

Influence of chemicals and growth hormones on growth, yield and quality of moringa

V. Kanthaswamy

Department of Horticulture, Pandit Jawaharlal Nehru College of Agriculture and Research Institute, Nedungadu, KARAİKAL (U.T.PONDICHERRY) INDIA

ABSTRACT

The investigations were carried out to study the influence of seasons, chemicals and varieties on growth, yield and quality in moringa under coastal systems of Karaikal in U.T. of Pondicherry. Various growth regulators and chemicals were sprayed in PKM1 and PKM2 moringa varieties in summer and rainy season. Among the chemicals, mepiquat chloride at 50 ppm spray produces more number of fruits per tree, yield per tree followed by NAA at 20 ppm. GA at 20 ppm spray produces more fruit length. The Iron and protein content of the leaves revealed that NAA at 20 ppm produces highest value.

Key words : Moringa, Chemicals, Seasons, Fruit yield, Quality, Growth hormones.

INTRODUCTION

Drumstick (or) Moringa (*Moringa oleifera* Lam) is one of the important vegetable crops in South India. The leaves, fruits and flowers are used as nutritious vegetable. The variety of products that can be obtained and the number of uses for which moringa can be put to have pushed this plant to the forefront of rural development. For exploitation of this crop for commercialization, growth retardants, regulators and chemicals play a major role especially for improvement of traits on quantitative and quality characters. The hormonal regulation of flowering and fruit set has been successfully established in other vegetable crops and it paved way for use of chemicals in moringa. The present experiment was undertaken to study the influence of growth hormones and chemicals on growth yield and quality of moringa fruits and leaves.

MATERIALS AND METHODS

The experiment was conducted from January 2003 to December 2004 in the orchard of Dept. of Horticulture, Pandit Jawaharlal Nehru College of Agriculture & Research Instt, Karaikal using hundred and eight moringa plants in each of PKM1 and PKM2. Spraying of chemicals was done on whole tree at 90 DAS in the main field and water spray served as control. For this experiment 108 moringa trees of uniform vigor were selected and divided into two lots each having 54 trees. The first lot of 54 trees were tagged (27 PKM1 and 27 PKM2) for taking observation on summer seasons (S₁) second lot was used for taking observation on rainy season. The experiment was laid out in split plot design with three replication. The treatment detail as follows.

Main plot – Season (S)

S₁ - Summer season, S₂ – Rainy season

Sub plot – Chemicals (C)

C₁ – Control – water spray, C₂ – Cycocel – 250 ppm, C₃ – Ethrel – 250 ppm, C₄ – NAA – 20 ppm

C₅ – GA – 20 ppm, C₆ – 2, 4 – D – 5 ppm, C₇ – Salicylic acid – 0.5%, C₈ – Mepiquat chloride – 50 ppm, C₉ – Urea – 1%

Sub- sub plot: -Varieties (V)

V1 – PKM 1, V2 – PKM -2

The observation on number of fruits per tree, yield per tree, length of the fruit, fruit flesh content, iron and protein content in leaves were recorded in different treatments with respect to varieties and seasons. The data were furnished in the table 1 and 2.

RESULTS AND DISCUSSION

The number of fruits per tree in PKM1 (163.4) and PKM2 (169.8) was more in summer season than rainy season (table 1). Among the varieties PKM 2 recorded highest number of fruits per tree than PKM.1 in both the seasons. Among the chemicals, spray of NAA at 20 ppm recorded highest number of fruits per tree in both the season and summer season was found to be better compared to rainy season for harvesting higher number of fruits per tree. During summer season, the trees experienced higher heat units and clear sunshine during their ontogeny while rainy season had experienced cloudy weather and low temp regimes (Vijay Kumar 2001). The increase in number of fruits can be attributed to the higher flower longevity resulting from the inhibition of ethylene biosynthesis by blocking the conversion of 1. amino cyclopropane – 1 carboxylic acid to ethylene. The more number of fruits obtained per tree by NAA application is in agreement with the findings of Barai and Sarkar (1999) in chillies, EL – Habbasha et al (1999) in tomato and Bala Hussaini and Hari Babau (2004) in bhendi.

The spray of Mepiquat Chloride at 50 ppm was more efficient than others in increasing fruit and yield per tree Gasti *et al* (1997) reported that yield increase in potato with mepiquat chloride at 150 ppm spray supports the present finding in moringa. Seasonal studies revealed that summer season was best (32.4 kg and 35.1 kg per trees) than rainy season and among the varieties, PKM 2 (27.4 and 24.5 kg per tree) recorded highest yield in both the seasons. The fruit length was highest in GA at 20 ppm in both the varieties. Among the seasons summer season recorded more length (95.7 and 139.3 cm) of fruits. The IAA oxidase content, which was low in the summer seasons, should have facilitated better auxin level in the system, which in turn, could have improved the fruit length. This is in accordance with the findings of Bala Hussaini and Hari Babu (2004) in bhendi with GA treatment for more fruit length. The flesh content was also higher with GA at 20 ppm followed by NAA at 20 ppm (Table 2). This is in line with the findings of Vijay Kumar et al. (2003). Among the treatments NAA at 20 ppm proved outstanding for leaf iron and protein content in both the seasons and PKM 2 recorded highest value.

Table 1 : Effect of Chemicals and seasons on fruit character of Moringa varieties PKM 1 and PKM 2

Chemicals	Number of fruits per tree				Yield per tree (kg)				Fruit length(cm)			
	Summer season		Rainy season		Summer season		Rainy season		Summer season		Rainy season	
	PKM 1	PKM 2	PKM 1	PKM 2	PKM 1	PKM 2	PKM 1	PKM 2	PKM 1	PKM 2	PKM 1	PKM 2
C1 - Control	136.6	142.3	127.0	131.0	23.13	24.0	20.9	23.1	70.20	128.20	62.7	114.9
C2 – CCC 250 ppm	168.3	170.6	150.6	150.3	27.70	28.7	25.4	26.0	77.00	130.80	72.0	122.2
C3 – Ethrel 250 ppm	154.0	152.0	132.6	130.6	25.20	24.8	22.1	21.8	78.32	132.00	74.3	124.8
C4 – NAA20 ppm	219.0	222.6	191.0	193.3	28.40	30.3	26.4	25.4	82.70	136.80	77.8	128.5
C5 – GA 20 ppm	170.6	171.6	150.3	150.3	28.30	29.4	23.9	24.6	95.70	139.30	90.3	130.3
C6 – 2,4 – D5 ppm	138.6	141.0	126.6	128.3	22.20	22.5	20.8	21.4	71.10	125.40	65.3	115.7
C7 – Salicylicacid 0.5%	164.0	166.6	144.0	144.0	26.80	27.6	23.8	24.7	75.40	128.20	70.7	120.1
C8 – mepiquatchloride ppm	178.0	181.0	156.3	159.0	32.40	35.1	26.6	28.7	76.90	131.50	71.8	122.9
C9 – Urea 1%	142.0	180.3	140.3	176.3	23.40	24.4	22.7	23.7	72.40	129.40	67.9	1212.1
Mean	163.4	169.8	146.5	151.4	26.40	27.4	23.4	24.5	77.70	131.28	-	122.3
For Comparison	S.E.d		CD (p=0.05)		S.E.d		CD (P=0.05)		S.E.d		CD (P=0.05)	
Seasons (S)	1.03		4.45**		0.14		0.63**		0.20		0.87**	
Chemicals (C)	1.26		2.57**		0.43		0.88**		0.33		0.69**	
Variety (V)	0.52		1.06**		0.13		0.27**		0.15		0.30**	
S at C	1.97		5.25*		0.59		1.29**		0.49		1.19**	
C at S	1.78		3.63**		0.61		1.24**		0.47		0.97**	
S at V	1.16		NS		0.20		NS		0.25		0.88**	
V at S	0.74		NS		0.19		NS		0.21		0.43**	
C at V	1.68		3.43**		0.52		1.06*		0.46		0.94**	
V at C	1.58		3.20**		0.41		0.83*		0.45		0.91**	
S at CV	2.31		NS		0.70		NS		0.63		NS	
C at SV	2.38		NS		0.73		NS		0.65		NS	
V at SC	2.23		NS		0.58		NS		0.64		NS	

Table 2 : Effect of Chemicals and seasons on quality characters of Moringa varieties PKM 1 and PKM 2

Chemicals	fruit flesh (g / fruit) content				Leaves iron content (mg/ 100 g)				Leaves protein content (g/100g)			
	Summer season		Rainy season		Summer season		Rainy season		Summer season		Rainy season	
	PKM 1	PKM 2	PKM 1	PKM 2	PKM 1	PKM 2	PKM 1	PKM 2	PKM 1	PKM 2	PKM 1	PKM 2
C1 - Control	70.5	125.5	67.3	122.5	8.81	8.86	7.46	7.50	6.64	7.01	8.70	10.58
C2 – CCC 250 ppm	83.7	135.5	77.3	131.4	9.80	9.88	6.91	6.94	7.20	7.61	8.52	11.61
C3 – Ethrel 250 ppm	75.7	124.5	71.4	120.5	7.35	7.37	8.98	6.75	7.36	7.83	8.62	08.62
C4 – NAA20 ppm	86.6	139.3	80.6	133.3	9.63	9.67	9.45	9.48	7.44	7.89	8.77	11.67
C5 – GA 20 ppm	93.8	135.5	88.4	128.5	8.77	8.87	8.24	8.26	7.25	7.69	8.65	11.44
C6 – 2,4 – D5 ppm	68.7	118.5	16.3	116.7	7.47	7.49	8.73	8.77	7.22	7.65	8.61	08.77
C7 – Salicylicacid 0.5%	82.2	134.0	75.2	127.6	6.66	6.69	7.27	6.62	6.82	7.26	8.44	08.25
C8 – mepiquatchloride ppm	83.6	134.4	76.5	126.6	7.08	7.08	9.16	9.14	6.86	7.04	8.34	08.54
C9 – Urea 1%	75.5	120.9	69.9	114.5	7.37	7.42	8.47	8.49	6.72	7.13	8.29	09.01
Mean	80.0	129.8	74.4	125.1	8.10	8.14	8.07	7.77	7.06	7.45	8.55	09.84
For Comparison	S.E.d		CD (P=0.05)		S.E.d		CD (P=0.05)		S.E.d		CD (P=0.05)	
Seasons (S)	0.09		0.42**		0.19		0.83**		0.01		0.02**	
Chemicals (C)	0.11		0.22**		0.88		1.80**		0.02		0.04**	
Variety (V)	0.04		0.09**		0.40		0.83**		0.01		0.02**	
S at C	0.17		0.48**		1.19		2.50**		0.03		0.06**	
C at S	0.15		0.31**		1.25		2.54**		0.03		0.06**	
S at V	0.10		0.42**		0.45		NS		0.01		0.03**	
V at S	0.06		0.13**		0.57		NS		0.01		0.03**	
C at V	0.14		0.30**		1.24		2.52**		0.03		0.06**	
V at C	0.13		0.28**		1.22		2.49**		0.03		0.06**	
S at CV	0.20		0.41**		1.70		NS		0.04		0.06**	
C at SV	0.20		0.42**		1.75		NS		0.04		0.09**	
V at SC	0.19		0.40**		1.73		NS		0.04		0.09**	

REFERENCES

Barai, B.K. and K.P. Sankar (1999). Effect of growth regulator on the yield improvement in chilli. *Environ. Ecol.*, **17 (8)**: 539 – 542

Bala Hussaini, M.G and K. Hari Babu (2004). Effect of Plant bioregulators on yield and yield attributes of bhendi CV Arka Abhay Orissa *J. Hort.*, **32 (1)** : 108 - 109

EL – Habbasha, K.M., H.M. Gooma, A.M and S.S. Mohamed (1999). Response of tomato plants to foliar spray with growth regulators under different seasons *Egyptian J. Hort.*, **25 (i)** – 109

Gasti, V.D., Madalageri, B.B., Dharmati P.R and Y.H. Ryagi (1997). Studies on response of growth retardants on commercial vegetables, *Adv. Agric. Res. India*, **7**:19-21

Vijaya Kumar, R.M., M. Vijayakumar, N. Chezhiyan, . Bangarusamy and T.N. Bala, Mohan (2003). Studies on the month of souring and growth regulating treatments in annual moringa. *South Indian Hort.*, **50 (4 - 6)**: 584 – 588

Vijaya Kumar, R.M. (2001). Studies on the month of souring and growth regulating treatments in annual moringa. Ph.D(Hort) Thesis, submitted to Tamilnadu Agricultural University, Coimbatore.

Received : November, 2005; Accepted : January 2006

ISSN : 0973-4767

THE ASIAN JOURNAL OF HORTICULTURE
AN INTERNATIONAL JOURNAL