Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
www.phytojournal.com
JPP 2020; 9(2): 1643-1645
Received: 19-01-2020
Accepted: 21-02-2020

Dudhat MA
College of Horticulture, JAU, Junagadh, Gujarat, India

Patel KD
Principal, Polytechnique in Horticulture, JAU, Junagadh, Gujarat, India

Corresponding Author:
Dudhat MA
College of Horticulture, JAU, Junagadh, Gujarat, India

Evaluation of integrated nutrient management on the performance of quality and yield attributes of hybrid bitter gourd VNR 22 [*Momordica charantia* L.]

Dudhat MA and Patel KD

Abstract
The present investigation was conducted at Fruit Research Station, Lal baugh. College of Agriculture, Junagadh Agricultural University, Junagadh during summer 2018 to find out the effect of inorganic and organic along with biofertilizers in an integrated manner for yield maximization and quality improvement in hybrid bitter gourd VNR 22. The experiment consisted of ten treatment with three replication, including different level of applications of inorganic fertilizers (Urea, DAP and Muriate of potash), organic manure (FYM) and biofertilizers (Azotobacter and PSB). The results illustrated that the plants treated with 100% RDF of NPK + FYM 5 t/ha + Biofertilizers 4 kg/ha (*Azotobacter* and Phosphate Solubilizing bacteria) has recorded maximum total soluble solids (3.19ºBrix), protein content (1.75 %), ascorbic acid (81.35 mg/100g) and shelf life (5.71 days) as well as maximum total fruit yield (5.65 t/ha) and higher benefit: cost ratio (2.99).

Keywords: NPK, farm yard manure, biofertilizers, yield, quality, bitter gourd

1. Introduction
Bitter gourd or balsam pear (*Momordica charantia* L.) is one of the commercially important cucurbitaceous vegetable crops. Bitter gourd is extensively grown throughout the country for its nutritive value and medicinal properties. India occupies an area of vegetables about 10295 thousand ha with an annual production of 176177 thousand MT. Gujarat occupies an area of vegetables about 643.87 thousand ha with an annual production of 13161.25 thousand MT and bitter gourd is cultivated in an area of 98 thousand ha with a production of 1106 thousand MT, having productivity of 11.28 MT/ha (Anon., 2017) [1]. Unlike other cucurbitaceous vegetables, the bitter fruit flavour of *M. charantia* is considered desirable for consumption, and thus bitter flavour has been selected during domestication (Marr *et al*., 2004) [4].

2. Materials and Methods
The present study was laid out in Randomized Block Design (RBD) with three replications involving ten treatments with three replication at Fruit Research Station, Lal baugh. College of Agriculture, Junagadh Agricultural University, Junagadh during summer 2018. This experiment includes ten treatments like 100 % RDF of NPK (60 : 60 : 60 kg/ha) (T_1), 100 % RDF of NPK + FYM 5 t/ha (T_2), 100 % RDF of NPK + FYM 5 t/ha + Biofertilizers 4 kg/ha (T_3), 75 % RDF of NPK (45 : 45 : 45 kg/ha) (T_4), 75 % RDF of NPK + FYM 5 t/ha (T_5), 75 % RDF of NPK + FYM 5 t/ha + Bio fertilizers 4 kg/ha (T_6), 50 % RDF of NPK (30 : 30 : 30 kg/ha) (T_7), 50 % RDF of NPK + FYM 5 t/ha (T_8), 50 % RDF of NPK + FYM 5 t/ha + Bio fertilizers 4 kg/ha (T_9), Absolute control (T_{10}). Bitter gourd seeds of hybrid variety VNR 22 were sown at a spacing of 1.50 m × 2.0 m. The plot size was 7.50 m × 6.00 m and sowing was done during the summer 2018. Data were taken five plants were selected randomly from each plot and tagged. Quality (TSS, protein content, ascorbic content, shelf life), yield (number of fruit per vine, length and girth of fruit, weight of fruit, yield per plant, yield per hectare) and benefit cost ratio were recorded as per standard methodology.

3. Results and Discussion
Effect of INM on quality parameters of bitter gourd:
The data presented in (Tables 1). Organic manure, inorganic fertilizers along with biofertilizers effect on quality of bitter gourd. The application of 100 % RDF of NPK + FYM 5 t/ha + Biofertilizers 4 kg/ha recorded total soluble solids (3.19º Brix), protein content (1.75%),

ascorbic acid (81.35 mg/100g) and shelf life (5.71 days). These finding clearly indicated that INM played a significant role on enhancing the quality of bitter gourd. Which helped in better uptake of NPK nutrients including micronutrients, nitrogen is a major constituent of plant protein, amino acids, chlorophyll and protoplasm. It is also a constituent nucleic acid, phospholipids and more vitamins, all of which play definite role in the physiology of plant and growth which in turn influenced the quality traits in fruit More or less the above findings are in close agreement with the results of Meerabai *et al.* (2007) [5] and Thriveni *et al.* (2015) [9] (Table 1).

Effect of INM on yield and yield attributes of bitter gourd:
Fertility levels had significant response on yield attributes. The application of 100% RDF of NPK + FYM 5 t/ha + Biofertilizers 4 kg/ha produced maximum number of fruits per plant (20.63), highest fruit weight (83.71 g) and fruit yield (5.65 t/ha) (Table 2). The fruit yield depends mainly on the length of fruit, girth of fruit, fruit yield per plant (kg), fruit yield per plot (kg), and average weight of fruit. The highly suitability of INM treatment increased number of fruit might be due to combined effect of organic manure, inorganic fertilizer and biofertilizers which favourably influenced translocation of nutrient to the fruiting nodes results in higher fruiting. The increase in fruit length and girth might have been due to the diversion of photosynthates to reproductive organs and organic manure with biofertilizers provide a production of carbohydrates. In this situations, flow of assimilates to sink was high and might be a reason of higher fruit length and girth (Prasad *et al.* 2009, Thriveni *et al.* 2015) [9]. Higher yield of bitter gourd in the present study is also related to the influence of luxurious supply of nitrogen, phosphorus, potash, FYM and biofertilizers and their effect absorption which the various physiological and metabolic processed especially protein metabolism. The translocation of these nutrients to the fruiting nodes results in higher fruiting and fruit development and ultimately yield. Similar findings with respect to nitrogen and phosphors on yield attributes were also reported by Pulak Bhunia Mandai (2009) [7] and Thriveni *et al.* (2015) [9] in bitter gourd, Saravaiya *et al.* (2012) [8] in pointed gourd, Kameswari and Narayanamma (2011) [3] in ridge gourd. Minimum results of yield attributing characters were obtained in control. Thus, the results of the present experiment are in a good agreement with the above mentioned findings (Table 2).

Effect of INM on economics of bitter gourd
The gross realization, net returns and benefit: cost ratio was computed for combinations of organic manure, inorganic fertilizers and biofertilizers. It was observed from data that maximum gross realization (₹ 2,26,000), net returns (₹1,69,336), Benefit: Cost ratio (2.99) of bitter gourd crop production in one-hectare area recorded with application of 100 % RDF of NPK + FYM 5 t/ha + Biofertilizers 4 kg/ha. Similar results finding with Bindiya *et al.* (2006) [2] and Prabhu *et al.* (2006) [6] in cucumber and Meerabai *et al.* (2007) [5] in bitter gourd (Table 3).

Table 1: Influence of INM on quality of hybrid bitter gourd

Tr. No.	Treatments	TSS (°Brix)	Ascorbic acid (mg/100g)	Protein content (%)	Shelf life (days)
T_1	100 % RDF of NPK (60 : 60 : 60 kg/ha)	2.60	68.87	1.56	5.15
T_2	100 % RDF of NPK + FYM 5 t/ha	2.95	75.74	1.60	5.56
T_3	100 % RDF of NPK + FYM 5 t/ha + Biofertilizers 4 kg/ha	3.19	81.35	1.75	5.71
T_4	75 % RDF of NPK (45 : 45 : 45 kg/ha)	1.62	67.00	1.22	4.59
T_5	75 % RDF of NPK + FYM 5 t/ha	2.81	73.04	1.36	4.96
T_6	75 % RDF of NPK + FYM 5 t/ha + Biofertilizers 4 kg/ha	3.10	75.40	1.69	5.56
T_7	50 % RDF of NPK (30 : 30 : 30 kg/ha)	1.91	62.93	1.22	4.31
T_8	50 % RDF of NPK + FYM 5 t/ha	2.70	65.14	1.39	4.71
T_9	50 % RDF of NPK + FYM 5 t/ha + Biofertilizers 4 kg/ha	2.85	74.90	1.54	5.24
T_{10}	Absolute control	1.74	57.31	1.19	4.12
	S.Em.±	0.124	2.479	0.083	0.221
	C.D. at 5%	0.37	7.37	0.25	0.66
	C. V.%	8.44	6.12	9.94	7.66

Table 2: Influence of INM on yield and yield attributes of hybrid bitter gourd

Tr. No.	Treatments	Number of fruits per plant	Fruit length (cm)	Fruit girth (mm)	Fruit weight (g)	Fruit yield /plant (kg)	Fruit yield/plot (kg)	Total yield (t/ha)
T_1	100 % RDF of NPK (60 : 60 : 60 kg/ha)	17.06	12.35	45.42	73.82	1.25	11.00	4.20
T_2	100 % RDF of NPK + FYM 5 t/ha	18.08	14.49	46.83	77.19	1.39	12.73	4.32
T_3	100 % RDF of NPK + FYM 5 t/ha + Biofertilizers 4 kg/ha	20.63	14.87	50.82	83.71	1.72	15.20	5.65
T_4	75 % RDF of NPK (45 : 45 : 45 kg/ha)	16.70	12.20	40.53	64.82	1.08	9.14	3.28
T_5	75 % RDF of NPK + FYM 5 t/ha	17.50	13.82	44.86	66.42	1.17	10.15	3.97
T_6	75 % RDF of NPK + FYM 5 t/ha + Biofertilizers 4 kg/ha	18.17	14.39	47.49	77.89	1.41	12.88	4.72
T_7	50 % RDF of NPK (30 : 30 : 30 kg/ha)	13.67	11.13	38.23	62.78	0.85	7.72	2.86
T_8	50 % RDF of NPK + FYM 5 t/ha	15.98	12.13	42.12	67.55	1.08	9.38	3.60
T_9	50 % RDF of NPK + FYM 5 t/ha + Biofertilizers 4 kg/ha	18.36	13.40	46.03	72.91	1.33	12.09	4.42
T_{10}	Absolute control	9.89	10.86	30.76	50.46	0.49	4.13	1.67
	S.Em.±	1.179	0.858	2.247	3.951	0.094	0.605	0.307
	C.D. at 5%	3.50	2.55	6.67	11.74	0.28	1.80	0.91
	C. V.%	12.30	11.47	8.99	9.81	13.85	10.03	13.76

Table 3: Influence of INM on economics of hybrid bitter gourd

Tr. No.	Treatments	Gross realization (₹/ha)	Net returns (₹/ha)	BCR
T_1	100 % RDF of NPK (60 : 60 : 60 kg/ha)	168000	116896	2.29
T_2	100 % RDF of NPK + FYM 5 t/ha	172800	116696	2.08
T_3	100 % RDF of NPK + FYM 5 t/ha + Biofertilizers 4 kg/ha	226000	169336	2.99
T_4	75 % RDF of NPK (45 : 45 : 45 kg/ha)	131200	81523	1.64
T_5	75 % RDF of NPK + FYM 5 t/ha	158800	105373	1.97
T_6	75 % RDF of NPK + FYM 5 t/ha + Biofertilizers 4 kg/ha	188800	134953	2.51
T_7	50 % RDF of NPK (30 : 30 : 30 kg/ha)	114400	66150	1.37
T_8	50 % RDF of NPK + FYM 5 t/ha	144000	93250	1.84
T_9	50 % RDF of NPK + FYM 5 t/ha + Biofertilizers 4 kg/ha	176800	125770	2.46
T_{10}	Absolute control	66800	21404	0.47

Conclusion

It is concluded that treatment consisted of 100 % RDF of NPK + FYM 5 t/ha + Biofertilizers 4 kg/ha gave significant effect on quality and yield attributing characters as well as net return. Treatment control was the lowest performer for the results of the said characters. So, keeping view on yield sustainability, balance in ecosystem, soil health improvement and good health of human beings it may be suggested that vegetable growers may supplement through the judicious and efficient use of organic, inorganic fertilizers and biofertilizers alone or in combination.

Reference

1. Anonymous. Indian Horticulture Database. National Horticulture Board, Ministry of Agriculture, Government of India, New Delhi, 2017. Available at www.nhb.gov.in. accessed on 25th January, 2018.
2. Bindiya Y, Reddy IP, Srihari D, Reddy RS, Narayanamma M. Effect of different sources of nutrition on soil health, bacterial population and yield of cucumber. Indian J. of Agric. Res. 2006; 34(2):12-17.
3. Kameswari PL, Narayanamma M. Influence of integrated nutrient management in ridge gourd (*Luffa acutangula* L.). J. Res. ANGRAU, 2011; 39(3):16-20.
4. Marr KL, Xia YM, Bhattarai NK. Allozyme, morphological and nutritional analysis bearing on the domestication of (*Momordica charantia* L.) cucurbitaceae. Econ. Bot., 2004; 58:435-455.
5. Meerabai M, Jayachandran BK, Asha KR. Biofarming in bitter gourd (*Momordica charantia* L.) International Conference on Indigenous Vegetables and Legumes. Prospectus for Fighting Poverty, Hunger and Malnutrition, ISHS Acta Hort., 2007; 75(2):1-300.
6. Prabhu M, Natarajan S, Srinivasan K, Pugalendh L. Integrated nutrient management in cucumber. Ind. J. Agric. Res., 2006; 40(2):123-126.
7. Pulak Bhunia Mandai AR. Influence of irrigation levels and nutrient management on growth and yield of bitter gourd (*Momordica charantia* L.) under West Bengal condition. Ind. agriculturist. 2009; 53(3, 4):91-96.
8. Saravaiya SN, Koladiya PB, Desai DT, Patel NB, Patel JC. Integrated nutrient management in pointed gourd (*Trichosanthes dioica* Roxb.) cv. Local under South Gujarat conditions. Int. J. plant Sci. 2012; 7(1):18-22.
9. Thriveni V, Mishra H, Pattanayak S, Sahoo G, Thomson T. Effect of inorganic, organic fertilizers and biofertilizers on growth, flowering, yield and quality attributes of bitter gourd, (*Momordica charantia* L.). Int. j. 2015.