AJH
eISSN- 0976-724X

THE ASIAN JOURNAL OF HORTICULTURE
Volume **11** | Issue 1 | June, 2016 | 129-131
Visit us -*www.researchjournal.co.in*

RESEARCH PAPER

DOI : 10.15740/HAS/TAJH/11.1/129-131

Article history :
Received : 30.12.2015
Revised : 25.04.2016
Accepted : 05.05.2016

Effect of organic manures and biofertilizers on the productivity of garden bean [*Dolichos lablab* (Roxb.) L. var. typicus]

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ABSTRACT : Field experiment was conducted at the vegetable unit of the Department of Horticulture, Faculty of Agriculture, Annamalai University. The study was to find out the effect of organic manures and biofertilizers on the productivity of garden bean cv. KONKAN BUSHAN. The experiment was laid out in a Randomized Block Design with 10 treatments. Each treatment was replicated thrice. Among the treatments tested, inoculation of *Rhizobium* and vesicular arbuscular mycorrhizae along with vegetable waste vermicompost and foliar supplementation of vermiwash proved superior and recorded significant increase on the growth characters of garden bean such as plant height, leaf area index and dry matter production during both years of crop growth. The same combination of treatments further recorded maximum pod yield (T_7). As a result of increased nutrient uptake, nodulation and biological nitrogen fixation of *Rhizobium*, colonization of vesicular arbuscular mycorrhizae and supplement of nutrients through vermiwash and vermicompost (vegetable) and the highest 'N' content (3.02 %) of the vegetable derived vermicompost, the treatment T_7 was found to be superior. These results indicate that the garden bean being a leguminous vegetable crop responds very well for inoculation of *Rhizobium*, VAM and vermicompost and its wash for providing all necessary nutrients in their available form which in turn leads to the avoidance of inorganic inputs.

KEY WORDS : Vermicompost, *Rhizobium*, Inorganic inputs

HOW TO CITE THIS ARTICLE : Sajitha, J.P., Haripriya, K., Maheswari, T. Uma and Stella, D. (2016). Effect of organic manures and biofertilizers on the productivity of garden bean (*Dolichos lablab* (Roxb.) L. var. typicus). *Asian J. Hort.*, **11**(1) : 129-131, **DOI : 10.15740/HAS/TAJH/11.1/129-131.**

Dolichos bean or garden bean is an important leguminous vegetable which is best suited for cultivation in tropical and subtropical regions as it is susceptible to frost. The merits of this legume are due to its versatility, richness in protein content and vigorous nodulating habit. These characters makes it fit for kitchen gardening (Panickar and Krishnakumary, 2002). The global scenario currently directs the scientists of agriculture to produce residue free farm produce. In India, though self sufficiency in food production is realized the cultivable land has been polluted due to heavy use of high analysis fertilizers during the post green revolution period. Hence, shift back to our traditional organic farming has become the need of the hour. Hence, a study was conducted to find out the effect of organic manures and biofertilizers on the productivity of garden bean cv. KONKAN BUSHAN.

RESEARCH METHODS

The present investigation was conducted to study the impact of organic manures and biofertilizers on the productivity of garden bean cv. KONKAN BUSHAN grown

at the organic land in the vegetable unit of the Department of Horticulture, Faculty of Agriculture, Annamalai University. The experiment was laid out in Randomized Block Design (RBD) with 10 treatments. Each treatment was replicated thrice. The treatments comprised of application of vermicompost @ 12.5 t ha^{-1} derived from various sources *viz*., pressmud, FYM, vegetable waste and flower waste and inoculation of *Rhizobium* and VA mycorrhizae. Foliar spray of vermiwash (1:5 dilution) was done 5 times from twenty DAS and at fifteen days interval. In normal practice incorporation of inorganic fertilizers @ 36 kg N and 72 kg P ha^{-1} was followed.

RESEARCH FINDINGS AND DISCUSSION

Among the treatments tested, vegetable waste vermicompost @ 12.5 t ha^{-1} along with *Rhizobium* VA mycorrhizae and vermiwash derived from vegetable waste (T_7) favourably improved growth component *viz*., plant height (65.25 and 82.40 cm), leaf area index (49.78 and 51.86) and dry matter production (5.22 and 6.25 t ha^{-1}) (Table 2). This result was closely followed by FYM based vermicompost @ 12.5 t ha^{-1} along with *Rhizobium* VA mycorrhizae and vermiwash (T_6). Application of these organics and biofertilizers significantly influenced the yield parameters *viz*., number of pods per plant (30.33 and 33.66), pod yield per plant (134.32 and 137.33 g $plant^{-1}$), single pod weight (4.03 and 4.08 g) and pod yield per hectare (5.46 and 6.86 t ha^{-1}) were observed in the treatment T_7 and this was closely followed by T_6 (Table 1). The same trend was followed in both the cropping years. This result is mainly due to the increased nutrient uptake, nodulation and biological nitrogen fixation by *Rhizobium*, colonization by vesicular arbuscular mycorrhizae and supplement of nutrients through

Table 1 : Effect of organic manures and biofertilizers on yield attributes of garden bean

Treatments	Number of pods/plant		Yield of pods/plant (g)		Single pod weight (g)		Yield /ha (tones)	
	Crop I	Crop II	Crop I	Crop II	Crop I	Crop II	Crop I	Crop II
T_1	21.48	23.67	70.34	82.60	3.22	3.49	3.32	4.13
T_2	22.98	24.69	78.94	88.88	3.27	3.60	3.43	4.44
T_3	24.28	26.96	84.14	99.48	3.34	3.69	4.08	4.98
T_4	18.98	21.98	65.24	75.17	3.18	3.42	3.13	3.75
T_5	27.96	30.00	108.22	117.00	3.49	3.90	4.35	5.85
T_6	29.38	32.52	121.70	130.08	3.68	4.00	4.50	6.50
T_7	30.33	33.66	134.32	137.33	4.03	4.08	5.46	6.86
T_8	27.07	28.45	99.70	108.67	3.44	3.82	4.26	5.43
T_9	17.00	19.00	60.04	62.70	3.10	3.30	2.98	3.13
T_{10}	24.47	27.25	84.70	101.37	3.36	3.72	4.10	5.01
S.E.±	0.11	0.18	1.28	1.35	0.01	0.02	0.02	0.02
C.D. (P=0.05)	0.24	0.38	2.64	2.79	0.03	0.05	0.04	0.05

Table 2 : Effect of organic manures and biofertilizers on growth characters of garden bean

Treatments	Plant height (cm)		Leaf area index		Dry matter production	
	Crop I	Crop II	Crop I	Crop II	Crop I	Crop II
T_1	47.74	51.70	38.97	40.88	3.58	4.48
T_2	49.86	53.60	39.72	41.51	3.82	4.69
T_3	51.75	54.80	40.41	42.52	4.12	4.98
T_4	45.38	50.40	38.28	40.23	3.36	4.30
T_5	58.36	65.60	45.00	47.11	4.67	5.62
T_6	62.06	69.40	47.60	48.64	4.96	5.90
T_7	65.25	82.40	49.78	51.86	5.22	6.25
T_8	55.73	57.60	43.04	45.80	4.46	5.30
T_9	40.12	46.80	37.05	39.19	2.89	3.10
T_{10}	52.15	55.40	40.64	42.82	4.19	5.07
S.E. ±	0.33	0.38	0.20	0.30	0.05	0.06
C.D. (P=0.05)	0.68	0.80	0.42	0.62	0.11	0.13

Table 3 : Nutrient content of vermicompost used in the study

Sr. No.	Nutrient content of vermicompost derived from	pH	Organic carbon	Nitrogen (%)	Phosphorus (%)	Potassium (%)
1.	Pressmud	7.58	21	2.10	1.40	1.48
2.	FYM	7.51	29	2.96	1.08	2.01
3.	Vegetable waste	7.46	27	3.02	1.22	2.08
4.	Flower waste	7.56	29	2.05	1.33	1.40

vermiwash and vermicompost and also it was reported that the combination of biofertilizers with organics not only helps in N fixation but simultaneous increase in N use efficiency and yield (Thanunathan and Ravichandran, 2000). The prolonged availability of nutrients during the crop growth period from vermicompost and vermiwash might have enhanced the yield attributes. Similar results were reported by Vinotha *et al*. (2000) who stated that vermicompost has enhanced the fertility of soil and yield of many agricultural produces due to improved activities of cellulose, amylase, invertase, protease, perioxidase, urease, phosphatase and dehydrogenase in the worm casts. The yield and yield attributes were significantly increased due to *Rhizobium* inoculation over uninoculated treatments. This corroborates the findings of (Prasad and Maurya, 1995). The overall superiority of the treatment T_7 might have attributed to the presence of higher 'N' content (3.02 %) in the vegetable waste based vermicompost and the next best range was found in FYM based vermicompost (2.96 %) (Table 3).

Summary :

Application of vegetable waste based vermicompost 12.5 t ha^{-1}, VA mycorrhizae, *Rhizobium* along with foliar spraying of vermiwash for five times at 15 days interval increased the growth and yield of garden bean cv. KONKAN BUSHAN.

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