

## Influence of Farm Yard Manure, Jeevamrutha and Panchagavya on Growth and Yield of French Bean (*Phaseolus vulgaris*L.)

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### ABSTRACT

A field experiment was conducted at organic Farming Block of Research Institute on Organic Farming, University of Agricultural Sciences, GKVK, Bengaluru during 2014 to study the combined effect of FYM and liquid manures (jeevamrutha and panchagavya) on growth and yield of french bean. There were twelve treatment combinations comprising of two levels of each jeevamrutha (0 and 1000 l ha<sup>-1</sup>) and panchagavya (0 and 3 %) with three levels of FYM. The experiment was laid out in Factorial Randomised Complete Block Design with three replications. Application of FYM in terms of 200 per cent N equivalent recorded significantly higher plant height (26.5 cm), number of branches (7.17), leaf area (1249 cm<sup>2</sup>) at 60 DAS, number of pods per plant (15.33), pod weight per plant (78.45 g) and green pod yield (135.2 q/ha) as compared to FYM in terms of 100 per cent N equivalent (24.9 cm, 6.23, 1091 cm<sup>2</sup>, 13.57, 69.86 g and 120.3 qha<sup>-1</sup>, respectively). Soil application of jeevamrutha (1000 l ha<sup>-1</sup>) and foliar spray of panchagavya (3 %) recorded significantly higher plant height (26.7 and 26.6 cm), number of branches (6.93 and 6.89), leaf area (1325 and 1263 cm<sup>2</sup>), number of pods plant<sup>-1</sup> (15.89 and 15.40), pod weight plant<sup>-1</sup> (81.58 and 79.42 g) and green pod yield (141.7 and 138.7 qha<sup>-1</sup>) as compared to without jeevamrutha (25.0 cm, 6.28, 991.0 cm<sup>2</sup>, 13.18, 67.30 g and 117.0 qha<sup>-1</sup>, respectively) and without panchagavya application (25.1 cm, 6.32, 1054.0 cm<sup>2</sup>, 13.67, 69.56 g and 120.0 qha<sup>-1</sup>, respectively).

FRENCH bean belongs to family leguminosae and it is considered to be a native of South and Central America. French bean is an excellent vegetable crop for pods as well as for seed and its worldwide significance for direct human consumption and a dietary supplement rich in proteins, vitamins and minerals such as calcium, phosphorus, iron and zinc (Broughton *et al.*, 2003). Organic agriculture is a holistic food production management system, which promotes and ensures biodiversity, biological cycles and biological activity by giving preference to the use of on farm inputs, which are highly adapted to the production system. Panchagavya and Jeevamrutha are eco-friendly organic preparations made from cow products. The products from cow have the ability to bring the flow of cosmic energy which in turn can revitalize the growth process (Sundararaman *et al.*, 2001 and Natarajan, 2002).

Use of organic liquid products such as Beejamrutha, Jeevamrutha and Panchagavya results in higher growth, yield and quality of crops and improve the soil physico-chemical and biological properties. They contain macro nutrients, essential micro nutrients, many vitamins, essential amino acids, growth

promoting factors like IAA, GA and beneficial microorganisms (Devakumar *et al.*, 2008 and Tharmaraj *et al.*, 2011). Use of farm yard manure and organic liquid formulations like Panchagavya, cow urine and jeevamrutha are potential sources of organic nutrients. Hence, the present experiment was conducted to study the combined effect of FYM, Panchagavya and Jeevamrutha on growth and yield of french bean.

A field experiment was conducted at Organic Farming Block of Research Institute on Organic Farming, Gandhi Krishi Vignana Kendra, University of Agricultural Sciences, Bengaluru under protective irrigation during *kharif* 2014 to study the combined effect of Farm Yard Manure (FYM), jeevamrutha and panchagavya on growth and yield of french bean. The experiment was laid out in Factorial Randomised Complete Block Design with three replications. Recommended dose of nutrients for french bean was through FYM 63:100:75 NPK kg / ha and nutrients were supplied on the basis of nitrogen equivalent to the crop. Treatment combinations included three FYM levels (100%, 150% and 200% N equivalent and incorporated three weeks prior to sowing in the soil),

two jeevamrutha levels (0 and 1000 litres / ha) and two pancha gavya levels (0 and 3 %). Soil of the experimental site was red sandy loam with acidic pH (6.6), EC 0.24 dSm<sup>-1</sup>, low in organic carbon (0.46 %) and medium in available nitrogen (331 kg ha<sup>-1</sup>), P<sub>2</sub>O<sub>5</sub> (38 kg ha<sup>-1</sup>) and K<sub>2</sub>O (231 kg ha<sup>-1</sup>).

Jeevamrutha was prepared by mixing 10 kg of cow dung, 10 litre of cow urine, 2 kg of jaggery, 2 kg of pigeon pea flour and hand full of soil collected from farm. All these were put in 200 litre plastic drum and mixed thoroughly and volume was made up to 200 litre by adding water. The mixture was stirred well in clock wise direction thrice a day and plastic drum was kept in shade covered with wet jute bag. Jeevamrutha fermented for 10 days was applied to base of the plants manually at 15, 30 and 45 days after sowing (DAS) as per treatments.

Panchagavya was prepared by mixing 7 kg fresh cow dung and 1 kg ghee and incubated in a container for 2 days and it was mixed daily once. On third day, 10 litres cow urine and 10 litres water were added, mixed thoroughly and incubated for fermentation for 13 days. Then, 3 litres milk, 2 litres curd, 3 litres tender coconut water, 3 kg jaggery and 12 well ripened Cavendish banana were added and contents were incubated for 6 days. The mixture was stirred thoroughly thrice a day at morning, afternoon and evening. Plastic drum was kept in shade and it was covered with wet jute bag. After 21 days of fermentation mixture was filtered through a cotton cloth and used for spraying. Panchagavya spray was given at 15, 30 and 45 DAS as per treatments.

Application of varied levels of FYM influenced the growth and yield parameters of french bean. Growth parameters like plant height (26.5 cm), number of primary branches (7.17) and leaf area (1249.0 cm<sup>2</sup>) were found significantly higher with the application of 200 % N equivalent through FYM as compared to those with 100 per cent N equivalent (25.1 cm, 6.23 and 1091.0 cm<sup>2</sup>, respectively) and were on par with the application of 150 per cent N equivalent through FYM (26.1, 6.68 and 1136.0 cm<sup>2</sup>, respectively). Similarly, higher level of FYM *i.e.* 200 per cent N equivalent recorded significantly higher number of pods plant<sup>-1</sup> (15.33), pod weight plant<sup>-1</sup> (78.45 g) and pod

yield (134.6 q ha<sup>-1</sup>) as compared to 100 % N equivalent (13.57, 69.86 and 120.3 q ha<sup>-1</sup>, respectively) and it was found on par with 150 % N equivalent through FYM application (14.70, 75.16 and 132.5, respectively) (Table 1 & 2). The increase in growth and yield of these treatments may be due to the fact that FYM besides supplying N, P and K also improved the soil condition, which enhanced the source to sink relationship and also make unavailable sources of elemental nitrogen, bound phosphates, micronutrients, and decomposed plant residues into an available form to facilitate the plants to absorb the nutrients (Ravikumar, 2009 and Yadav *et al.*, 2013). These results are in agreement with findings of the Guriqbal Singh *et al.* (2012) in chickpea and Siddappa (2015) in field bean.

Application of jeevamrutha and panchagavya significantly influenced the growth and yield of french bean. Soil application of jeevamrutha and foliar spray of panchagavya had given significantly higher plant height (26.65 & 26.56 cm), number of branches (6.93 & 6.89), leaf area (1325 & 1263 cm<sup>2</sup>), number of pods plant<sup>-1</sup> (15.89 & 15.40), pod weight per plant (81.58 & 79.42 g) and pod yield (141.7 & 138.7 q / ha) as compared to without jeevamrutha (25.12 cm, 6.28, 991.0 cm<sup>2</sup>, 13.18, 67.30 g and 117.0 q / ha, respectively) and without panchagavya application (25.21 cm, 6.32, 1054.0 cm<sup>2</sup>, 13.67, 69.56 g and 120.0 q/ha, respectively) (Table I & II). The cow dung in panchagavya and jeevamrutha act as a media for the growth of beneficial microbes and cow urine provides nitrogen which is essential for crop growth upon fermentation with other ingredients in panchagavya and jeevamrutha. Tender coconut water is being used for preparation of panchagavya and it contains kinetin which has role in enhancing chlorophyll content and leaf size in plant, thus in turn enhanced photosynthetic activity, growth and yield. Fermented liquid organic manures also contain plant growth promoting substances like IAA, GA (Palekar, 2006, Devakumar *et al.*, 2008 and Nileema and Sreenivasa, 2011). These might have stimulated the necessary growth and development in plants, leading to better growth and yield of French bean. Similar results were also found by Sharma and Thomas (2010) and Siddappa (2015) in black gram and field bean.

TABLE I  
*Growth parameters of french bean as influenced by FYM, Jeevamrutha and Panchagavya application at 60 DAS*

Treatments	60 DAS								
	Plant ht (cm)			No. of branches plant <sup>-1</sup>			Leaf area plant <sup>-1</sup> (cm <sup>2</sup> )		
	J <sub>0</sub>	J <sub>1</sub>	Mean	J <sub>0</sub>	J <sub>1</sub>	Mean	J <sub>0</sub>	J <sub>1</sub>	Mean
FYM levels (F)									
F <sub>1</sub>	23.82	26.01	24.92	5.90	6.57	6.23	945.0	1236.0	1091.0
F <sub>2</sub>	25.56	26.66	26.11	6.37	7.00	6.68	989.0	1283.0	1136.0
F <sub>3</sub>	25.64	27.29	26.46	6.57	7.22	7.17	1040.0	1457.0	1249.0
Mean	25.01	26.65		6.28	6.93		991.0	1325.0	
	S.Em±	C.D.		S.Em±	C.D.		S.Em±	C.D.	
F	0.38	1.13		0.13	0.38		38.79	113.77	
J	0.31	0.92		0.11	0.31		31.67	92.90	
F x J	0.54	NS		0.18	NS		54.86	NS	
	P <sub>0</sub>	P <sub>1</sub>	Mean	P <sub>0</sub>	P <sub>1</sub>	Mean	P <sub>0</sub>	P <sub>1</sub>	Mean
F <sub>1</sub>	23.99	25.85	24.92	5.83	6.63	6.23	1000.0	1182.0	1091.0
F <sub>2</sub>	25.64	26.58	26.11	6.50	6.87	6.68	1042.0	1230.0	1136.0
F <sub>3</sub>	25.67	27.25	26.46	6.62	7.17	7.17	1120.0	1377.0	1249.0
Mean	25.10	26.56		6.32	6.89		1054.0	1263.0	
	S.Em±	C.D.		S.Em±	C.D.		S.Em±	C.D.	
P	0.31	0.92		0.11	0.31		31.67	92.90	
F x P	0.54	NS		0.18	NS		54.86	NS	
	P <sub>0</sub>	P <sub>1</sub>	Mean	P <sub>0</sub>	P <sub>1</sub>	Mean	P <sub>0</sub>	P <sub>1</sub>	Mean
J <sub>0</sub>	24.28	25.74	25.01	5.96	6.60	6.28	946.0	1037.0	991.0
J <sub>1</sub>	25.93	27.38	26.65	6.68	7.18	6.93	1162.0	1489.0	1325.0
Mean	25.10	26.56		6.32	6.89		1054.0	1263.0	
	S.Em±	C.D.		S.Em±	C.D.		S.Em±	C.D.	
J x P	0.44	NS		0.15	NS		44.79	131.37	
F x J x P	0.77	NS		0.26	NS		77.58	NS	

Note: CD at 5 per cent J<sub>0</sub>- Without Jeevamrutha, J<sub>1</sub>-Jeevamrutha 1000 litre ha<sup>-1</sup>, P<sub>0</sub>- Without Panchagavya, P<sub>1</sub>- Panchagavyaat 3 %, F<sub>1</sub>- 100 per cent, F<sub>2</sub>- 150 per cent and F<sub>3</sub>- 200 per cent equivalent N through FYM

TABLE II

*Yield components of french bean as influenced by FYM, Jeevamrutha and Panchagavya application*

Treatments	Podsplant <sup>-1</sup>			Pod wtplant <sup>-1</sup> (g)			Green Pod yield (q ha <sup>-1</sup> )		
	J <sub>0</sub>	J <sub>1</sub>	Mean	J <sub>0</sub>	J <sub>1</sub>	Mean	J <sub>0</sub>	J <sub>1</sub>	Mean
FYM levels (F)									
F <sub>1</sub>	11.87	15.27	13.57	60.76	78.97	69.86	102.5	138.2	120.3
F <sub>2</sub>	13.43	15.97	14.70	68.73	81.59	75.16	123.2	141.9	132.5
F <sub>3</sub>	14.23	16.43	15.33	72.41	84.48	78.45	125.3	145.0	135.2
Mean	13.18	15.89		67.30	81.58		117.0	141.7	
	S.Em±	C.D.		S.Em±	C.D.		S.Em±	C.D.	
F	0.23	0.66		1.46	4.29		2.57	7.52	
J	0.18	0.54		1.20	3.51		2.09	6.14	
F x J	0.32	NS		2.07	NS		3.63	NS	
	P <sub>0</sub>	P <sub>1</sub>	Mean	P <sub>0</sub>	P <sub>1</sub>	Mean	P <sub>0</sub>	P <sub>1</sub>	Mean
F <sub>1</sub>	12.40	14.73	13.57	63.49	76.24	69.86	105.7	135.0	120.3
F <sub>2</sub>	14.13	15.27	14.70	71.58	78.74	75.16	125.9	139.2	132.5
F <sub>3</sub>	14.47	16.20	15.33	73.61	83.29	78.45	128.5	141.8	135.2
Mean	13.67	15.40		69.56	79.42		120.0	138.7	
	S.Em±	C.D.		S.Em±	C.D.		S.Em±	C.D.	
P	0.18	0.54		1.20	3.51		2.09	6.14	
F x P	0.32	NS		2.07	NS		3.63	NS	
	P <sub>0</sub>	P <sub>1</sub>	Mean	P <sub>0</sub>	P <sub>1</sub>		P <sub>0</sub>	P <sub>1</sub>	Mean
J <sub>0</sub>	12.22	14.13	13.18	62.19	72.41		104.9	129.1	117.0
J <sub>1</sub>	15.11	16.67	15.89	76.92	86.44		135.2	148.2	141.7
Mean	13.67	15.40		69.56	79.42		120.0	138.7	
	S.Em±	C.D.		S.Em±	C.D.		S.Em±	C.D.	
J x P	0.26	NS		1.69	NS		2.96	NS	
F x J x P	0.45	NS		2.93	NS		5.13	NS	

Note: CD at 5 per cent J<sub>0</sub>- Without Jeevamrutha, J<sub>1</sub>-Jeevamrutha 1000 litre ha<sup>-1</sup>, P<sub>0</sub>- Without Panchagavya, P<sub>1</sub>- Panchagavyaat 3 %, F<sub>1</sub>- 100 per cent, F<sub>2</sub>- 150 per cent and F<sub>3</sub>- 200 per cent equivalent N through FYM

In conclusion this study found that application of liquid manures (Jeevamrutha and panchagavya) and FYM are beneficial in improving growth and yield of french bean due to better availability of nutrients, beneficial microbes and growth promoting substances.

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