



EFFECT OF DIFFERENT LEVELS OF FERTILIZERS AND GROWTH REGULATOR ON GROWTH, YIELD AND ECONOMIC OF BITTER GOURD (*MOMARDICA CHARANTIA*) UNDER NORTH EASTERN TRANSITION ZONE

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Abstract

The field experiment was conducted at College of Horticulture, Bidar, during the year 2013–2014 to know the effect of different levels of fertilizer (F₁ - 100% RDF, F₂ - 75% RDF, F₃ - 50% RDF and F₄ - 100% RDF + Azatobacter @ 500 gm.) and ethylene concentration (G₁ - Ethrel – 25 PPM, G₂ - Ethrel – 50PPM and G₃ Ethrel – 75 PPM) on growth, yield and economics of bitter gourd. From the data it was revealed that significantly higher fruit yield per plot and per heacter was recorded under F₄ -100 % RDF + Azosprillum 500gm/ha (11.11 kg/plot and 9.26 t/ha). Whereas, lower yield of 10.23 kg/plot and per heacter (8.52 t/ha) was recorded under treatment F₃ - 50% recommended NPK and significantly higher yield per plot and per heacter (11.46 kg/plot and 9.55 t/ha) was recorded under G₃ (Ethrel 75 ppm). Among the treatments imposed, the treatment F₄G₃ obtained highest yield (10.88 t/ha) and net income (Rs. 61500/ha), gross income (Rs. 108750/ha) and B : C ratio of 2.30.

Key words : Fertilizer levels, growth regulator and economics.

Introduction

Bitter gourd (*Momordica charantia* L.) is a tropical and subtropical vine of the family Cucurbitaceae. It is widely grown for edible fruit, which is among the most bitter of all vegetables. The original home of the species is not known, other than that it is a native of the tropics. It is widely grown in South Asia and Southeast Asia, China, and Africa. The herbaceous tendril-bearing vine grows to 5 m. It bears simple, alternate leaves 4-12 cm across, with 3-7 deeply separated lobes. Each plant bears separate yellow male and female flowers (Rashid, 2004). Bitter gourd is usually grown under kitchen garden as a summer vegetable. But at present it is also being grown as commercial crop near the urban areas. Moreover, it can also be grown in any type of soil having good drainage system. From nutritional point of view, bitter gourd can be considered as nutrition rich fruit vegetable. It contains considerable amount of water (83-92%), carbohydrates (4.0-10.5%), protein (1.5-2.0%), fat (0.2-1.0%), minerals (0.5-1.0%) and fiber (0.8-1.7 %). Ripe fruits are rich in vitamin-A (Akter *et al.*, 2009). The role of growth

regulators in various physiological and biochemical process in plant is well known from its identification. Growth regulators are known to have an effect on the production of earliest flower, yield (Gedam *et al.*, 1998). The average ratio of staminate to pistillate flowers in monoecious lines throughout the flowering period is typically 50:1, but ratios can vary dramatically 9:1 to 48:1 by exogenous application PGRs In bitter gourd, it is possible to increase the yield level by increasing the fruit set percent by use of some growth regulator *viz.*, ethylene at 2-4 leaf stage (Muhammad Awai S. Ghani *et al.*, 2013). The yield of bitter gourd is low, which can be attributed to lack of improved varieties, imbalanced use of fertilizers and growth regulator. Hence, the present investigation carried out to know the effect of different levels of fertilizers and growth regulator on growth, yield and economic on bitter gourd (*Momardica charantia*) under North Eastern transition zone of Karnataka, India.

Materials and Methods

Field experiment was conducted during 2013 to 2014 at College of Horticulture, Bidar, to know the effect of different levels of fertilizers and growth regulator on

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Table 1: Vine length (cm) and number of branches of Bitter gourd at different growth stages as influenced by Different levels of fertilizer and ethylene.

Treatments	Vine length (cm)		Number of branches
Fertilizers levels			
1. F1-100% RDF	37.46	139.73	3.47
2. F2- 75% RDF	30.97	135.53	3.04
3. F3- 50% RDF	31.46	117.69	2.96
4. F4- 100% RDF + Azosprillum 500gm/ha	42.25	143.24	3.64
Mean	35.53	134.05	3.27
S. Em.±	2.14	8.40	0.96
C.D. at 5%	3.76	0.13	0.49
Growth regulator			
1. Ethrel – 25 PPM	34.24	133.05	3.35
2. Ethrel –50 PPM	31.33	124.73	2.78
3. Ethrel – 75	41.03	144.37	3.70
Mean	35.53	134.05	3.27
S. Em.±	1.49	4.41	4.03
C.D. at 5%	11.98	0.18	NS
F at the same V levels	2.57	NS	6.99
S. Em.±	NS	0.32	NS
C.D. at 5%			
V at the same or different F levels	3.09	NS	6.13
S. Em.±	NS	0.30	NS
C.D. at 5%			

NS - Non significant.

growth, yield and economic on bitter gourd (*Momardica charantia*). The experiment was laid out using split plot design with total 12 treatments with three replications, main plot consist of four levels of fertilizers, F₁- 100% RDF, F₂- 75% RDF, F₃- 50% RDF and F₄- 100% RDF + Azotobacter @ 500 gm. sub plot includes three levels of ethylene G₁- Ethrel – 25 PPM, G₂- Ethrel –50PPM and G₃ Ethrel–75 PPM. The spacing adopted for planting was 120X90cm. The plots were irrigated immediately after the completion of sowing. Thinning of excess seedlings and gap filling was undertaken one week after germination. All cultural practices have followed as per package of practices of UHS, Bagalkot. The observations viz., plant height, no. of branches, days to 50% flowering, sex ratio, yield per plot and yield per ha. Economics were worked out. The collected data were subjected for statistical analysis.

Table 2: Yield and yield parameters of Bitter gourd as influenced by as influenced by different levels of fertilizer and ethylene.

Treatments	Days to 50 per cent flowering	Sex ratio	Fruit length (cm)	Fruit Diameter (cm)
Fertilizers levels				
1. F1-100% RDF	42.78	15.74	9.94	15.02
2. F2- 75% RDF	42.67	9.95	9.38	14.82
3. F3- 50% RDF	42.56	10.19	9.27	15.68
4. F4- 100% RDF + Azosprillum 500gm/ha	40.56	10.64	10.33	17.60
Mean	42.13	11.62	9.73	15.78
S. Em.±	0.38	0.76	0.44	0.33
C.D. at 5%	NS	3.00	1.73	1.28
Growth regulator				
1. G1- Ethrel-25 PPM	41.75	12.59	8.98	15.27
2. G2- Ethrel-50 PPM	42.17	11.56	10.44	16.22
3. G3- Ethrel-75 PPM	42.50	10.74	9.77	15.86.
Mean	42.13	11.62	9.73	15.78
S. Em.±	1.19	0.95	0.73	0.51
C.D. at 5%	NS	2.83	2.16	1.51
F at the same G levels	2.06	1.65	1.26	0.88
S. Em.±	NS	NS	NS	NS
C.D. at 5%				
G at the same F levels	1.82	1.62	1.18	0.83
S. Em.±	NS	NS	NS	NS
C.D. at 5%				

NS - Non significant.

Results and Discussion

Effect of different levels of fertilizers

Significantly maximum vine length of 42.25 and 143.24 cm were recorded in F₄ (100% RDF + Azosprillum 500gm/ha) and lower vine length was recorded in F₃ (50% RDF) (31.46 and 117.69 cm) at 30 and 60DAS, respectively. Significantly maximum number of branches per vine recorded under the treatment F₄ (100% RDF + Azosprillum 500gm/ha) 3.64 (table 1). Significantly higher fruit length of 10.33 cm and fruit diameter of 17.60 cm were recorded under F₄ (100% RDF + Azosprillum 500gm/ha). This conforms the findings of Nasreen *et al.* (2013).

Data presented in table 2 revealed that among various fertilizer levels, significantly higher fruit yield per plot and per hectare was recorded under F₄ -100% RDF + Azosprillum 500gm/ha (11.11 kg/plot and 9.26 t/ha),

Table 3 : Yield per plot and per hectare of Bitter gourd as influenced by as influenced by different levels of fertilizer and ethylene.

Treatments	Yield per plot (Kg)	Yield per hectare (tones)
Fertilizer levels		
1. F1-100% RDF	10.73	8.94
2. F2- 75% RDF	10.53	8.78
3. F3- 50% RDF	10.23	8.52
4. F4- 100% RDF + Azospirillum 500gm/ha	11.11	9.26
Mean	10.65	8.87
S. Em.±	0.15	0.13
C.D. at 5%	0.61	0.51
Growth regulator		
1. G1- Ethrel – 25 PPM	10.50	8.75
2. G2- Ethrel – 50 PPM	10.00	8.34
3. G3- Ethrel – 75 PPM	11.46	9.55
Mean	10.65	8.87
S. Em.±	0.29	0.24
C.D. at 5%	0.87	0.73
F at the same G levels		
S. Em.±	0.51	0.42
C.D. at 5%	NS	NS
G at the same F levels		
S. Em.±	0.47	0.39
C.D. at 5%	NS	NS

NS : Non significant.

Table 4 : Economics of growing Bitter gourd as influenced by different levels of as influenced by Different levels of fertilizer and ethylene.

Treatments	Yield (t/ha)	Gross returns (Rs./ha)	Cost of cultivation (Rs./ha)	Net returns (Rs./ha)	B:C ratio
FIG1	8.88	88805.6	46300	42505.6	1.92
FIG2	8.66	86638.9	46300	40338.9	1.87
FIG3	9.28	92833.3	46300	46533.3	2.01
F2G1	8.61	86111.1	43450	42661.1	1.98
F2G2	8.61	86111.1	43450	42661.1	1.98
F2G3	9.11	91138.9	43450	47688.9	2.10
F3G1	8.22	82222.2	41250	40972.2	1.99
F3G2	8.43	84277.8	41250	43027.8	2.04
F3G3	8.92	89166.7	41250	47916.7	2.16
F4G1	9.27	92694.4	47250	45444.4	1.96
F4G2	7.64	76388.9	47250	29138.9	1.62
F4G3	10.88	108750.0	47250	61500.0	2.30

Note : Price of fruit Rs. 10 per kg.

whereas lower yield of 10.23 kg/plot and per heacter (8.52 t/ha) was recorded under treatment F₃-50% recommended NPK. Momin *et al.* (2013) also recorded similar result.

Effect of different concentration of ethylene

Vine length of bitter gourd influenced significantly due to different concentration of ethylene at 30 and 60 DAS. The significantly higher vine length of 41.03 and 144.37 cm at 30 and 60 DAS, respectively was recorded under the treatment consisting of G₃ (Ethrel 75 ppm). The highest sex ratio was recorded in the treatment consisting G₁ (Ethrel 25 ppm) 12.59. This result aggrsess the findings of Momin *et al.* (2013) and Sreeramulu (1987) in bitter gurd.

Different concentration of ethylene excreted significant difference maximum fruit length of 10.44 cm and maximum fruit diameter of 16.22 cm were noticed under G₂ (Ethrel 50 ppm). Prabhu and Natarajan (2006) in Ivy gourd and Ghani *et al.* (2013) in bitter gourd reported similar results.

Significantly higher yield per plot and per heacter (11.46 kg/plot and 9.55 t/ha) was recorded under G₃ (Ethrel 75 ppm). Olivira *et al.* (2005) reported the similar results in pumkin.

Interaction

The interaction effects of various treatment combinations was found to be non significant.

Economics

The data on economics of bitter gourd as influenced by different fertilizer levels and ethylene concentration are presented in table 4.

Among the treatments imposed, the treatment F₄G₃ obtained highest yield (10.88 t/ha) and net income (Rs. 61500/ha), gross income (Rs. 108750/ha). This was followed by F₃G₃, which produced 8.92 tonnes per hectare with Rs. 47916.7 per hectare, Rs. 89166.7 per hectare per hectare of net income, gross income, respectively. The lowest yield (7.64 t/ha) of bitter gourd was recorded in F₄G₂ with net income of Rs. 29138.9 per hectare, gross income of Rs. 76388.9 per hectare.

Higher B: C ratio (2.30) was recorded in the treatment F₄G₃. Whereas, lower B:C ratio (1.62) was recorded in the treatment F₄G₂.

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