

Original Research Article

<https://doi.org/10.20546/ijcmas.2018.708.100>

Effect of Pruning with Paclobutrazol Application for Growth, Yield and Quality of Mango (*Mangifera indica* L.) C.V. Amrapali

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ABSTRACT

A long term experiment was conducted to Effect of pruning with paclobutrazol application for Growth, Yield and Quality of Mango (*Mangifera indica* L.) C.V. Amrapali was conducted during 2007-08 to 2014-15 at Fruit Research Station Kuthulia farm, College of Agriculture, Rewa Under All India Coordinated Research Project on subtropical fruits. The experiment was laid out in Randomized Block Design (RBD) comprising 10 treatments, which were replicated thrice. The treatments were comprised of 3 pruning methods namely M₀: No pruning, M₁: 10cm heading back to terminal shoots, M₂: 10cm heading back to terminal shoots, and 2 levels Paclobutrazol treatments i.e. P₀: without paclobutrazol and P₁: standard dose of paclobutrazol. The results indicate that various pruning of high density planting level and use of paclobutrazol exhibited significant effect on canopy, yield and quality of the fruits. The maximum tree height (7.10 m,) were observed in treatment M₂F₂T₂ “20 cm heading back to terminal shoots during rest period before the emergence of new growth biannual time” tree spread from E-W and N-S (6.20m and 6.17m), were observed with the treatments M₀F₀T₀ control without paclobutrazole application (Table 1a), The higher fruit weight and pulp percentage (347.50 g and 72.30), were observed with the treatment M₂F₂T₁: “20 cm heading back to terminal shoots during rest period before the emergence of new growth Annual time” The maximum Pulp percentage was recorded (71.85%) in M₂F₁T₂ 20 cm heading back to terminal shoots Immediately after fruit harvest (June-July) Biannual time. The Maximum Total Soluble Solid (TSS) and acidity percentage (21.87°B and 0.30) were observed with the treatment M₀F₀T₀ control with paclobutrazol application. The pooled mean of 8 years data clearly indicated that fruit yield tree⁻¹ and yield ha⁻¹ (53.27 and 213.08 qt.) have been registered with the treatment of M₀F₀T₀:Control with paclobutrazol application. The benefit cost ratio was also found higher with this treatment 2.6 (hectare basis) has been observed with the treatment of No Pruning with Paclobutrazol application.

Keywords

Mango pruning,
Growth yield and
quality

Article Info

Accepted:
08 July 2018
Available Online:
10 August 2018

Introduction

Mango (*Mangifera indica* L.) is one of the most important commercial fruits of India which is being grown in India more than four

thousand years has been a source of inspiration of other countries and is currently being grown in over 90 countries around the world. In Madhya Pradesh region, farmers' economy is better dependent on mango.

However under changing climate Langra mango yield is not sure. India ranks first in mango production of total world production. It has always placed at the highest position. It is national fruit of India, which is most popular among the consumers. It has great adaptability, thrives in a wide range of climatic, and soil conditions. It's utilized at all stages of its development both in its immature and mature stages. In Madhya Pradesh region farmers economy is better dependent on mango. where it occupies an area of 2515.97 thousand hectare with total production of 18431.33 thousand million tons. In which Madhya Pradesh, occupies an area of 25.43 thousand hectare and production is 379.73 thousand million tons (Anonymous 2013-14). In Rewa region has great potentially for mango cultivation is 7262 hectare. The success of mango cultivation largely depends on the soil, nutrient management etc. Actually soil is not an inert medium of plant growth as people often believe. The soil can influence of root growth, impact functional activities of plant and control the availability of nutrients. Nutrition consumption an important component of intensive cultivation of mango. An inadequate nutrition of mango orchard is one of the major constraints limiting the productivity. In Madhya Pradesh region farmers economy is better dependent on mango. However under changing climate hybrid Amrapali mango yield is sure. To overcome this High density planting in mango, HDP (2.5 x 2.5 m) appears to the most appropriate answer to overcome high productivity and yield is continue long period. But due to hot and humid conditions tree put forth vegetative flushes in a year. Once the tree has occupied their allotted spaces, crowding may occur and canopies of an adjacent tree begin to overlap. Hence, to restrain the exuberant vegetative growth of mangoes to manageable sizes and forms thereby to achieve optimum production, to increase productivity of orchards and to

stimulate precocious flowering, different pruning strategies were studied.

Materials and Methods

The field experiment was laid out in 2007 on 15 years old cv. Amrapali with the objectives to standardize level of pruning intensity for high density planting increasing the productivity of mango tree and to determine the effect of paclobutrazol on productivity and quality of mango fruits. The experiment was laid out in Randomized Block Design (RBD) comprising 10 treatments, which were replicated thrice. The plant grown at a distance of 2.5x2.5m. The treatments were comprised of 3 pruning methods namely M₀: No pruning, M₁: 10cm heading back to terminal shoots, M₂: 10cm heading back to terminal shoots, and 2 levels Paclobutrazol treatments i.e. P₀: without paclobutrazol and P₁: standard dose of paclobutrazol. Thus, the ten treatment combinations (M₁F₁T, M₁F₂T₁, M₁F₁T₂, M₁F₂T₂, M₂F₁T₁, M₂F₂T₁, M₂F₁T₂, M₂F₂T₂, M₀F₀T₀, (without pp 333), (M₀F₀T₀,) (with pp 333), were imposed during rest period before the initiation of new growth. Data were recorded on tree height, trunk girth, canopy height, tree spread, yield tree⁻¹, yield ha⁻¹, fruit weight, pulp%, stone %, peel %, total soluble solids, acidity and benefit: cost ratio of different treatments. The experimental unit, consisted of three trees, were randomly either treated with PBZ or left un-treated in a randomized complete block design with three replications. Paclobutrazol (25% active ingredient) was applied as soil drenching at the rate of 2.5 g a.i./m² followed by application of sufficient irrigation water and irrigation was withhold thereafter for three weeks. The fruits of each tree under study were picked of the commercial maturity stage on 15th July. Titrable acidity was determined by the titration method with 0.1 N NaOH up to ph 8.1 using 2g of homogenized pulp in 100ml distilled water the results were expressed as

percentage. The fruit length and width were measured by digital Verniercalipers and expressed in centimeters (cm). The pulp percentage was calculated by considering the fruit, peel and stone weight. Total soluble solids (TSS) were determined using a Fisher hand refractometer at 20 c⁰ and results were expressed as ⁰B.

Results and Discussion

The results indicate that various pruning of high density planting level and use of paclobutrazol exhibited significant effect on canopy, yield and quality of the fruits. The maximum tree height (7.10 m) were observed in treatment M₂F₂ T₂ “20 cm heading back to terminal shoots during rest period before the emergence of new growth biannual time” (Davenport, 2007). Tree spread from E-W and N-S (6.20mand 6.17m), were observed with the treatments M₀F₀ T₀ “control without paclobutrazole application (Table 1a),

Maximum canopy height(6.86m) was recorded in M₂F₂ T₂” 20 cm heading back to terminal shoots during rest period before the emergence of new growth biannual time (Blaikie *et al.*, 2004, and Kulkarni *et al.*, 2006). The higher fruit weight and pulp percentage (347.50 g and 72.30), were observed with the treatment M₂F₂T₁: “20 cm heading back to terminal shoots during rest period before the emergence of new growth Annual time and followed by (344.33g) was recorded in M₀F₀T₀ control without paclobutrazole application” (Tandel and Patel, 2011 and Rahim *et al.*, 2011). The Maximum Total Soluble Solid (TSS) (22.00B) was recorded M₀F₀ T₀: control without paclobutrazol application and followed by (21.870B) was recorded M₀F₀T₀ control with paclobutrazol application acidity percentage (21.87⁰B and 0.30) were observed with the treatment M₀F₀ T₀: control with paclobutrazol application (Matrnez *et al.*, 2008).

Table 1(a) Effect of pruning on growth of mango cv. Amrapali during 2014-15

S.No	Treatments	Plant height (m)	Canopy height(m)	Root stock	Scion	N-S	E-W
1	M ₁ F ₁ T ₁	6.99	6.31	84.52	70.27	6.22	5.76
2	M ₁ F ₁ T ₂	6.91	6.06	76.11	65.76	5.63	5.52
3	M ₁ F ₂ T ₁	7.00	6.57	85.41	76.33	6.02	6.20
4	M ₁ F ₂ T ₂	6.83	5.95	94.71	69.66	6.07	5.91
5	M ₂ F ₁ T ₁	6.68	5.74	82.27	63.77	6.03	5.16
6	M ₂ F ₁ T ₂	6.78	6.19	80.81	75.52	6.07	5.45
7	M ₂ F ₂ T ₁	6.92	6.05	68.87	57.44	4.83	4.75
8	M ₂ F ₂ T ₂	7.10	6.86	81.11	71.07	6.33	5.73
9	M ₀ F ₀ T ₀ (without pp 333)	6.65	5.94	78.08	65.57	6.17	5.27
10	M ₀ F ₀ T ₀ (with pp 333)	7.05	6.36	89.77	79.91	6.45	6.04
	SEM ±	0.222	0.234	2.830	2.435	0.249	0.222
	CD @ 5%	0.702	0.739	8.916	7.672	0.783	0.701

Table 1(c) Effect of pruning cummulative mean yield 8 year in HDP during 2007-08 to 2014-15

S.No	Treatments	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	Mean Yield tree ⁻¹ (kg)	Yield ha ⁻¹ (qt.)	B:C ratio
1	M ₁ F ₁ T ₁	12.74	19.62	16.73	41.55	35.10	18.27	15.70	38.28	24.75	99.00	1.8
2	M ₁ F ₁ T ₂	10.25	15.38	13.72	21.24	19.27	13.60	12.70	37.27	17.93	71.72	1.3
3	M ₁ F ₂ T ₁	8.60	13.00	12.18	36.15	38.17	15.27	14.90	38.41	22.09	88.34	1.6
4	M ₁ F ₂ T ₂	6.88	10.72	9.15	18.40	27.93	13.10	11.50	35.36	16.63	66.52	1.2
5	M ₂ F ₁ T ₁	9.67	14.70	12.98	25.00	22.40	20.03	19.80	45.7	21.29	85.14	1.5
6	M ₂ F ₁ T ₂	9.00	14.00	12.07	15.87	17.57	19.93	18.20	45.76	19.05	76.20	1.4
7	M ₂ F ₂ T ₁	11.20	13.36	15.03	32.15	30.87	19.50	19.50	50	23.95	95.81	1.7
8	M ₂ F ₂ T ₂	7.92	12.00	12.31	25.90	27.97	20.00	18.00	49.33	21.68	86.72	1.6
9	M ₀ F ₀ T ₀ (without pp 333)	25.10	39.24	30.53	16.35	17.73	12.27	11.00	87.27	29.94	119.75	2.1
10	M ₀ F ₀ T ₀ (with pp 333)	48.56	74.30	35.69	68.27	67.17	50.00	49.30	32.87	53.27	213.08	2.6
	S. Em ±	1.895	2.965	2.130	5.570	1.493	0.627	1.923	2.429			
	C.D. at 5%	5.631	8.809	6.170	16.118	3.05	1,318	5.936	7.654			

Table 1(b) Effect of pruning with paclobutrazol on physico-chemical of mango fruits during 2014-15

S.No	Treatments #	Fruit weight (g)	Peel weight (%)	Pulp weight (%)	Stone weight (%)	TSS (°B)	Acidity (%)
1	M ₁ F ₁ T ₁	336.67	13.96	72.53	13.51	21.27	0.29
2	M ₁ F ₁ T ₂	340.67	13.87	72.67	13.47	21.50	0.29
3	M ₁ F ₂ T ₁	341.50	13.87	72.63	13.50	21.30	0.30
4	M ₁ F ₂ T ₂	339.33	13.53	72.43	14.03	21.47	0.29
5	M ₂ F ₁ T ₁	342.00	13.93	72.27	13.80	21.80	0.29
6	M ₂ F ₁ T ₂	340.86	13.87	71.85	14.29	21.47	0.30
7	M ₂ F ₂ T ₁	347.50	13.37	72.30	14.33	21.13	0.29
8	M ₂ F ₂ T ₂	343.33	13.43	72.33	14.23	21.47	0.30
9	M₀F₀T₀ (without pp 333)	343.67	13.40	72.37	14.23	22.00	0.29
10	M ₀ F ₀ T ₀ (with pp 333)	344.33	13.27	72.17	14.57	21.87	0.30
	SEM ±	0.222	0.234	0.230	0.135	0.249	0.005
	CD @ 5%	4.606	0.536	0.569	0.365	1.130	0.012

The maximum peel weight percentage (13.96) was recorded in M₁F₁ T₁ 10 cm heading back to terminal shoots Immediately after fruit harvest (June-July) Annual time. Maximum Stone percentage (14.57) was observed M₀F₀T₀ control without paclobutrazole application, (Table 1b). Here it is mention that the results related to vegetative parameters and physico-Chemical characteristics of fruits are on the basis of only 1 year data. The pooled mean of 8 years data clearly indicated that fruit yield tree⁻¹ and yield ha⁻¹ (53.27 and 213.08 qt.) have been registered with the treatment of M₀F₀T₀ control with paclobutrazol application. The benefit cost ratio was also found higher with this treatment 2.6 (hectare basis) has been observed with the treatment of No Pruning with Paclobutrazol application (Balley I.S.E. 2000) and followed by (29.94 kg/plant and 119.75 qt) was recorded in M₀F₀T₀ control without paclobutrazol application and benefit

cost ratio with this treatment 2.1 has been observed (Winston, 1992). Evaluation of Paclobutrazol on growth showed better, are recommended for No Pruning with Paclobutrazol application for high density planting orchard to increase the productivity and quality of fruits as compared to other treatments in high density orchards of mango. (Table 1c).

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How to cite this article:

Singh, T.K., Divya Singh A.K. Jain and Bose, U.S. 2018. Effect of Pruning with Paclobutrazol Application for Growth, Yield and Quality of Mango (*Mangifera indica* L.) C.V. Amrapali. *Int.J.Curr.Microbiol.App.Sci*. 7(08): 883-888. doi: <https://doi.org/10.20546/ijcmas.2018.708.100>