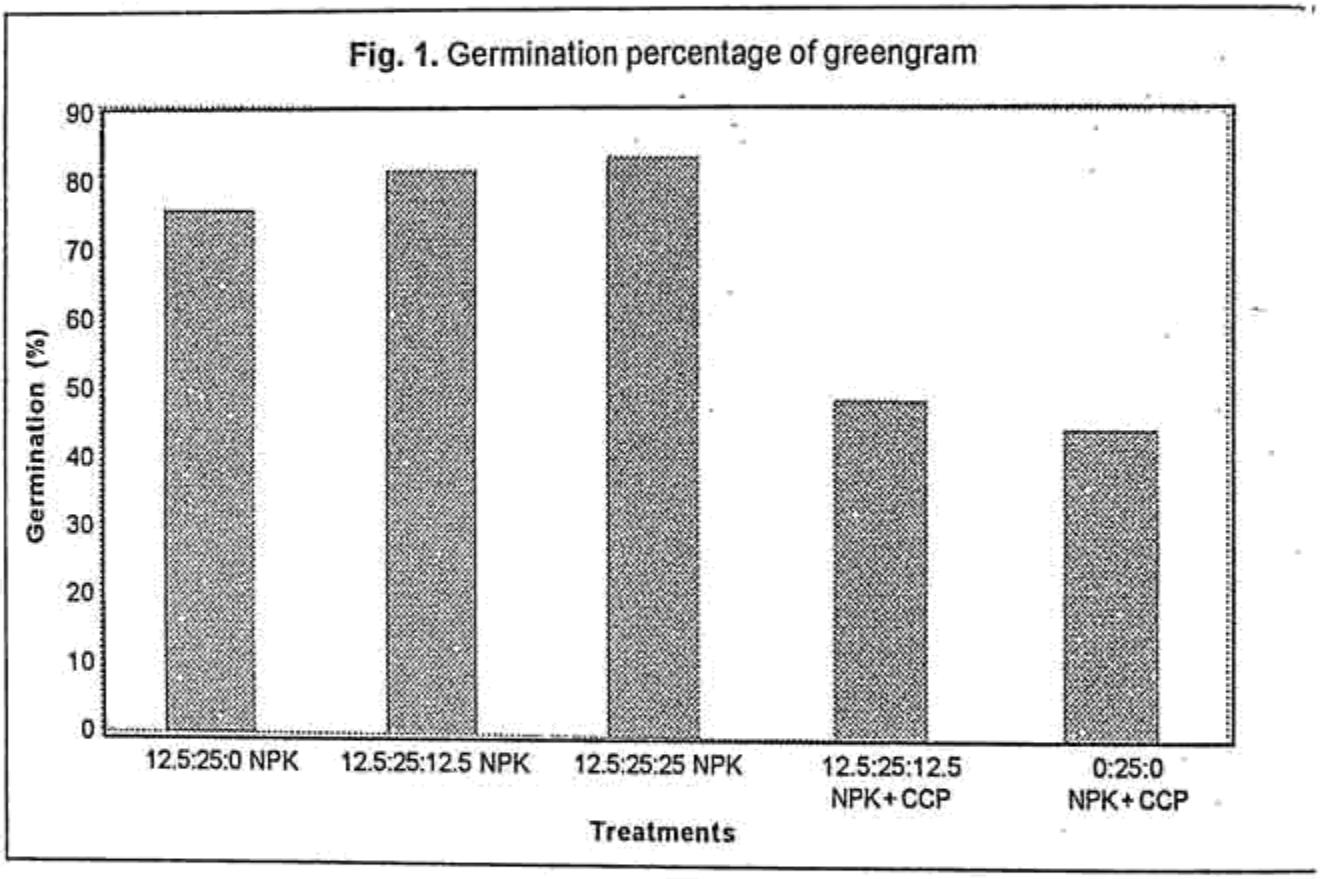
It could be observed that the application of 12.5 kg N + 25 kg P + 25 kg K along with CCP increased the grain yield of greengram significantly by 52.6 per cent as compared to 12.5 kg N + 25 kg P + 0 kg K. Haulm yield and 100 seed weight also followed the similar trend and it was increased by 9.1 per cent and 7.8 per cent respectively. The reason might be the major nutrient (K) regulates the utilization of other nutrient in the plant system (Ghonsikar and Shinde, 1997) and influenced the crop yield.

Nutrient content

Nitrogen content in plant was significantly increased by the application of CCP along with P as compared to 12.5:25:0 kg NPK ha^{-1} on 60 or 90th day. It may be due to the application of P with minimum quantities of nitrogen increased nodulation and nitrogen fixation (Ssali and Keya, 1985). Addition of CCP highly influenced the

Table 3. Nutrient content (%) of greengram on 30th and 60th day

Treatment	30th day			60th day		
	N	P	K	N	P	K
12.5 : 25 : 0 NPK kg ha^{-1}	2.58	0.20	1.38	1.74	0.15	1.16
12.5 : 25 : 12.5 NPK kg ha^{-1}	2.97	0.19	1.16	1.79	0.18	1.20
12.5 : 25 : 25 NPK kg ha^{-1}	3.02	0.17	1.20	1.85	0.14	1.11
12.5 : 25 : 25 + CCP @ 12.5 t ha^{-1}	2.97	0.22	1.42	1.29	0.15	1.24
0 : 25 : 0 + CCP @ 12.5 t ha^{-1}	2.69	0.22	1.16	1.85	0.16	1.07
CD (P=0.05)	0.02	0.007	0.04	0.01	0.01	0.03



content of P and K on 30th day whereas no influence could be noticed on 60th day (Table 3). Application of 12.5 kg K ha^{-1} increased the K content in grain while 25 kg K significantly increased the K content in haulm on 60th day. N:K ratio in plants varied from 0.96 to 2.52. This value is increased in the case of grains (Table 4).

Post harvest soil fertility

Organic carbon and available K was high in NPK treated plot at the rate of 12.5 : 25:25 kg ha^{-1}. CCP treated plot along wit P recorded high amount of available N whe compared to other treatments. The reason bein symbiotic nitrogen fixation does not occur efficientl when large quantities of N are added to legume It was observed that application of low lev of starter nitrogen with P improved early ro development which in turn stimulate subseque nodule formation and N fixation (Ssali an Keya, 1985 and Ghonsikar and Shinde, 1997 Available P was more in CCP treated pl along with NPK as compared to other treatmen (Table 4).

Table 4. Nutrient content of greengram and soil fertility status

Treatments	Nitrogen		Phosphorus		Potassium		Organic carbon ($g\ kg^{-1}$)	$KMnO_4$-N ($mg\ kg^{-1}$)	Olsen's P ($mg\ kg^{-1}$)	NH_4OAC-K ($mg\ kg^{-1}$)
	Haulm	Grain	Haulm	Grain	Haulm	Grain				
12.5 : 25 : 0 NPK kg ha^{-1}	0.67	2.58	0.19	0.46	0.70	0.82	4.85	72.7	6.08	176.0
12.5 : 25 : 12.5 NPK kg ha^{-1}	1.29	1.51	0.19	0.54	0.86	0.86	4.72	72.0	5.55	179.8
12.5 : 25 : 25 NPK kg ha^{-1}	1.40	2.58	0.22	0.48	0.99	0.82	5.65	71.3	7.70	195.6
12.5 : 25 : 25 + CCP @ 12.5 t ha^{-1}	1.23	2.91	0.18	0.49	0.90	0.82	4.94	71.6	8.20	186.6
0 : 25 : 0 + CCP @ 12.5 t ha^{-1}	1.79	3.19	0.15	0.53	0.86	0.86	5.38	74.1	5.00	190.7
CD (P=0.05)	0.02	0.02	0.01	0.01	0.13	0.05	0.8	NS	0.13	2.13

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