

Total dry matter, nutrient uptake and yield of summer mungbean as influenced by organic management practices

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Abstract

The experiment was conducted at MARS, University of Agricultural Sciences, Dharwad, Karnataka state during summer season of 2013-14. Significantly higher Total dry matter Production at harvest was obtained with application of Enriched compost (1/3) + Vermicompost (1/3) + Glyricidia green leaf manure (1/3) equivalent to recommended dose P₂O₅ + FYM (24.18 g/plant) and among liquid organic manurial treatments, foliar application of panchagavya @ 5 percent (24.98 g/plant). The higher uptake of NPK by mungbean at harvest was significantly higher with application of EC (1/3) + VC (1/3) + GLM (1/3) equivalent to 50 kg P₂O₅ + FYM and with panchagavya foliar spray @ 5 % applied at flowering and 15 days after flowering. Application of EC (1/3) + VC (1/3) + GLM (1/3) equivalent to 50 kg P₂O₅ + with FYM recorded significantly higher grain yield (1368 kg/ha) as compared to EC (1/3) + VC (1/3) + GLM (1/3) equivalent to 50 kg P₂O₅ per ha alone (1258 kg/ha) and was on par with RDF + FYM (1301 kg/ha).

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Introduction

India is the largest producer and consumer of pulses in the world. The crop productivity under organic production system can be enhanced through optimizing the nutrient requirement of crop at different stages. It can be achieved through integrated organic nutrition by using different sources of nutrients which have different nutrient release pattern and efficiency. Combined application of organic manures mainly Compost, VC and GLM manure produced higher yield apart from improving soil health (Babalad et al 2009). Further, the liquid organic manures correct the nutrient deficiency as and when noticed under organic production system. Keeping these points in view a field experiment entitled “Effect of nutrient management through organics on growth and yield of summer mungbean” was carried out at MARS, UAS, Dharwad (Karnataka) during summer season of 2013-14.

Material and methods

The field experiment was conducted under irrigated condition during summer season of 2013-14. The soil of experimental site was sandy loam in texture, well drained and maximum water holding capacity was 52 per cent and bulk density was 1.20 Mg /m³.

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Eighteen treatments were laid out in split plot design with three treatments in main plot Viz, organic manures M1: EC (1/3) + VC (1/3) + GLM (1/3) equivalent 50 kg P₂O₅ + FYM, M2 : EC (1/3) + VC (1/3) + GLM (1/3) equivalent 50 kg P₂O₅ and M3 : RDF + FYM @ 5 t/ha and six treatment in sub plot Viz, liquid organic manures treatments, L1 : Cow urine @ 10 % two sprays at flowering and 15 DAF, L2 : Panchagavya @ 5 % two sprays at flowering and 15 DAF, L3 : Vermiwash @ 10 % two sprays at flowering and 15 DAF, L4 : Plant Growth Promoting Rhizobacteria two sprays at flowering and 15 DAF, L5 : Urea @ 2 % two sprays at flowering and 15 DAF and L6 : Control (water spray). GLM on fresh weight basis, FYM, enriched compost and vermicompost on dry weight basis were applied as per the treatments in M₁ and M₂ 10 days before sowing. Panchagavya @ 5 %, vermiwash @ 10%, cow urine @ 10%, PGPR and urea 2% were foliar applied as per the treatments at flowering and 15 DAF.

Results

Total dry matter production

Application of EC (1/3) + VC (1/3) + GLM (1/3) equivalent to 50 kg P₂O₅ with FYM recorded significantly higher total dry matter production of summer mungbean (24.18 g/plant) over EC (1/3) + VC (1/3) + GLM (1/3) equivalent to 50 kg P₂O₅ alone and on par with RDF + FYM (23.48 g/plant) (Table.1). Among liquid organic manures, application of panchagavya @ 5 per cent recorded significantly higher TDMP (24.98 g/plant) and it was at par with the application of vermiwash @ 10% (24.38 g/plant) and cow urine 10% (23.93 g/plant).

Seed yield

Seed yield of summer mungbean was significantly higher (1368.3 kg/ha) with application of EC (1/3) + VC (1/3) + GLM (1/3) equivalent to 50 kg P₂O₅ with FYM as compared to EC (1/3) + VC (1/3) + GLM (1/3) equivalent to 50 kg P₂O₅ alone (1258 kg/ha) and was on par with RDF + FYM treatment (1301 kg/ha). (Table.1) Among liquid organic manures, foliar application of panchagavya @ 5% (L2) recorded significantly higher grain yield (1430 kg/ha) as compared to rest of the treatments except vermiwash @ 10 % (L3) which was found at par.

Uptake of nutrients

At harvest uptake of major nutrients N (56.19 kg/ha), P (12.63 kg/ha) and K (24.93 kg/ha) was significantly higher with the application of EC (1/3) + VC (1/3) + GLM (1/3) equivalent to P₂O₅ with FYM over EC + VC + GLM equivalent to P₂O₅ alone. Similarly, panchagavya spray has resulted in significantly higher uptake of N (60.36 kg/ha), P (12.73 kg/ha) and K (27.97 kg/ha) over other liquid organic manures. (Table.1) The interaction effect of EC (1/3) + VC (1/3) + GLM (1/3) equivalent to P₂O₅ with FYM along with panchagavya @ 5 per cent has resulted in higher uptake of NPK over other treatments.

Thus, it can be concluded that among organic manures application of EC (1/3) + VC (1/3) + GLM (1/3) equivalent to 50 kg P₂O₅ with FYM and among liquid organic manures, panchagavya @ 5 per cent were found to be optimum for mungbean crop for obtaining higher TDMP, yield and uptake of nutrients.

Table.1 Total drymatter production (TDMP), yield and uptake of nutrients in summer mungbean as influenced by organic management Practices

Liquid organic manures (L)	TDMP (gplant ⁻¹)				Yield (kg ha ⁻¹)				Nitrogen uptake (kg ha ⁻¹)				Phosphorus uptake(kg ha ⁻¹)				Potassium uptake (kg ha ⁻¹)			
	Organic Manures (M)																			
	M1	M2	M3	Mean	M1	M2	M3	Mean	M1	M2	M3	Mean	M1	M2	M3	Mean	M1	M2	M3	Mean
L1	23.06	24.67	24.06	23.93	1284	1434	1367	1362	50.37	56.93	52.73	53.34	11.23	13.00	12.17	12.13	23.52	25.98	25.35	24.95
L2	24.02	26.11	24.80	24.98	1342	1538	1409	1430	57.23	63.83	60.00	60.36	11.73	13.47	13.00	12.73	26.65	29.45	27.82	27.97
L3	23.34	25.17	24.62	24.38	1307	1462	1379	1383	54.40	59.63	56.73	56.92	11.40	13.20	12.57	12.39	25.25	26.88	25.92	26.02
L4	21.36	23.06	22.55	22.32	1230	1261	1237	1243	45.37	52.37	48.57	48.77	10.37	12.07	11.43	11.29	18.55	21.65	20.65	20.28
L5	22.20	23.89	23.30	23.13	1250	1353	1265	1290	48.37	54.97	51.00	51.44	10.97	12.43	11.87	11.76	22.05	25.25	23.78	23.69
L6	20.50	22.17	21.55	21.40	1134	1161	1147	1147	41.97	49.43	44.73	45.38	10.07	11.63	10.83	10.84	17.35	20.35	19.05	18.92
Mean	22.41	24.18	23.48		1258	1368	1301		49.62	56.19	52.29		10.96	12.63	11.98		22.23	24.93	23.76	
For comparison	S.Em± LSD (0.05)				S.Em± LSD (0.05)				S.Em± LSD (0.05)				S.Em± LSD (0.05)				S.Em± LSD (0.05)			
M	0.39		1.52		19.74		77.51		0.69		2.70		0.29		1.15		0.37		1.45	
L	0.44		1.26		20.71		59.80		0.90		2.61		0.19		0.56		0.39		1.13	
Interaction (M x L)	0.81		NS		5.45		NS		0.97		2.81		0.82		2.38		0.76		2.19	

Discussion

The combined application of organic manures and liquid organic manure spray provided better availability of nutrients at different stages of crop growth with higher efficiency and hence resulted in higher TDMP, growth, yield and yield attributes and uptake of nutrients. Similar results also have been observed by Sanjutha *et al.* (2008) Tolanur (2008) and Somaundram (2003).

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