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Effect of paclobutrazol on fruit quality and physio-chemical composition of Mango cvs. Dashehari, Langra, Chausa and Fazri

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Abstract

Soil application of Paclobutrazol (applied as a cultural of 0.5 g/ meter canopy diameter and 1.0 g/meter canopy diameter) evaluated as a method is slightly increased TSS, Acidity total sugar, non-reducing sugar, non-reducing sugar, β -carotene, Ascorbic Acid compare to control. However, the treatment is better in higher doses (1gm/meter canopy diameter) compare lower doses (0.5 gm / meter canopy diameter). The chemical name Paclobutrazol [(2 RS, 3RS)-1-(4-chlorophenyl)-4, 4- dimethyl -2-[1,2,4-triazol -1-y)] pentan-3-ethanol.

Keywords: Paclobutrazol (PBZ); Cultural; Amino-Cyclo Propane; TSS

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The production scenario of different fruits in India indicates that all the fruits occupied 6,480 thousand ha area with 92,846 thousand MT production and 14.3 MT/ha productivity during 2016-17. The total allocation to the fruits in the country has been increased from 6,235 to 6,480 thousand ha over the previous year, while the total production of fruits has also been increased from 89,512 to 92,846 thousand MT.

The area and production of mango has been almost continuously increases over the years.

The area under mango cultivation was 1077.6 thousand ha during 1991-92 which reaches up to 2516 thousand ha in 2013-14 and recorded 2262.8 thousand ha in 2016-17. However, the production has been fluctuating drastically. During 1991-92, the total production was 8,715.6 thousand MT which was increased up to 13,997 thousand MT in 2007-08. During

2008-09 the production was declined from 13997 thousand MT to 12,750 thousand MT. From 2009-10 there is continuous increase in the mango production (15,026.7 thousand MT) to 2016-17 (19,686.9 thousand MT). A total 109.99 % increase in area under mango cultivation has been recorded from 1991-92 to 2014-15 while, 125.88 % increase in production was recorded during the same period. However, productivity has been fluctuating drastically from 1991-92 to 2014-15. The productivity of 8.1 MT/ha was recorded during 1991-12 whereas, it was declined up to 5.5 MT/ha in 2008-09 and again increased up to 8.5 MT/ha in 2014-15 and reached up to maximum productivity of 8.7 MT/ha in 2016-17.

Paclobutrazol is usually applied to the soils due to its low solubility and long residual activity, this class of growth retardants is most efficacious as it reduces shoot elongation and promotes flowering, and yield in the Commercial mango of Indo China., Australia and South Africa. Reduced numbers of panicles for the uses of paclobutrazol despite increased fruit set resulting increased yield. Paclobutrazol [(2RS, 3RS)-1-(4-chlorophenyl)-4, 4-dimethyl-2-[1, 2, 4-triazol-1-yl] Pentan-3-ethanol did not affect sugar, pH, colour, K or glucose-fructose ratio in grapes (zoectleine et al., 1991), amino-cyclo propane, carboxylic acid, ethylene, respiration. Sorbitol, fructose, glucose, sucrose and malic acid in apple [1]. Paclobutrazol reduced sugar concentration in apple [2-8], grape Persimmon [7], TSS in cherry [9], acidity in apricot [10] and grape [11-13].

Paclobutrazol did not affect TSS and Firmness of Apple [14], Banana [15], Cherry [13], Mango [16], Peach [17,18], Pear [19] and Plum. It could not affect acidity in peach [17,18]. Paclobutilized also increased fruit TSS in Apple [20], Grape [15], Plum [21] and fruit ripening was retarded by Paclobutrazol in Apple [2,3,11], Citrus. In contrast paclobutrazol induced early maturity and ripening in grape

Reynold, Peach [22,23]. This report discusses the effect of PBZ on fruit qualitative and physio-chemical composition of 'Tommy Atkins' mango trees grown at the Upper Awash Agro-industry Enterprise in Ethiopia. This is the first study in Ethiopia on the effect of growth retardants on fruit trees and other crops (Ethiopian Agricultural Research Organization planning office pers. Comm).

Material and Methods

The present investigation was carried out in the department of Horticulture, college of Agriculture in G.B. Pant University of Agriculture & Technology, Pant Nagar (India).

Treatment and Layout - The treatment consist of different doses of paclobutrazol of different doses of paclobutrazol namely 1.0 g/meter canopy diameter and 0.5 g/meter canopy diameter along with control.

Physio-chemical Analysis- The observation on various physio-chemical analysis character were recorded from 22 June and 22 July, harvested fruits recorded on 10 days of storage in all replications according to the experiments. The physio-chemical parameters viz, TSS was determined with the help of hand refractometer. Acidity was estimated by titrating pulp extract with 0.1 N NaOH using phenolphthalein indicators. Total sugar, β -carotene etc. was determined according to method suggested by Ranganna.

Statistical Design -The observation recorded were subjected to statically analysis by using completely randomized design for lab experiment and valid conclusion were draw only in significant differences between the treatment mean at 5% level of probability (Conchran and Cox, 1959). In order to compare treatments of critical difference were calculated.

Result and Discussion

The fruits were kept in corrugated Fiber Board (CFB) boxes in single layer under ambient temperature (30-33°C). The time taken for ripening of fruits in cultivars (1992). Dashehari, Langra. Chausa and Fazri were 1-2 days earlier in both the consecutive years. However, lowest doses of Paclobutrazol 0.5 g/m canopy diameter was ineffective on early ripening, similar was the dots, oblong to oblong oblique with base rounded to oblique round medium sized, skin smooth, medium thick, tough and non-adhering. The flesh is yellow, firm with almost no fiber, scanty juice and delightful aroma, very sweet test of excellent quality. Table 1A to 1B shown that Paclobutrazol treated Dashehan Mango is slightly increase TSS (23.40%), acidity (0.22%), total sugar (15.33%), reducing

sugar (3.89%) non-reducing sugar (11.46%), β -carotene (1.42%) and ascorbic acid (36.79mg) However, this treatment is better in higher doses of Paclobutrazol (1.0 g/meter canopy diameter) compare to lower doses (0.5 g/meter canopy diameter). Paclobutrazol treated Mango cvs. Dashehari, Langa, Chausa and Fazri was more pronounced than these applied later and paclobutrazol were higher doses confirming the fact that was capable of increasing TSS, acidity (percent.), ascorbic acid, total sugar, reducing and non-reducing sugar, β -carotene in mango cultivars and taken lower time to ripen after harvest. Data's further shows that PBZ treatment induced 1-2 days earlier ripening with reduction of fruit size, increased in weight loss with higher TSS and total sugar and low acidity and better fruit quality in terms of TSS and total sugar due to PBZ.

Table 1A: Effects Paclobutrazol treatment on fruit quality and physio-chemical composition of mango cv. Dasherri, Langra, Chausa and Fazri (1997-98).

Treatment	TSS(%)	Acidity (%)	Total Sugar (%)	Reducing Sugar (%)	Non reducing Sugar(%)	β carotene	Ascorbic acid (mg)
Dashehari							
Control	23.4	0.22	15.33	3.89	11.46	1.42	36.79
1.0g PBZ m tree canopy diam.	23.73	0.2	15.39	3.9	11.51	1.14	37.16
Langra							
Control	21.07	0.18	17.35	5.82	11.54	1.38	132.34
1.0g PBZ m tree canopy diam.	21.83	0.17	17.39	5.85	11.56	1.39	132.43
Chausa							
Control	21.66	0.26	17.47	5.34	12.14	1.12	38.86
1.0g PBZ m tree canopy diam.	21.71	0.25	17.51	5.36	13.23	1.13	39.35
Fazri							
Control	17.57	0.31	13.64	5.66	7.98	1.15	12.91
1.0g PBZ m tree canopy diam.	17.81	0.29	13.69	5.67	8.05	1.16	13.21
CD at 5%							
Cultivar	0.2	0.84	0.19	0.12	0.4	0.76	0.51
Treatment	0.14	0.59	0.13	0.86	0.28	0.54	0.36
Interction	0.28	NS	NS	NS	NS	NS	0.72

(Means followed by different letters within columns significantly differ by Fisher's LSD at p=0.05).

Table 1B: Effects Paclobutrazol treatment on fruit quality and physio-chemical composition of Mango cv Dasherri, Langra, Chausa and Fazri (1997-98).

Treatment	TSS(%)	Acidity(%)	Total Sugar(%)	Reducing Sugar(%)	Nonreducing Sugar(%)	βcarotene	Ascorbic acid (mg)
Dashehari							
Control	23.31	0.23	15.35	3.88	11.44	1.13	37.75
0.5g PBZ/ m tree canopy diam.	23.65	0.2	15.42	3.88	11.48	1.14	37.12
Langra							
Control	21.11	0.18	17.37	5.81	11.54	1.37	132.32
0.5g PBZ/ m tree canopy diam.	21.78	0.17	17.41	5.83	11.54	1.38	132.37
Chausa							
Control	21.64	0.26	17.48	5.33	12.13	1.11	38.97
0.5g PBZ/ m tree canopy diam.	21.81	0.25	17.54	5.36	13.15	1.13	39.33
Fazri							
Control	17.54	0.31	13.64	5.67	7.46	1.14	22.89
0.5g PBZ/ m tree canopy diam.	17.75	0.29	13.73	5.65	8.04	1.16	13.17
CD at 5%							
Cultivar	0.6	0.84	0.11	0.43	0.37	0.56	0.44
Treatment	0.43	0.59	0.79	0.3	0.26	0.4	0.31
Interction	0.86	NS	NS	0.61	NS	NS	0.63

(Means followed by different letters within columns significantly differ by Fisher's LSD at p=0.05)

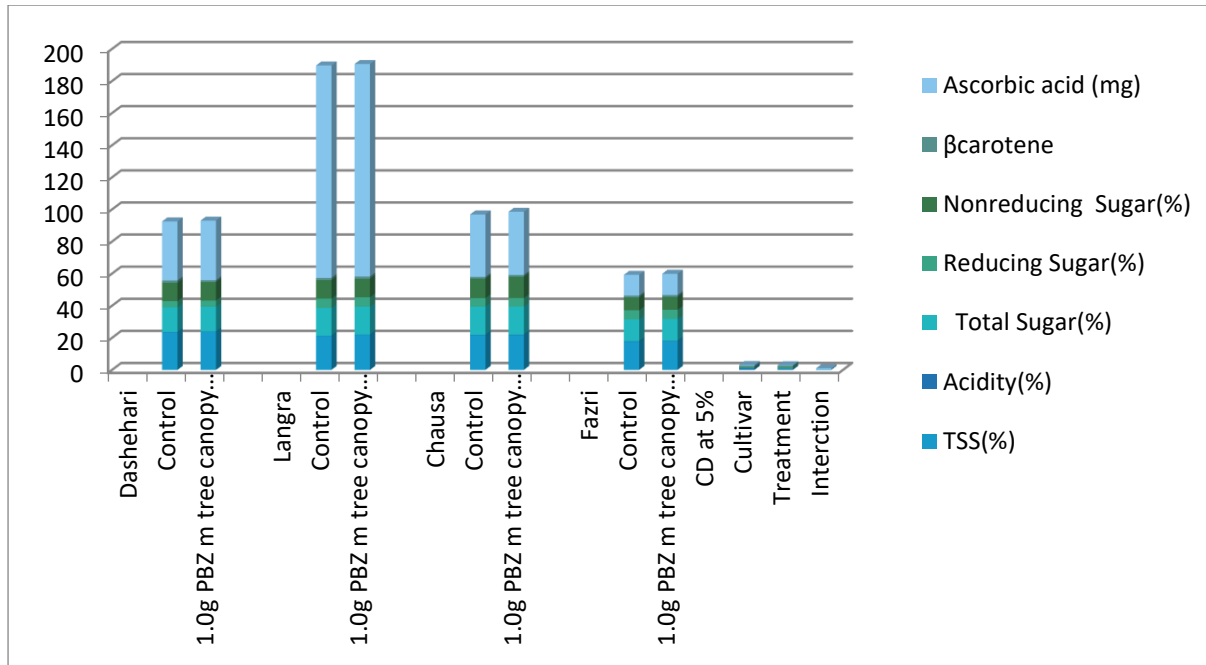


Figure 1A: Effects Paclobutrazol treatment on fruit quality and physio-chemical composition of Mango cvs Dasher, Langra, Chausa and Fazri (1997-98).

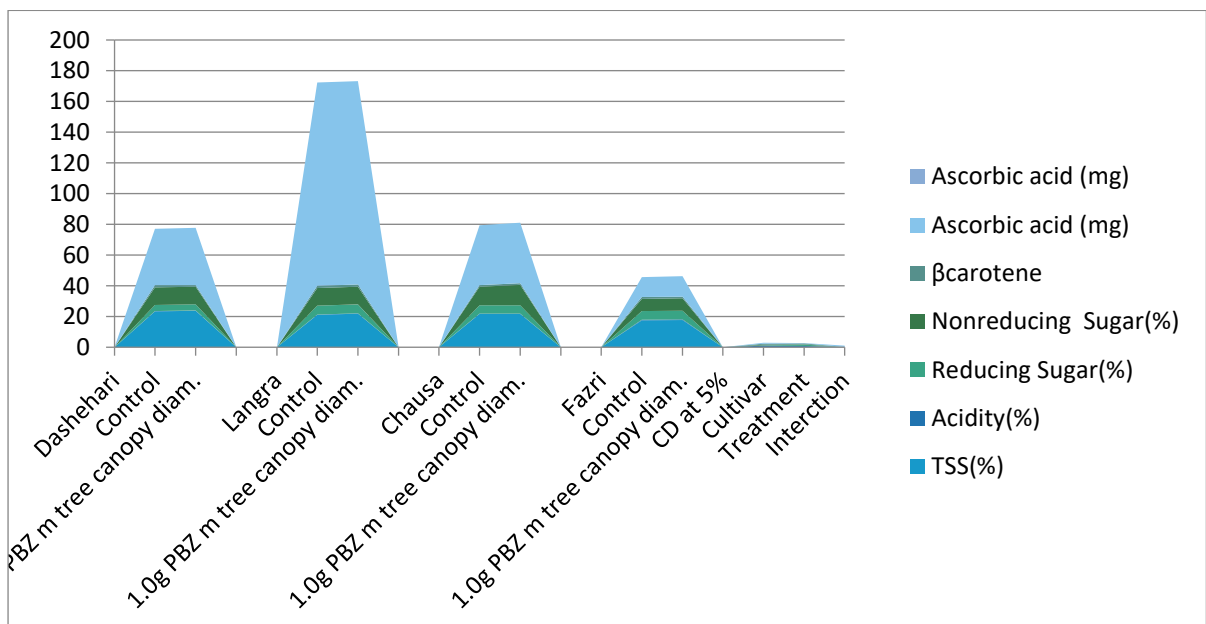


Figure 1B: Effects Paclobutrazol treatment on fruit quality and physio-chemical composition of Mango cvs Dasher, Langra, Chausa and Fazri (1997-98).

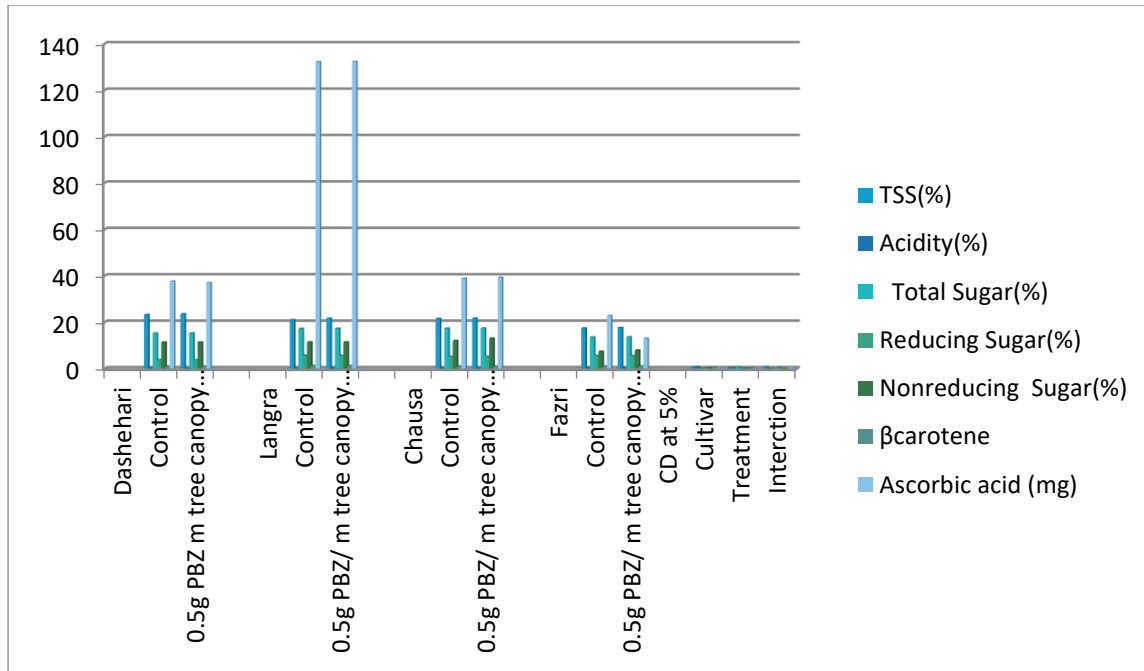


Figure 2A: Effect of Paclobutrazol on fruit quality and Physio-Chemical composition of Mango Cvs. Dashehari, Langra, Chausa and Fazri. (1998-99).

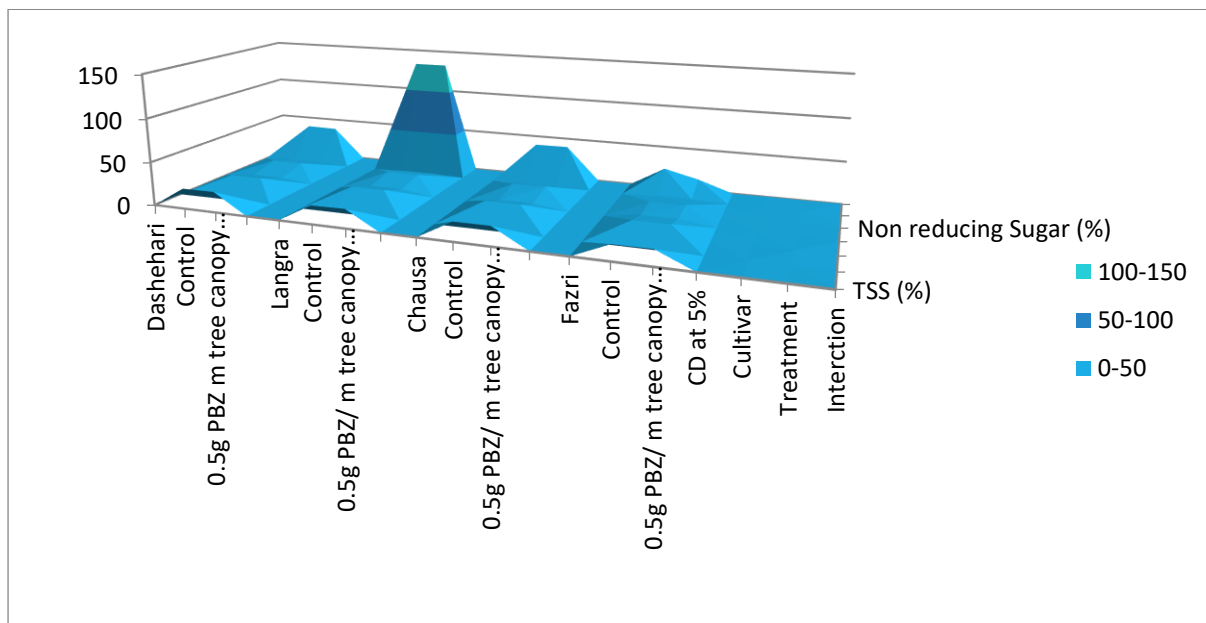


Figure 2B: Effect of Paclobutrazol on fruit quality and Physio-Chemical composition of Mango Cvs. Dashehari, Langra, Chausa and Fazri (1998-99).

Conclusion

The findings of the present investigation revealed that foliar application of Paclobutrazol 1.0 g and 0.5 g per canopy diameter was an effective way for improvement of flowering and fruiting quality of Mango cvs. Dashehari, Langra, Chausa and Fazli. Whereas, Paclobutrazol was most effective for maintaining fruit set percentage, fruit drop percentage and fruit retention percentage in Mango and slightly increased TSS, Acidity total sugar, non-reducing sugar, non-reducing sugar, β -carotene, and Ascorbic Acid compare to control.

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