IJPS INTERNATIONAL JOURNAL OF PLANT SCIENCES
Volume 7 | Issue 1 | January, 2012 | 18-22

RESEARCH ARTICLE

Integrated nutrient management in pointed gourd (*Trichosanthes dioica* Roxb.) cv. LOCAL under South Gujarat conditions

S. N. SARAVAIYA, P. B. KOLADIYA, D.T. DESAI, N. B. PATEL AND J. C. PATEL

SUMMARY

A field experiment was conducted at Regional Horticultural Research Station under an umbrella of Navsari Agricultural University, Navsari during the year of 2007-08, 2008-09 and 2009-10 to ascertain best blend of organic and inorganic nutrients for sustainable production of pointed gourd under South Gujarat conditions by utilizing the cultivar "LOCAL". A randomized block design was used with three replications which consisted of nine treatments *viz*., T_1 – 100 per cent RDF(120:60:40 NPK kg/ha), T_2 – FYM @ 20 t/ha, T_3 – bio compost @ 10 t/ha, T_4 – neem cake @ 5 t/ha, T_5 – vermi compost @ 10 t/ha, T_6 – 50 per cent RDF + FYM @ 20 t/ha, T_7 – 50 per cent RDF + Bio compost @ 10 t/ha, T_8 – 50 per cent RDF + neem cake @ 5 t/ha and T_9 - 50 per cent RDF + vermicompost @ 10 t/ha.On the basis of pooled analysis of the experimental findings as well as economics of different INM treatments it may be concluded that to obtain higher fruit yield of pointed gourd (17.93 t/ha) under INM system the vine should be fertilized with the combination of 50 per cent RDF (60:30:30 NPK kg/ha) along with 10 tones of bio-compost/ha.

Key Words **:** Pointed gourd, INM, Growth, Yield and economics

How to cite this article **:** Saravaiya, S.N., Koladiya, P.B., Desai, D.T., Patel, N.B. and Patel, J.C. (2012). Integrated nutrient management in pointed gourd (*Trichosanthes dioica* Roxb.) cv. LOCAL under South Gujarat conditions. *Internat. J. Plant Sci.*, **7** (1) : 18-22.

Article chronicle **: Received :** *06.07.2011;* **Sent for revision :** *20.07.2011;* **Accepted :** *15.10.2011*

The growing popularity of a vegetarian diet and the rising awareness of consumers about the importance of vegetable in a balanced diet have opened up huge market for vegetable crops both in the domestic and global front. At present, West Bengal ranks top in the total vegetable production in the country. Diverse agro-climatic zones, a pool of progressive farmers, small farm holding and increased irrigation facility are the advantages for successful vegetable farming. However, the major concerns are low productivity, diminishing return from farming as a whole and lack of awareness among the farmers regarding scientific crop management and product quality.

India has made significant progress on the vegetable map of the world and accounts for about 12 per cent share in the world total vegetable production and is second only to China. It occupies an area of 79 m ha with the production of 129 m tonne under vegetable crops. India has the potential to be the horticulture heaven and plantation paradise.

Pointed gourd (*Trichosanthes dioica* Roxb.) belongs to the family Cucurbitaceae having the origin of Indo-Malayan region is a warmth-loving crop thus, thrives well under hot or moderately warm and humid climate and is widely grown in eastern Uttar Pradesh, Bihar, West Bengal, Assam, Orissa, Madhya Pradesh, in some parts of Maharashtra and Gujarat and some hilly tracts of Andhra Pradesh and Tamil Nadu. It is called as the 'King of gourd' because it is one of the most

MEMBERS OF THE RESEARCH FORUM

Author to be contacted :
S. N. SARAVAIYA, Department of Vegetable Science, ASPEE College of Horticulture and Forestry, Navsari Agricultural University, NAVSARI (GUJARAT) INDIA
E-mail: sanmukhsaravaiya@yahoo.in

Address of the co-authors:
P. B. KOLADIYA, Vegetable Research Scheme, Regional Horticultural Research Station, Navsari Agricultural University, NAVSARI (GUJARAT) INDIA
E-mail: koladiya_paresh22@yahoo.co.in

N.B. PATEL, Horticulture Polytechnique, Navsari Agricultural University, NAVSARI (GUJARAT) INDIA, E-mail: nitin_nau@yahoo.com

D.T. DESAI AND J. C. PATEL, Department of Vegetable Science, ASPEE College of Horticulture and Forestry, Navsari Agricultural University, NAVSARI (GUJARAT) INDIA, E-mail: dtdesai19b@yahoo.com, jignesh_427@yahoo.co.in

nutritive and wholesome vegetable. It is easily digestible and is good for maintaining the healthy heart and brain. It is the highest dietary fibre (3g / 100g) containing vegetables. Great possibility exists for exploring its export to South-East Asia, Gulf countries, USA and even to European countries. It is also called in different Indian names of Parwal, Parmal, Panal and Patal. The tender fruits of pointed gourd are generally consumed as cooked and fried vegetable dishes and also used in making curries. The immature fruits are used for preparing pickles. Pointed gourd is cultivated in India using different locally adopted female clones (Chattopadhyay *et al.*, 2007). In Gujarat the area under vegetable crops is 4.12 lakh ha, with the production of 74.03 lakh tonne. Pointed gourd is commercially grown in the district of Surat, Bharuch, Navsari, Tapi, Dangs and Valsad.

Nutrient management is one of the key factors and most important cultural practice to improve the productivity of pointed gourd. Its productivity is adversely affected, if the crop is not fed properly (Singh and Krishna Mohan, 2007).

The basic concept of INM system, nevertheless, is the maintenance and possible improvement of soil health, sustaining crop productivity and also to minimize the use of chemicals but maximize the fertilizer use efficiency and improving farmers' profitability through the judicious and efficient use as well as scientific management of different sources of plant nutrients such as mineral fertilizers, organic manures, micronutrients etc. in an integrated manner for securing optimum yield from a specific cropping system. Information on the conjoint use of organic manures and chemical fertilizers in pointed gourd under the Indian conditions in general and the South Gujarat conditions in particular is very limited. Hence, the present study was conducted to evaluate the effect of INM on fruit yield of parwal as well as to determine the possibility of reduction of chemical fertilizers applied with FYM, bio compost, vermicompost and neem cake. Increase in the yield of chilli, okra and brinjal by combination of different INM components have been reported by Asha (1999), Rekha (1999) and Sharu and Meeradai (2001).

MATERIALS AND METHODS

The present investigation was carried out at Regional Horticultural Research Station, ASPEE College of Horticulture and Forestry of Navsari Agricultural University, Navsari during summer seasons of 2007-08, 2008-09 and 2009-10 under irrigated condition. The "LOCAL" variety of pointed gourd, extensively grown in south Gujarat region was used for the present experiment. The experiment consisted of 9 treatments *viz.*,T_1 – 100 per cent RDF(120:60:40 NPK kg/ha), T_2 – FYM @ 20 t/ha, T_3 – bio compost @ 10 t/ha, T_4 – neem cake @ 5 t/ha, T_5 – vermi compost @ 10 t/ha, T_6 – 50 per cent RDF + FYM @ 20 t/ha, T_7 – 50 per cent RDF + bio compost @ 10 t/ha, T_8 – 50 per cent RDF + neem cake @ 5 t/ha and T_9 - 50 per cent RDF + vermicompost @ 10 t/ha.The experiment was laid out in randomized block design in three replications. Raised bed method was adopted with the spacing of 2 m x 1 m. The entire quantity of fine and fully decomposed FYM, vermicompost, neem cake and BC required for experimental plot area was calculated and weighed as per treatments and well-mixed in the respective experimental plots before a month of planting. Pointed gourd cv. LOCAL was fertilized @ 120:60:40 kg ha^{-1}. nitrogen (N) was applied in the form of urea (CO $(NH_2)2$; containing 46 % N).Half the quantity of nitrogen in the form of urea was given as basal dose in each treatment. The remaining half quantity of N was applied as top dressings in two equal splits on 30th and 60th day after planting (DAP) through urea during all the years. Entire quantity of phosphate (P_2O_5) in the form of single super phosphate (containing 16% P_2O_5) and potash (K_2O) in the form of muriate of potash (KCL; containing 60% K_2O) was applied as basal dose during all the years.

The vines were trailed on the trellis. 10 per cent male plants have also planted as pollen donator. The Physico-chemical properties of the soil was clay-loam in texture (Table A and B).The initial values of organic carbon was 0.58 per cent, available N-240 kg/ha, P_2O_5-38.5 kg/ha and K_2O-268 kg/ha was recorded from the soil sample of experimental field. The pH value was 7.9 *i.e.* slightly alkaline in reaction with E.C. value 0.35 dSm^{-1}. The recommended package of practices was adopted to raise the crop. The fruits were harvested regularly at proper marketable stage. The traits, fruit weight (g), fruit length (cm) and fruit girth (cm) were recorded on 10 fruit bases and averaged. The observation related to per cent fruit set and fruit yield were also recorded. The data were analyzed

Table A : Physical properies of an experimental soil (0-225 cm depth)

Sr. No.	Particulars	Initial value
1.	Coarse sand (%)	1.72
2.	Fine sand (%)	9.10
3.	Silt (%)	25.78
4.	Clay (%)	60.72
5.	Bulk density (g cm^{-3})	1.69

Table B : Chemical properties of an experimental soil (0 - 22.5 cm depth)

Sr. No.	Particulars	Initial value
1.	Soil pH (1:2.5 soil : water ratio)	7.9
2.	Electrical conductivity (1:2.5 soil: water ratio) dS m^{-1} at 25° C	0.35
3.	Organic carbon (%)	0.58
4.	Available 'N' (kg ha^{-1})	240.0
5.	Available 'P_2O_5' (kg ha^{-1})	38.5
6.	Available 'K_2O' (kg ha^{-1})	268.0

by the method given by Panse and Sukhatme (1989).

RESULTS AND DISCUSSION

The results obtained from the present investigation have been discussed under following heads:

Growth parameters :

Fruit weight (g):

The treatments effects were found to be non significant during the year of 2007-08 and 2008-09 whereas it was found significant during the year of 2009-10. In pooled analysis the effect was found non-significant. The interaction of year x treatment was found non significant (Table 1).

Fruit length (cm) :

It is obvious from the data (Table 1) that the effects of different INM treatments was found non significant during the year of 2008-09, while it was found significant during the year of 2007 -08 and 2009-10.

Looking to the pooled analysis, non significant results have been noticed. The interaction of year x treatment was found significant (Table 1).

Fruit girth (cm) :

The statistical comparison shows the significant influence of different treatments on this character during first year *i.e.* 2007-08, while it was found non-significant during the year of 2008-09 and 2009-10 as well as in pooled analysis also. The interaction of year x treatment was found non-significant (Table 2).

Yield attributes :

No. of fruits per plot:

It is explicit from the data (Table 2) that significant effect of different INM treatments was found during the first year of study *i.e.* in 2007-08. In remaining two years as well as in pooled analysis, it was found non-significant. The interaction of year x treatment was found significant.

Table 1 : Mean effect of INM treatments on fruit weight and fruit length of pointed gourd cv. LOCAL

Treatments	Fruit weight (g)				Fruit length (cm)			
	2007-08	2008-09	2009-10	Pooled	2007-08	2008-09	2009-10	Pooled
T_1 – 100 % RDF(120:60:40 NPK kg/ha)	28.76	29.43	29.10	29.10	7.16	7.26	7.33	7.25
T_2 – FYM @ 20 t/ha	28.56	27.90	28.20	28.22	7.06	6.96	6.86	6.96
T_3 – Bio compost @ 10 t/ha	29.80	29.26	29.56	29.54	7.53	7.13	7.20	7.28
T_4 – Neem cake @ 5 t/ha	28.80	28.96	29.66	29.14	7.13	7.20	7.26	7.20
T_5 – Vermi compost @ 10 t/ha	28.96	28.06	26.93	27.98	7.36	7.40	6.83	7.20
T_6 – 50 % RDF + FYM @ 20 t/ha	29.40	28.30	30.20	29.30	7.52	6.86	7.26	7.22
T_7 – 50 % RDF + Bio compost @ 10 t/ha	29.06	29.83	30.46	29.78	7.36	7.26	7.36	7.33
T_8 – 50 % RDF + Neem cake @ 5 t/ha	27.33	30.50	31.00	29.61	6.86	7.33	7.53	7.24
T_9 - 50 % RDF + Vermi compost @ 10 t/ha	27.63	30.00	30.80	29.47	6.93	7.30	7.46	7.23
S.E.±	0.83	0.90	0.61	0.49	0.09	0.11	0.08	0.14
C.D. (P=0.05)	NS	NS	1.84	NS	0.29	NS	0.25	NS
C.V.%	5.07	5.38	3.60	4.74	2.37	2.67	2.06	2.38

NS= Non significant

Table 2 : Mean effect of INM treatments on fruit girth and no. of fruits per plot of pointed gourd cv. LOCAL

Treatments	Fruit girth (cm)				No. of fruits per plot			
	2007-08	2008-09	2009-10	Pooled	2007-08	2008-09	2009-10	Pooled
T_1 – 100 % RDF(120:60:40 NPK kg/ha)	9.23	9.26	9.23	9.24	513.00	518.66	628.66	553.44
T_2 – FYM @ 20 t/ha	8.70	8.76	8.90	8.78	439.33	447.66	658.66	515.22
T_3 – Bio compost @ 10 t/ha	9.36	8.80	8.76	8.97	408.70	558.66	768.00	578.45
T_4 – Neem cake @ 5 t/ha	9.26	8.96	9.00	9.07	471.66	509.00	569.00	516.55
T_5 – Vermi compost @ 10 t/ha	9.30	9.03	8.63	8.98	439.00	516.00	542.33	499.11
T_6 – 50 % RDF + FYM @ 20 t/ha	9.33	8.86	9.30	9.16	511.33	591.33	740.33	581.00
T_7 – 50 % RDF + Bio compost @ 10 t/ha	9.30	9.20	9.36	9.28	529.00	541.00	546.00	538.66
T_8 – 50 % RDF + Neem cake @ 5 t/ha	8.56	9.23	8.53	8.77	358.66	530.66	535.00	474.77
T_9 - 50 % RDF + Vermi compost @ 10 t/ha	8.60	9.20	9.33	9.04	489.66	519.33	537.33	515.44
S.E. ±	0.14	0.37	0.33	0.17	71.40	32.18	26.99	49.37
C.D. (P=0.05)	0.42	NS	NS	NS	214.07	NS	NS	NS
C.V.%	2.70	7.20	6.37	5.76	21.43	10.72	9.18	15.47

NS=Non-significant

Table 3 : Mean effect of INM treatments on fruit yield of pointed gourd cv. LOCAL

Treatments	Fruit yield (t/ha)			
	2007-08	2008-09	2009-10	Pooled
T_1 – 100 % RDF(120:60:40 NPK kg/ha)	13.14	15.61	23.87	17.54
T_2 – FYM @ 20 t/ha	10.36	14.86	21.12	15.45
T_3 – Bio compost @ 10 t/ha	12.58	19.04	18.12	16.58
T_4 – Neem cake @ 5 t/ha	12.28	13.01	23.42	16.24
T_5 – Vermi compost @ 10 t/ha	8.61	12.25	21.19	14.02
T_6 – 50 % RDF + FYM @ 20 t/ha	11.99	18.04	25.08	18.37
T_7 – 50 % RDF + Bio compost @ 10 t/ha	13.22	13.67	26.89	17.93
T_8 – 50 % RDF + Neem cake @ 5 t/ha	9.96	13.78	28.54	17.43
T_9 - 50 % RDF + Vermi compost @ 10 t/ha	11.22	13.58	27.43	17.41
S.E.±	637.21	1681.48	1438.44	1582.88
C.D. (P=0.05)	1910.46	5041.3	4312.65	NS
C.V.%	8.78	21.13	10.21	13.61

Fruit yield (t/ha) :

Significant differences in terms of fruit yield were noted among different treatments during all the three years under study. In pooled analysis it was found non-significant. The interaction of year x treatment was found significant.

However, the maximum fruit yield (18.37 t/ha) was noticed with the treatment T_6 (50%RDF + FYM 20 t/ha), whereas it was recorded minimum (14.02 t/ha), with the sole organic manure treatment of vermicompost 10 t/ha. The values varied from 14.02 to 18.37 t/ha. (Table 3).These results are in agreement with the findings Kumar *et al.* (1990) as well as Singh and Krishna Mohan (2007) in pointed gourd. Consequently this gain was also seen in other characters such as heavier fruit weight (29.78 g), longer fruit length (7.33 cm), greater fruit girth (9.28 cm) and more number of fruits per plot (581) on pooled data basis integrated with application of organic-inorganic combination of manures and fertilizers. These may be due to better utilization of nutrients by parwal vines due to its split application in clay loam soil of south Gujarat regions. These results are in conformity with the results reported by Prabhakar *et al.*(1985) in muskmelon.

Economics :

Considering the economics of different INM treatments, the maximum benefit : Cost ratio (4.85) was recorded in treatment T_7 (50 % RDF + bio compost @10 t/ha). This treatment was found economic, profitable and proved highly remunerative (Table 4). This may be attributed to better manifestation of yield and yield attributes on account of application of organic-inorganic combination of manures and fertilizers resulting in better growth indices due to efficient utilization of nutrients by the test crop of pointed gourd cv. "LOCAL".

Table 4: Economics (Rs./ha) of parwal as influenced by different INM treatments

INM Treatments	Fruit yield (t ha^{-1})	Variable cost	Fixed cost	Total cost	Gross return	Net return	Benefit : Cost ratio
T_1 – 100 % RDF(120:60:40 NPK kg/ha)	17.54	10,979	57,375,	68,354	3,50,800	2,82,446	4.13
T_2 – FYM @ 20 t/ha	15.45	15,666	57,375,	73,041	3,09,000	2,35,959	3.23
T_3 – Bio compost @ 10 t/ha	16.58	2,453	57,375,	59,828	3,31,600	2,71,772	4.54
T_4 – Neem cake @ 5 t/ha	16.24	28,167	57,375,	85,542	3,24,800	2,39,258	2.79
T_5 – Vermi compost @ 10 t/ha	14.02	26,903	57,375,	84,278	2,80,400	1,96,122	2.32
T_6 – 50 % RDF + FYM @ 20 t/ha	18.37	16,407	57,375,	73,782	3,67,400	2,93,618	3.97
T_7 – 50 % RDF + Bio compost @ 10 t/ha	17.93	3,860	57,375,	61,235	3,58,600	2,97,365	4.85
T_8 – 50 % RDF + Neem cake @ 5 t/ha	17.43	29,740	57,375,	87,115	3,48,600	2,61,485	3.50
T_9 - 50 % RDF + Vermi compost @ 10 t/ha	17.41	28,715	57,375,	86,090	3,48,200	2,62,110	3.04

Value of inputs:	
1. Sale price of parwal	: Rs.20/kg fruit
2. Cost of FYM	: Rs. 750/tonne
3. Cost of urea	: Rs. 260 / 50 kg
4. Cost of SSP	: Rs. 183 / 50 kg
5. Cost of muriate of potash	: Rs. 231 / 50 kg
6. Planting material cost	: Rs. 5000/ ha
7. Irrigation cost	: Rs. 2400 (Rs.30 / hr)
8. Cost of picking	: Rs. 0.50 / kg fruit
9. Labour cost	: Rs. 66 / day (Av. of 3 years)
10. Cost of biocompost	: Rs. 212 / tonne
11. Cost of vermicompost	: Rs. 265 / tonne
12. Cost of neem cake	: Rs. 5.6 / kg
13. Fixed cost includes	: Mandap preparation, Land preparation, Irrigation, Planting, Training and pruning, weeding, interculturing, plant protection mesures etc.
14. Variable cost includes	: Chemical fertilizers, organic fertilizers, application cost, picking of fruits
15. Ploughing	: Rs. 200/hr
16. Harrowing	: Rs. 150 / hr
17. Planking	: Rs. 100 / hr
18. Cost of 100% RDF	: Rs. 2813/-
19. Cost of 50% RDF	: Rs. 1407/-
20. Mandap cost	: Rs. 1,00,000 / ha (Life span 5 years *i.e.* Rs. 20,000 / year)

REFERENCES

Asha, K. R. (1999). Organic nutrition of okra (*Abelmoschus esculentus*). M.Sc.(Ag.) Thesis, Kerala Agricultural University, Vellanikkara, THRISUR, KERALA (India).

Chattopadhyay, A., Dutta, S., Karmakar, K., Bhattacharya, I. and Hazra, P. (2007). *Technology for vegetable crop production*. Published by AICRP (VC), BCKV, Directorate of Research, Kalyani, NADIA, W.B. (India).

Kumar Rajesh,Singh,R.K. and Pujari,M.M.(1990). Effect of nitrogen and phosphorus on pointed gourd (*Trichosanthes dioica* Roxb.). *Haryana J. Hort. Sci*., **19**(3-4): 368-370.

Panse, V.G. and Sukhatme, P.V.(1989). *Statistical methods for agricultural workers*. ICAR, NEW DELHI (India).

Prabhakar, B.S., Srinivas, K. and Shukla,Vishnu (1985). Yield and quality of muskmelon cv. HARA MADHU in relation to spacing and fertilization. *Prog. Hor*t.,**17**(1) : 51-55.

Rekha, S.R.(1999). Integrated nutrient management in brinjal (*Solanum melongena* L.) M.Sc. (Ag.) Thesis, Kerala Agricultural University, Vellanikkara, THRISUR, KERALA (India).

Sharu, R.S. and Meeradai, M. (2001). Effect of integrated nutrient management on yield and quality in chilli (*Capsicum annum* L.) *Veg. Sci*., **28**(2): 184-185.

Singh, K. P. and Krishna Mohan (2007). Integrated nutrient management for sustainable production of pointed gourd (*Trichosanthes dioica* Roxb.) under Ganga diara of Bihar. *Asian J. Hort.* **2**(1): 99-101.

****
*****