The Pharma Innovation Journal 2022; 11(8): 1290-1293

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; 11(8): 1290-1293

www.thepharmajournal.com
Received: 05-05-2022
Accepted: 12-06-2022

P Trinadh
PG Scholar, Department of Vegetable Science, College of Horticulture, Dr. YSR Horticultural University, Venkataramannagudem, West Godavari, Andhra Pradesh, India

K Usha Kumari
Assistant Professor, Department of Vegetable Science, College of Horticulture, Dr. YSR Horticultural University, Venkataramannagudem, West Godavari, Andhra Pradesh, India

K Uma Jyothi
Dean of PG Studies, Dr. YSR Horticultural University, Venkataramannagudem, West Godavari, Andhra Pradesh, India

RV Sujatha
Associate Professor, Department of Genetics and plant breeding, College of Horticulture, Dr. YSR Horticultural University, Venkataramannagudem, West Godavari, Andhra Pradesh, India

M Paratpara Rao
Associate Professor, Department of Agricultural economics, College of Horticulture, Dr. YSR Horticultural University, Venkataramannagudem, West Godavari, Andhra Pradesh, India

V Sekhar
Assistant Professor, Department of Statistics, College of Horticulture, Dr. YSR Horticultural University, Venkataramannagudem, West Godavari, Andhra Pradesh, India

Corresponding Author:
P Trinadh
PG Scholar, Department of Vegetable Science, College of Horticulture, Dr. YSR Horticultural University, Venkataramannagudem, West Godavari, Andhra Pradesh, India

Effect of foliar application of growth regulators and micronutrients on growth, reproductive yield and yield attributes of ivy gourd (*Coccinia grandis* L.)

P Trinadh, K Usha Kumari, K Uma Jyothi, RV Sujatha, M Paratpara Rao and V Sekhar

Abstract
A field experiment was carried out during *Rabi* season, 2021-2022, Venkataramannagudem, West Godavari district, Andhra Pradesh. The experiment was laid out in Factorial Randomized Block Design with single control in three replications. The first factor consists of six levels of growth regulators *viz*., GA_3 100 ppm (G_1), GA_3 150 ppm (G_2), Naphthalene acetic acid 100 ppm (G_3), Naphthalene acetic acid 200 ppm (G_4), Ethrel 50 ppm (G_5), Ethrel 100 ppm (G_6) and the second factor consists of four levels of micronutrients *viz*., $ZnSO_4$ 100 ppm (M_1), $ZnSO_4$ 200 ppm (M_2), Boron 100 ppm (M_3), Boron 200 ppm (M_4). Foliar application of GA_3 100 ppm (G_1) had recorded the maximum values for growth and yield parameters. Ethrel 100 ppm had recorded the best values for reproductive parameters. In case of micronutrients, Boron 200 ppm (M_4) reported the maximum values for growth, reproductive and yield parameters. Among the treatment combinations, G_1M_4 - (GA_3 100 ppm + Boron 200 ppm) found to be superior over other treatments.

Keywords: Ivy gourd, growth regulators, micro nutrients, GA_3 boron

Introduction
Ivy gourd (*Coccinia grandis* L.) is one of the cucurbitaceous vegetables grown in India. It belongs to family Cucurbitaceae and has chromosome number 2n = 24, native to India. The name coccinia is derived from the latin word *coccineous*, meaning scarlet color in their ripe fruits (Wanger *et al.*, 1999). It is also known as Indian gourd, dondakaya (Telugu), tondali (Hindi), kovaikkai (Tamil), Tondekai (Kannada), little gourd (English), scarlet gourd, bimba (Wasantwisut and Viriyapanich, 2003; Chun 200). The genus Coccinia has nearly 30 species confined to Tropical Africa but only one species *Coccinia grandis* (Syn. *Coccinia indica*) is extensively cultivated in India, Mayanmar, Srilanka and Malaysia. In India, this is widely grown in states like Karnataka, Tamil Nadu, Kerala, Maharashtra, Andhra Pradesh, Gujarat, Telangana and West Bengal.

The fruits of ivy gourd are good source of carbohydrates, protein and vitamin A and C. Fruits contain 92.3% water, 2% protein, 0.3% fat, 0.5% mineral matter, 3% fiber, 1.9% carbohydrates, 0.04% phosphorus and rich in minerals. The green immature fruits are used to prepare an array of delicious dishes like stir fries, stuffed curries, stews, pickles and salads whereas, leaves and stems are usually added to clear soup dishes. The tender shoots of the plant are used as pot herb. Root, stem, leaves are used to cure skin disease, bronchitis and diabetes. The various parts of the plants are used in the indigenous system of medicine in both ayurvedic and unani practices (Wasantwisut and Viriyapanich, 2003). In addition to that, the plant has been very popularly used since ancient times as an antidiabetic drug by physicians who practice ayurveda (Rebecca *et al.*, 2008).

Ivy gourd is a perennial, diecious which male and female flowers grow separately, but can set fruits parthenocarpically. It is a climbing vine that may spread with support of a tree, shrub, fence or any supports. It is sensitive to shade and water logging condition. Ivy gourd produces profuse branching with tuberous roots, tendril simple and bifid. Ivy gourd is a dioecious plant, it can be propagated by seeds, stem cuttings and tuberous roots. But seed propagation is not in vogue due to its dioecious nature. In Andhra Pradesh ivy gourd is extensively cultivated in Godavari zone and has good commercial importance.

The availability of scientific literature for improvement of productivity of ivy gourd through application of growth regulators and micronutrients is very meager even though the crop had

high demand with lot of nutritional values. Hence the present investigation was aimed to know the influence of growth regulators and micronutrients on growth, reproductive and yield parameters of ivy gourd.

Material and Methods

A research trial was taken up during *Rabi* season of 2021-2022 at farmer field, Venkataramannagudem, West Godavari District, Andhra Pradesh. The experiment was laid out in Factorial randomized Block Design (FRBD) with single control in three replications in which the treatments comprised of two levels of GA_3 (100 and 150 ppm), NAA (100 and 200 ppm), Ethrel (50 and 100 ppm) and two levels of micronutrients *i.e* $ZnSO_4$ (100 and 200 ppm) and Boron (100 and 200 ppm) The experimental site was well prepared, cultural practices include training, pruning, weeding, irrigation, fertilizer application and plant protection measures were followed for the healthy growth of crop. The growth regulators, micronutrients and water as control were sprayed at 30, 45, 60 and 75 DAP. Data on growth, reproductive, yield and yield attributes were collected from five randomly selected plants from each treatment in each plot at appropriate stages.

Results and Discussion

The data on vegetative, reproductive and yield parameters are presented in Table showed that application of growth regulators and micronutrients significantly influence the growth and yield parameters of ivy gourd. In case of growth regulators GA_3 100 ppm (G_1) recorded significantly the highest vine length (352.31 cm), number of nodes (40.52), internodal length (9.07 cm), number of primary branches (5.73), number of fruits per vine (448), fruit length (7.63 cm), fruit diameter (2.30 cm), fruit weight (15.45 g), yield per vine (6.92 kg) and yield per hectare (346.13 q). The increase in growth and yield characters in GA_3 treated plots might be due to its involvement in the process of cell division and cell elongation, thus might have helped in increasing the growth attributes of the plant. GA_3 also involves in accumulation of carbohydrates as the result of photosynthesis and efficient translocation of food reserves from source to sink resulting in increased yield and yield contributing characters. (Hussaini and Babu, 2004) [1]. These results are in conformity with the findings of Muhammad *et al.* (2013) [3] in bitter gourd, Kumari *et al.* (2017) [2] in bottle gourd, Garg *et al.* (2020) in cucumber.

In case of micronutrients application, the maximum vine length (329.68 cm), number of nodes (38.73), internodal length (8.70 cm), number of primary branches (4.27), number of fruits per vine (427.50), fruit length (7.46 cm), fruit diameter (2.18 cm), fruit weight (15.17 g), yield per vine (6.35 kg) and yield per hectare (317.67 q) were recorded in treatment M_4 (Boron 200 ppm).This might be due to fact that Boron involve in protein metabolism, pectin synthesis, maintain correct water balance in the plant which might help in efficient absorption of nutrients from soil. These results are in accordance with Baraskar *et al.* (2018) [4] in okra. Sanjay *et al.* (2019) [5] in chilli.

Interaction between growth regulators and micronutrients spray was found significant with respect to growth and yield parameters. The treatment combination G_1M_4 (GA_3 100 ppm + Boron 200 ppm) recorded the highest vine length (363.40 cm), number of nodes (44.89), internodal length (9.86 cm), number of primary branches (6.50), number of fruits per vine (473), fruit length (7.80 cm), fruit diameter (2.48 cm), fruit weight (16.46 g), yield per vine (7.47 kg), and yield per hectare (373.70 q) and highest benefit cost ratio (2.44:1) with gross return of Rs. 6,53,923/- per hectare. This might be due to synergistic influence of both growth regulators and micronutrients resulted in good growth and yield.

The plant growth hormones or regulators are the organic chemical compounds, which modify or regulate physiological processes in an appreciable amount in the plant when they are applied in minute quantities. Plant growth regulators are readily absorbed and move rapidly through the tissues, when applied to different plant parts and are specific in their action. The plant growth regulators improving physiological efficiency of the crops and greatly help in improvement of growth, yield and quality. Micronutrients are equally play an important role in plant growth equal to macronutrients. They perform specific functions which are much required for the development of plants. Which involved in many physiological functions and activates enzymes that are responsible for the synthesis of certain proteins, cellular functions in plants. As per the study revealed that, growth regulators and micronutrients showed positive impact on improving the growth and yield parameters.

Table 1: Effect of growth regulators and micronutrients on vine length, number of primary branches at 75 DAP

Growth regulators (G)	Vine length (cm) at 75 DAP					Number of primary branches at 75 DAP				
	Micronutrients (M)					Micronutrients (M)				
	M_1	M_2	M_3	M_4	Mean	M_1	M_2	M_3	M_4	Mean
G_1	347.04	348.07	350.72	363.40	352.31	5.02	5.37	6.02	6.50	5.73
G_2	350.33	349.51	349.67	350.10	349.90	4.56	4.87	5.41	5.86	5.18
G_3	304.53	311.34	327.86	330.50	318.56	1.20	1.28	2.08	2.12	1.67
G_4	310.08	331.20	325.28	332.15	324.68	1.55	1.98	2.20	2.87	2.15
G_5	275.65	273.94	290.83	310.08	287.62	3.19	3.30	4.09	4.82	3.85
G_6	273.15	276.76	294.09	291.85	284.96	3.06	2.98	3.32	3.45	3.20
Mean	310.13	315.14	323.07	329.68		3.10	3.30	3.85	4.27	
Control Mean					264.17					1.25
Factors	S.Em±		C.D (0.05)			S.Em±		C.D (0.05)		
G	1.213		3.449			0.035		0.099		
M	0.990		2.816			0.029		0.081		
G x M	2.426		6.898			0.070		0.199		
Control Vs. Treatments	2.476		7.040			0.071		0.203		

Table 2: Effect of growth regulators and micronutrients on node at which first female flower appearance, Days taken for 1st female flower appearance

Growth regulators (G)	Node at which first female flower appearance					Days taken for 1st female flower appearance				
	Micronutrients					Micronutrients (M)				
	M1	M2	M3	M4	Mean	M1	M2	M3	M4	Mean
G1	13.10	13.35	13.85	14.02	13.58	55.95	56.13	55.78	53.72	55.39
G2	14.88	14.12	14.20	14.77	14.24	58.23	58.95	57.45	56.75	57.85
G3	12.40	11.60	11.25	10.85	11.53	49.88	53.52	48.69	48.25	50.09
G4	10.40	10.10	9.85	9.50	9.96	53.65	54.45	53.23	52.77	53.53
G5	9.30	8.80	8.52	8.35	8.74	45.80	45.92	45.75	45.00	45.62
G6	8.10	7.80	7.25	7.00	7.54	44.69	44.85	43.12	38.83	42.87
Mean	11.36	11.08	11.04	10.94		51.37	52.30	50.67	49.22	
Control Mean					15.34					61.45
Factors	S.Em±		C.D (0.05)			S.Em±		C.D (0.05)		
G	0.084		0.239			0.357		1.016		
M	0.069		0.195			0.292		0.829		
G x M	0.168		0.477			0.715		2.032		
Control Vs. Treatments	0.171		0.487			0.729		2.074		

Factor 1: Growth regulators
G1: Gibberellic acid 100 ppm
G2: Gibberellic acid 150 ppm
G3: Naphthaleneacetic acid 100 ppm
G4: Naphthaleneacetic acid 200 ppm
G5: Ethrel 50 ppm
G6: Ethrel 100 ppm

Factor 2: Micronutrients
M1: $ZnSO_4$ 100 ppm
M2: $ZnSO_4$ 200 ppm
M3: Boron 100 ppm
M4: Boron 200 ppm

Table 3: Effect of growth regulators and micronutrients on Days taken for 50% flowering, Fruiset percentage (%)

Growth regulators (G)	Days taken for 50% flowering					Fruit set percentage (%)				
	Micronutrients (M)					Micronutrients (M)				
	M1	M2	M3	M4	Mean	M1	M2	M3	M4	Mean
G1	59.15	59.33	58.98	58.45	58.98	87.90	84.72	88.12	91.42	89.14
G2	61.43	62.15	60.65	59.95	61.05	84.88	89.12	86.23	89.92	86.43
G3	53.18	54.80	51.99	51.55	52.88	82.22	83.40	87.45	86.90	86.24
G4	56.95	57.75	56.53	56.07	56.83	85.89	87.92	86.45	86.25	86.63
G5	48.00	48.12	47.95	47.20	47.82	85.42	86.56	85.56	90.08	86.90
G6	46.89	47.05	45.32	40.83	45.02	86.50	88.14	88.42	92.88	88.98
Mean	54.27	54.87	53.57	52.34		85.46	86.64	87.04	91.24	
Control Mean					63.74					78.58
Factors	S.Em±		C.D (0.05)			S.Em±		C.D (0.05)		
G	0.445		1.265			0.629		1.790		
M	0.363		1.033			0.514		1.461		
G x M	0.890		2.530			1.259		3.580		
Control Vs. Treatments	0.908		2.582			1.285		3.653		

Table 4: Effect of growth regulators and micronutrients on number of fruits, fruit weight

Growth regulators (G)	Number of fruits					Fruit weight (g)				
	Micronutrients (M)					Micronutrients (M)				
	M1	M2	M3	M4	Mean	M1	M2	M3	M4	Mean
G1	433.00	447.00	439.00	473.00	448.00	14.76	14.78	15.80	16.46	15.45
G2	410.00	399.00	407.00	431.00	411.75	14.58	15.38	14.80	14.90	14.91
G3	381.00	383.00	391.00	407.00	390.50	14.18	14.26	14.86	14.95	14.56
G4	389.00	407.00	415.00	431.00	420.00	14.35	14.58	14.90	15.10	14.73
G5	427.00	423.00	428.00	424.00	430.75	14.12	14.25	14.62	14.80	14.45
G6	448.00	467.00	475.00	399.00	433.00	14.05	14.20	14.08	14.83	14.29
Mean	414.66	421.00	425.83	427.50		14.34	14.58	14.84	15.17	
Control Mean					319.00					14.23
Factors	S.Em±		C.D (0.05)			S.Em±		C.D (0.05)		
G	3.286		9.345			0.108		0.307		
M	2.683		7.630			0.088		0.250		
G x M	6.573		18.690			0.216		0.613		
Control Vs. Treatments	6.708		19.075			0.220		0.626		

Factor 1: Growth regulators
G1: Gibberellic acid 100 ppm M1:
G2: Gibberellic acid 150 ppm M2:
G3: Naphthaleneacetic acid 100 ppm
G4: Naphthaleneacetic acid 200 ppm
G5: Ethrel 50 ppm
G6: Ethrel 100 ppm

Factor 2: Micronutrients
$ZnSO_4$ 100 ppm
$ZnSO_4$ 200 ppm
M3: Boron 100 ppm
M4: Boron 200 ppm

Table 5: Effect of growth regulators and micronutrients on number of fruit length, fruit diameter

Growth regulators (G)	Fruit length (cm)					Fruit diameter (cm)				
	Micronutrients (M)					Micronutrients (M)				
	M_1	M_2	M_3	M_4	Mean	M_1	M_2	M_3	M_4	Mean
G_1	7.64	7.35	7.73	7.8	7.63	2.19	2.20	2.33	2.48	2.30
G_2	7.42	7.39	7.44	7.51	7.44	2.10	2.03	2.15	2.30	2.14
G_3	6.81	7.1	7.14	7.57	7.16	2.10	2.00	2.03	2.13	2.07
G_4	7.34	7.3	7.35	7.38	7.34	2.05	2.11	2.18	2.10	2.11
G_5	6.56	7.11	7.14	7.16	6.99	1.90	1.95	2.18	2.01	2.01
G_6	6.73	7.21	7.23	7.34	7.13	2.00	2.11	2.00	2.05	2.04
Mean	7.1	7.24	7.34	7.46		2.06	2.07	2.14	2.18	
Control Mean					6.90					1.80
Factors	S.Em±		C.D (0.05)			S.Em±		C.D (0.05)		
G	0.045		0.127			0.016		0.046		
M	0.036		0.104			0.013		0.038		
G x M	0.089		0.254			0.033		0.092		
Control Vs. Treatments	0.091		0.259			0.033		0.094		

Table 6: Effect of growth regulators and micronutrients on number of yield per vine, yield per hectare

Growth regulators (G)	Yield per vine (kg)					Yield per hectare (q)				
	Micronutrients (M)					Micronutrients (M)				
	M_1	M_2	M_3	M_4	Mean	M_1	M_2	M_3	M_4	Mean
G_1	6.60	6.49	7.13	7.47	6.92	329.90	324.50	356.40	373.70	346.13
G_2	5.82	6.26	6.11	6.38	6.14	290.90	312.90	305.50	318.90	307.05
G_3	5.50	5.70	5.87	6.06	5.78	274.80	285.00	293.70	303.20	289.18
G_4	6.62	5.91	6.32	6.30	6.07	287.30	295.70	316.00	315.10	303.53
G_5	5.75	6.08	6.64	5.97	6.16	297.20	303.90	332.20	298.60	307.98
G_6	5.94	6.77	5.85	5.93	6.29	331.10	338.70	292.30	296.50	314.65
Mean	6.04	6.20	6.32	6.35		301.87	310.12	316.02	317.67	
Control Mean					6.49					227.00
Factors	S.Em±		C.D (0.05)			S.Em±		C.D (0.05)		
G	0.080		0.227			2.036		5.790		
M	0.065		0.185			1.663		4.728		
G x M	0.160		0.454			4.073		11.580		
Control Vs. Treatments	0.163		0.463			4.157		11.819		

Factor 1: Growth regulators
G_1: Gibberellic acid 100 ppm
G_2: Gibberellic acid 150 ppm
G_3: Naphthaleneacetic acid 100 ppm
G_4: Naphthaleneacetic acid 200 ppm
G_5: Ethrel 50 ppm
G_6: Ethrel 100 ppm

Factor 2: Micronutrients
M_1: $ZnSO_4$ 100 ppm
M_2: $ZnSO_4$ 200 ppm
M_3: Boron 100 ppm
M_4: Boron 200 ppm

References

1. Hussaini BMG, Babu HK. Effect of plant bioregulators on yield and yield attributes of bhendi cv. Arka Abhay. Orissa Journal of Horticulture. 2004;32(1):108-109.
2. Kumari R, Singh SP, Meena BL, Kumar S, Prakash R. Plant growth regulators affecting sex expression of bottle gourd (*Lagenaria siceraria* Mol.) cv. Pusa Summer Prolific Long. Journal of Plant Development Sciences. 2017;9(3):277-79.
3. Muhammad AG, Muhammad A, Qumer I, Aami RN, Tanveer A, Hafeez OBA, *et al.* Efficacy of plant growth regulators on sex expression, earliness and yield components in bitter gourd. Pakistan Journal of Life and Social Sciences. 2013;10(10):45-49.
4. Baraskar TV, Gawande PP, Kayande NV, Lande SS, Naware MS. Effect of plant growth regulators on growth parameters of okra (*Abelmoschus esculentus* L. Moench). International Journal of Chemical Studies. 2017, 2018;6(6):165-68.
5. Sanjay S, Singh T. Effect of gibberellic acid on growth, yield and quality parameters of chilli (*Capsicum annum* L.). The Journal of Pharmacognosy and Phytochemistry. 2019;8(2):2021-23.