

Utilization of agro-industrial wastes for the improvement of vegetative and yield characters in black gram (*Vigna mungo* L.)

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SUMMARY

An experiment was conducted to analyse the effect of the interaction between different rates of composted press mud, composted coirpith, farmyard manure and NPK on vegetative and yield parameters of black gram (*Vigna mungo* L. Var.Co. ADT5). On the 25th day a significant increase in root length (T₂- Composted coirpith), shoot length (T₉- Composted coirpith + 25 % NPK), number of leaves (T₆-Composted coirpith + 50 % NPK), number of nodules (T₂- Composted pressmud), fresh weight (T₁₁- FYM + 25% NPK), dry weight (T₁₀- Composted pressmud + 25%NPK) was observed. On the 45th day an increase in root length (T₁₁- FYM +25% NPK), shoot length (T₁₀- Composted pressmud + 25%NPK), number of leaves (T₈- FYM+50% NPK), number of nodules (T₆- Composted coirpith + 50% NPK), number of flowers (T₅- NPK 100%), fresh weight (T₇- Composted pressmud + 50%NPK), dry weight (T₇- Composted pressmud + 50%NPK) were noted. On the 55th day a significant increase in root length (T₉- Composted coirpith + 25% NPK), shoot length (T₁₀- Composted pressmud + 25%NPK), number of nodules (T₃- Composted pressmud), number of fruits (T₁₁- FYM+25% NPK), fresh weight (T₇- Composted pressmud + 50%NPK), dry weight (T₇- Composted pressmud + 50%NPK) was observed. And on 75th day the yield parameters number of pods/plant, length of pods, weight of pods, number of seeds/pod, weight of seed/pod, pods fresh weight and dry weight were significantly increased in T₁₁ (FYM + 25%NPK) treatment. Thus, in conclusion composted coirpith, composted pressmud and FYM increased the vegetative growth and FYM with 25%NPK increase the yield of black gram.

Key Words : Composted coirpith, Compostedpressmud, Farm yard manure, *Vigna mungo*

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Black gram (*Vigna mungo* L. var. Co. ADT5) is the most important pulse in India, where beans are eaten whole or split, boiled or roasted, ground into flour and used to make cakes, breads and porridge. Integrated nutrient management approach is flexible, minimizes the use of chemicals but maximizes its own efficiency. Use of organic and industrial wastes such as farmyard manure, pressmud,

coirpith improve the moisture holding capacity of the soil. The abundance of coir pith and press mud, the problem of their disposal, the environmental hazards connected with their accumulation and their positive role as an organic manure substitute are the back ground attributing to this investigation. Hence, the present investigation was undertaken involving different treatments in combination with coir pith, farmyard manure, press mud and NPK in various forms in order to study their influence on the growth and the yield of black gram.

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MATERIAL AND METHODS

Collection of agro industrial wastes :

The agroindustrial waste such as press mud was collected from Bannari Sugars Private Limited Sathyamangalam and coir pith from Pollachi (Tamil Nadu). Seeds of black gram and FYM were collected from Tamil Nadu Agricultural University, Coimbatore. Using *Pleurotus Sajor*

Caju the compost was prepared.

Pot culture experiment :

The pots were filled with 7kg of sandy clay loam soil. The composts was applied to the respective pots and mixed thoroughly. Viable seeds were selected and about five seeds were sown in each pot with three replications. After germination three healthy plants were maintained per pots. In this experiment composted coir pith, composted press mud, FYM and NPK were incorporated in different concentration - T₁- Control, T₂- Composted coir pith (12.5t ha⁻¹), T₃- Composted press mud (12.5t ha⁻¹), T₄- Farm yard manure(12.5t ha⁻¹), T₅- NPK(100%), T₆- Composted coir pith (12.5t ha⁻¹) + 50% NPK, T₇- Composted press mud(12.5t ha⁻¹) + 50% NPK, T₈- Farm yard manure(12.5t ha⁻¹) + 50% NPK, T₉- Composted coir pith (12.5t ha⁻¹) + 25% NPK, T₁₀- Composted press mud (12.5t ha⁻¹) + 25% NPK, T₁₁- Farm yard manure (12.5t ha⁻¹) + 25 % NPK, T₁₂- Composted coir pith (6.5t ha⁻¹) + Composted press mud (6.5t ha⁻¹) + Farm yard manure (6.5t ha⁻¹).

Statistical analysis :

The data obtained from the various biometrical observations and yield parameters were subjected to the statistical analysis and based on the results inference were drawn.

RESULTS AND DISCUSSION

The results obtained from the present investigation are presented in Table 1, 2 and 3.

The shoot length differed significantly among the treatments. The very significant increase in shoot length was

obtained in T₉ (composted coir pith + NPK) on 25 DAS (27.56 cm), T₁₀ (composted pressmud + NPK) on 45DAS (33.56cm) and 55DAS (36.00cm) when compared to the control (20.89, 25.33, 22.36). As in the present study, an increase in the shoot length was noted by Antiland Singh (2007). Among the treatment T₂(composted coirpith) increased root length on 25(15.12cm), T₁₁ (FYM + 25%NPK) on 45(18.67cm) and T₉ (composted coirpith + 25%NPK) on 55(18.33cm) days after sowing, respectively. The result is in agreement with the result of Ramesh *et al.* (2006) in pearl millet.

On 25DAS the number of leaves were highest in T₆ (17.00), T₁₀ (13.00) treatment. On 45DAS the number of leaves were increased in T₈ (21.78), T₉ (19.00) treatment and on 55DAS an increased was noted in T₁₀ (20.00), T₇ (19.78) than the control T₁ (10.44).

On 25DAS the number of nodules was significantly increased in T₂ (14.00) when compared to the control T₁ (0.66) and other treatments. On 45DAS the number of nodules was increased in T₆ (8.55) when compared to the control T₁ (0.33). On 55DAS the increase was significant in the treatment T₃ (8.77), T₁₂ (6.77), T₁₀ (5.00) when compared to the control T₁ (1.33). On 45DAS the increase in lateral roots was noted in T₄ (5.00), T₇ (4.44), T₉ (4.00) when compared to the control T₁ (1.33). A significant increase in flowers was noted in T₅(3.33), T₆(3.33) and T₁₁(3.00) on 45DAS when compared to the control T₁(1.00).

Number of fruits significantly increased in T₁₁ (11.0), T₁₀ (9.00) and T₁₂ (7.33) on 55DAS when compared to the control T₁ (1.33). Plant fresh weight was increased in T₁₁ (4.64g), T₁₀ (4.56g) on 25DAS. Plant dry weight was increased in T₁₀ (1.36g) on 25DAS, T₇ (15.31g) on 45DAS and on 55DAS T₇ (6.50g)

Table 1 : Effect of composted pressmud, composted coirpith and farm yard manure on vegetative parameters of black gram

Treatments	Root length(cm)			Shoot length(cm)			Number of leaves			Number of nodules		
	25DAS	45DAS	55DAS	25DAS	45DAS	55DAS	25DAS	45DAS	55DAS	25DAS	45DAS	55DAS
T ₁	6.49	8.32	9.37	20.89	25.33	22.36	6.78	7.56	10.44	0.66	0.33	1.33
T ₂	15.12	18.33	13.00	22.89	18.78	27.38	8.78	16.11	12.67	14.00	2.44	1.88
T ₃	8.29	13.22	14.39	22.89	31.89	32.00	8.67	10.22	14.17	0.66	0.44	8.77
T ₄	8.28	9.44	10.39	22.89	31.78	23.78	8.44	15.33	16.11	0.66	5.55	2.88
T ₅	10.27	15.22	14.56	23.00	24.44	26.40	7.00	12.89	16.89	1.33	6.44	1.33
T ₆	12.44	13.28	12.37	23.22	33.44	27.78	17.00	14.33	14.00	0.66	8.55	2.77
T ₇	7.29	9.29	11.44	23.33	32.22	34.00	9.44	15.33	19.78	5.11	0.44	4.22
T ₈	7.44	15.11	13.89	24.28	27.56	26.00	9.00	21.78	14.00	1.44	0.55	1.44
T ₉	11.11	9.33	18.33	27.56	28.22	33.22	9.00	19.00	13.78	3.00	0.55	2.77
T ₁₀	12.44	9.17	15.31	24.67	33.56	36.00	13.00	18.56	20.00	1.33	2.55	5.00
T ₁₁	9.89	18.67	12.20	25.89	29.67	35.89	6.89	12.44	11.00	0.66	0.44	2.66
T ₁₂	9.56	10.44	8.30	22.00	23.44	25.38	12.89	15.33	11.00	0.66	2.44	6.77
S.E.±		0.29264			0.42928			0.42216			0.26324	
C.D.(0.05)		0.58366			0.85617			0.84197			0.52502	
C.D.(0.01)		0.77491 **			1.13671 **			1.11785 **			0.69705 **	

** Indicate significance of value at P=0.01, DAS – Days after sowing

when compared to the control T₁ (0.41g, 1.24g and 0.52g) on 25, 45 and 55 days after sowing, respectively. This result is in agreement with findings of Thankamani *et al.* (2007) in black pepper, Pannu *et al.* (2007) in summer mash.

Effect of composted pressmud, composted coir pith and FYM on yield parameters of black gram :

Number of pods per plants was increased in T₁₁ (7.22) when compared to the control T₁ (2.66). This result is in

agreement with findings of Saraswathy *et al.* (2004) in green gram. The length of pods was increased in T₁₁ (5.34cm) when compared to the control T₁ (3.30cm). The weight of the pods increased significantly in T₁₁ (5.76g), T₁₀ (3.73g) and T₈ (3.66g) when compared to the control T₁ (2.36g). The number of seeds per pods was higher in T₁₁ (6.00) when compared to the control T₁ (4.55). This is in agreement with the work of Prabhakaran (2008).

The weight of the seeds per pod was increased in the

Table 2 : Effect of composted press mud, composted coirpith and farm yard manure on vegetative parameters of black gram

Treatments	Number of flowers		Number of fruits		Fresh weight(gm)		Dry weight(gm)	
	45DAS	55DAS	25DAS	45DAS	55DAS	25DAS	45DAS	55DAS
T ₁	1.00	1.33	1.30	3.57	12.14	0.41	1.24	0.52
T ₂	1.33	2.00	2.41	10.81	22.14	0.66	1.67	2.03
T ₃	3.00	3.67	2.43	13.69	32.24	0.63	3.52	5.33
T ₄	1.67	3.33	2.64	6.85	17.44	0.62	3.01	4.95
T ₅	3.33	4.00	2.27	12.59	23.56	0.67	3.58	0.66
T ₆	3.33	5.00	1.64	7.87	18.89	1.34	2.31	1.91
T ₇	2.00	6.67	1.71	6.51	60.43	0.47	15.31	6.50
T ₈	1.67	4.67	2.13	4.31	16.53	0.64	1.25	1.28
T ₉	2.33	6.33	1.77	4.60	15.79	0.47	1.45	0.91
T ₁₀	2.33	9.00	4.56	6.30	37.34	1.36	1.68	3.58
T ₁₁	3.00	11.00	4.64	7.45	21.63	1.35	2.17	1.77
T ₁₂	2.00	7.33	2.55	6.17	14.33	0.64	2.00	1.24
S.E. _±	0.4907	0.5932		0.05221			0.66782	
C.D.(0.05)	1.0127	1.2242		0.10412			1.33193	
C.D.(0.01)	1.3800 **	1.6683 **		0.13824 **			1.76835 **	

** Indicate significance of value at P=0.01, DAS – Days after sowing

Table 3: Yield parameters of black gram influenced by pressmud, coirpith compost and farm yard (75th day)

Treatments	Number of pods/plant	Length of pods(cm)	Weight of pods(gm)	Number of seeds/pod	Weight of seed/pod(g)	Pod's fresh weight	Pod's dry weight
T ₁	2.66	3.30	2.36	4.55	1.11	2.33	0.11
T ₂	3.22	4.11	2.73	3.11	0.67	1.77	0.11
T ₃	3.77	3.75	1.87	4.11	1.16	1.86	0.31
T ₄	1.77	3.71	3.26	5.22	1.56	3.27	0.16
T ₅	3.88	3.76	1.86	4.66	1.33	1.84	0.27
T ₆	1.77	3.67	1.67	3.77	1.23	1.67	0.31
T ₇	1.55	3.64	1.75	4.22	1.27	1.72	0.31
T ₈	2.77	3.75	3.66	4.22	1.77	3.63	0.21
T ₉	1.77	3.72	2.77	3.66	1.12	2.76	0.12
T ₁₀	4.33	4.22	3.73	4.55	2.03	3.72	0.24
T ₁₁	7.22	5.34	5.76	6.00	2.87	5.72	0.38
T ₁₂	3.14	3.93	2.78	4.35	1.47	2.68	0.24
S.E. _±	0.2839	0.0519	0.0423	0.3861	0.0041	0.0908	0.0044
C.D.(0.05)	0.5889	0.1076	0.0878	0.8008	0.0084	0.1882	0.0091
C.D.(0.01)	0.8004 **	0.1463 **	0.1193 **	1.0884 **	0.0115 **	0.2558 **	0.0124 **

** Indicate significance of value at P=0.01, DAS – Days after sowing

treatment T₁₁ (2.87g), T₁₀ (2.03g) than the control T₁ (1.11g). This result is in agreement with the result of Usharani (2011) in soybean and green gram. The pod's fresh weight was increased in T₁₁ (5.72g) than the control T₁ (2.33g). The pods dry weight was highest in T₁₁ (0.38g) when compared to the control T₁ (0.11g). The results are in agreement with the findings of Manickam(2007).

Conclusion :

Agro industrial wastes can be recycled and used as cheaper source of organic nutrients. From the present investigation it has become evident that the composted press mud, composted coir pith, farmyard manure along with NPK increased the vegetative and yield parameters of black gram. Hence, it was concluded that the composted press mud, composted coir pith along with farmyard manure can be effectively used as an organic manure substitute individually and in combination with NPK.

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