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Response of Frenchbean (*Phaseolus vulgaris*) to application of organics and inorganics in eastern Uttar Pradesh

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ABSTRACT

An experiment was conducted during 1994–95, 1995–96 and 1996–97 to work out the productive and economic association of organics and inorganics in Frenchbean (*Phaseolus vulgaris* L.) on sandy-loam soil of eastern Uttar Pradesh. A marked increase in growth, yield attributes and yield was observed due to application of organics, inorganics alone and their combinations. Farmyard manure @ 10 tonnes + 75% of recommended dose of fertilizer gave the highest net return and benefit : cost ratio.

Key words : Frenchbean, Organics, Inorganics

Frenchbean is mainly cropped for seed purpose in eastern part of Uttar Pradesh, which contains 22–25 % protein in its dry seed (Singh and Singh, 1987). Unlike other leguminous crop, it does not nodulate with native rhizobia. Therefore, requirement of fertilizer for this crop is of prime importance (Ali and Kushwaha, 1987). In view of price hike coupled with the limited production of chemical fertilizers made it imperative that a part of essential plant nutrients should come from organic sources. Popularizing the use of organic to reduce the dependence on fertilizers and to contribute pollution-free atmosphere is the greatest need of the day. Therefore, there is a urgent need to develop a system using organics and inorganics in a complementary way. These may enhance the efficiency and simultaneously reduce the requirement of inorganics. In this context, the present study was planned to find out their suitable combination to get the maximum sustainable production of Frenchbean.

MATERIALS AND METHODS

The experiment was conducted at Zonal Agricultural Research Sub-Station, Bari-Bagh, Ghazipur, during the winter season of 1994–95, 1995–96 and 1996–97. The soil was sandy loam with pH 7.8 and organic carbon 0.21%. It was medium in available phosphorus (14.34 kg/ha), medium in available potassium (152.40 kg/ha) and low in total nitrogen (251.00 kg/ha). The treatment consisted of applying

different levels of inorganics either alone or in combination with organics at different proportions (Tables 1, 2). The organics used were farmyard manure (0.48% nitrogen, 0.17% phosphorus and 0.49% potash) and cane compost (0.36 % nitrogen, 0.11% phosphorus and 0.42% potash). The inorganics levels were 100, 75 and 50% of recommended dose of fertilizer. The recommended level of fertilizer for Frenchbean is 120 kg N, 60 kg P_2O_5 and 30 kg K_2O/ha.

The inorganics were supplied through urea, single superphosphate and muriate of potash. The experiment was laid out in randomized block design with 3 replications. Frenchbean cv. 'PDR 14' was sown on 27 November 1994, 17 November 1995 and 23 November 1996 in rows, 30 cm apart using 150 kg seed/ha. Uniform distance of about 10 cm was maintained between the plants by thinning and gap-filling 15 days after sowing. Required quantities of organics was mixed thoroughly in the plots before pre-sowing irrigation. Half dose of N and full dose of P and K were dressed basal and remaining N was applied in the standing crop after irrigation in 2 equal splits. Besides, pre-sowing irrigation, 3–4 irrigations were given to the experimental crop. Need-based agronomic and plant-protection practices were followed as per requirement of the crop.

RESULTS AND DISCUSSION

Plant height, branches/plant, pods/plant and 100-seed weight were significantly affected due to application of organics or inorganics alone or in various combinations (Table 1). Maximum plant height, branches/plant, pods/plant and 100-seed weight were recorded where 10 tonnes farmyard manure/ha was coupled with 75% of recommneded dose of fertilizer, and it was closely followed by 10 tonnes farmyard manure + 50% of recommended dose of fertilizer and minimum under the control during 1994–95, 1995–96 and 1996–97 respectively. This increase in yield-attributing characters was owing to improvement in physico-chemical properties of the soil and more availability of essential nutrients to plants which supported the vegetative growth (plant height and branches/plant) and finally increased the pods/plant as well as the 100-seed weight.

Application of organics as well as the inorganics significantly increased the grain yield over the control (Table 2). Organics (farmyard manure and cane compost) in combination with inorganics proved its superiority in increasing the seed yield compared to their individual effects. Maximum seed yield was recorded where farmyard manure @ 10 tonnes/ha + 75% of recommended dose of fertilizer to the tune of 164 % over the control and it was follwed by farmyard manure @ 10 tonnes/ha + 50% recommeneded dose of fertilizer (149%). The yield increase was mainly owing to improvement in yield-attributing characters, with increased levels of N and P coupled with farmyard manure (Kushwaha, 1991; and Dwivedi *et al.*, 1994). Further, inorganics alone, either at 100, 75 or 50% of recommended dose of fertilizer, proved its superiority to the organics (farmyard manure and cane compost) in increasing the seed yield during 1994–95, 1995–96 and

Table 1. Growth and yield attributes of Frenchbean as influenced by organics and inorganics application

Treatment	Plant height (cm)			Branches/plant			Pods/plant			100-seed weight (g)		
	1994–95	1995–96	1996–97	1994–95	1995–96	1996–97	1994–95	1995–96	1996–97	1994–95	1995–96	1996–97
T_1 Control	27.62	36.13	27.37	2.53	2.43	2.48	5.23	5.14	5.17	24.89	24.68	24.72
T_2 100% recommended fertilizer	24.42	33.13	33.36	2.84	2.78	2.77	6.37	6.13	6.13	27.43	27.13	27.21
T_3 75% recommended fertilizer	32.63	31.53	31.54	2.78	2.69	2.70	5.92	5.43	5.44	27.17	26.79	26.80
T_4 50% recommended fertilizer	29.73	28.68	28.91	2.72	2.63	2.66	5.56	5.38	5.41	27.33	26.54	26.62
T_5 10 tonnes farmyard + 75% recommended fertilizer	36.23	35.73	37.27	3.42	3.23	2.53	7.13	6.94	7.29	29.42	29.33	29.68
T_6 10 tonnes farmyard manure + 50 % recommended fertilizer	35.78	33.93	33.74	3.32	3.14	3.21	6.97	6.41	6.38	29.14	27.68	27.68
T_7 10 tonnes cane compost + 75% recommended fertilizer	35.17	33.41	33.13	3.34	3.13	3.17	6.83	6.32	6.27	28.96	27.63	27.66
T_8 10 tonnes cane compost + 50% recommended fertilizer	34.83	33.12	32.67	3.27	3.10	3.06	6.53	6.13	5.94	28.93	27.58	27.48
T_9 10 tonnes farmyard manure	29.68	28.53	28.83	2.68	2.53	2.57	5.43	5.21	5.37	26.84	26.43	26.47
T_{10} 10 tonnes cane compost	28.13	27.93	28.11	2.62	2.56	2.59	5.37	5.26	5.29	46.48	24.69	24.83
CD (P=0.05)	3.73	3.32	3.48	0.29	0.33	0.35	0.63	0.64	0.69	1.63	1.82	1.66

Table 2. Yield and economics of Frenchbean as influenced by organics and inorganics application

Treatment	Grain yield (q/ha)			Seed yield (q/ha)*	Increase over control (%)	Cost of cultivation (Rs/ha)	Total return (Rs/ha)	Net returns (Rs/ha)	Benefit : cost ratio
	1994–95	1995–96	1996–97						
T_1 Control	10.37	8.89	9.05	9.44		7,180	14,302	7,122	0.99
T_2 100% recommended fertilizer	13.86	12.68	12.70	13.08	138.55	9,185	20,012	10,827	1.18
T_3 75% recommended fertilizer	12.28	11.26	11.30	11.61	122.98	8,684	17,720	9,036	1.04
T_4 50% recommended fertilizer	11.98	10.76	10.90	11.21	118.75	8,182	17,067	8,885	1.08
T_5 10 tonnes farmyard + 75% recommended fertilizer	15.45	14.51	16.49	15.47	163.98	9,684	23,684	14,001	1.45
T_6 10 tonnes farmyard manure + 50 % recommended fertilizer	14.75	13.69	13.61	14.02	148.51	9,182	21,409	12,226	1.33
T_7 10 tonnes cane compost + 75% recommended fertilizer	14.55	13.53	13.30	13.79	146.08	9,484	21,868	11,584	1.22
T_8 10 tonnes cane compost + 50% recommended fertilizer	14.20	13.07	12.24	13.17	139.51	8,982	20,051	11,069	1.23
T_9 10 tonnes farmyard manure	11.51	10.21	10.56	10.76	113.98	8,180	16,342	8,162	1.00
T_{10} 10 tonnes cane compost	11.07	09.57	09.80	10.15	107.52	7,980	15,377	7,397	0.93
CD (P=0.05)	1.72	1.70	1.80						

*Mean

1996–97. Ali and Lal (1992) also reported that Frenchbean needs application of 100, 60 and 30 kg N, P and K/ha respectively. Farmyard manure was found superior in increasing the seed yield, but it remained at par with cane compost. Possible reason for superiority of farmyard manure may be owing to its rich nutritional composition which increased the vegetative, yield-attributing characters and finally the yield.

Organics in combination with inorganics greatly influenced the net profit and benefit : cost ratio of Frenchbean. Farmyard manure @ 10 tonnes/ha in combination with 75% of recommended dose of fertilizer (90 kg N, 45 kg P and 22.5 kg K/ha) gave the highest net profit (Rs 14,000) and benefit : cost ratio (1.45).

On the basis of 3 years data, it was concluded that application of farmyard manure @ 10 tonnes/ha + 75% of recommended dose of fertilizer (90 kg N, 45 kg P and 22.5 kg K/ha) may be adopted for getting the higher sustainable production from Frenchbean in eastern part of Uttar Pradesh.

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