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INFLUENCE OF PACLOBUTRAZOL FOR EARLINESS IN MANGO CV. ALPHONSO

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Abstract: The experiment was carried on more than 30 years old mango cv. Alphonso during the year 2010-11 and 2011-12 with objective to know the effect of different concentration of Pachlobutrazol as soil drench on flowering, fruit setting, yield and quality of fruits. Different concentrations *viz*., T_1 -Untreated Check, T_2 -Paclobutrazol 23% W/W SC @ 4.60 g a.i. (20ml/tree), T_3 -Paclobutrazol 23% W/W SC @ 6.21 g a.i. (27ml/tree), T_4 - Paclobutrazol 23% W/W SC @ 7.5 g a.i. (30 ml/tree), T_5 -Paclobutrazol 23% W/W SC @ 7.59 g a.i. (33ml/tree), T_6 - Paclobutrazol 23% W/W SC @ 9.2 g a.i. (40 ml/tree), T_7 (Paclobutrazol 23% W/W SC @ 10.12 g a.i. (44ml/tree) and T_8 (Paclobutrazol 23% W/W SC @ 18.4 g a.i. (80 ml/tree) were tested in Randomized Block Design with three replications. On the bases of pooled data, treatment T_6 - Paclobutrazol 23% W/W SC @ 9.2 g a.i./tree as soil drench (i.e. 40 ml/tree) produced earlier flowers with respect to panicle emergence, full bloom and total days for fruit harvesting from the date of treatments given. Maximum number of fruits at pea stage, marble stage and harvesting stage as well as highest fruit number and yield was noted with treatment T_6. Average fruit weight was also higher in T_6 but it was at par with T_1 – untreated check. On the basis of economics, maximum net realization and BCR, treatment T_6 - Paclobutrazol 23% W/W @ 9.2 g a.i./tree as soil drench (i.e. 40 ml/tree) was found better without any phytotoxic effect over leaves and fruit surface.
Keywords: Pachlobutrazol, Flowering, Earliness, Fruit setting, Yield and Quality.

Introduction

Mango belongs to family Anacardiaceae, originating in South East Asia at an early date. Besides fine taste and good qualities, it is called as 'king of the fruit', and known as the most important national fruit of India. The vigorous growth high yield, having good consumer's acceptance, attractive shape, size, and saffron colour of pulp and very good keeping quality are the features of Alphonso, although the nature of flower production is a very complex one related to biannual fruiting habit (Mukherjee, 1953; Singh, 1954). The mechanism of controlling the balance between vegetative and reproductive phase can govern by newly developed growth retardant paclobutrazol available in the form of cultar (25% paclobutrazol a.i. as a Soluble Concentrate), a gibberellins biosynthesis inhibitor (Davenport *et al.*, 2001),

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has been demonstrated to induce early flowering in a number of commercially important mango cultivars and in general, soil application is more effective (Burondker and Gunjate, 1991). Moreover, induction of early flowering results in early maturity of mango fruits which fetch the higher price in the market as compared to late maturing mango fruits (Naidu and Naidu, 2009 and Vahora, 2010). Therefore, present study "**Influence of Paclobutrazol for earliness in mango cv. Alphonso** was undertaken to understand the flowering, fruiting and fruit quality behaviours of important mango cultivar Alphonso.

Material and Methods

The experiment was framed in Randomized Block Design with three replications at Regional Horticultural Research Station, ASPEE College of Horticulture and Forestry, N.A.U., Navsari (Gujarat) during the year 2010-11 and 2011-12. The experiment was framed out in RBD with eight treatments having different concentrations of Paclobutrazol *viz*., T_1 - Untreated Check, T_2 -Paclobutrazol 23% W/W @ 4.60 g a.i. (20ml/tree), T_3 -Paclobutrazol 23% W/W 6.21 g a.i. (27ml/tree), T_4 - Paclobutrazol 23% W/W @ 7.5 g a.i. (30 ml/tree), T_5 - Paclobutrazol 23% W/W @ 7.59 g a.i. (33ml/tree), T_6 - Paclobutrazol 23% W/W @ 9.2 g a.i. (40 ml/tree), T_7-(Paclobutrazol 23% W/W @ 10.12 g a.i. (44ml/tree) and T_8 -Paclobutrazol 23% W/W 18.4 g a.i. (80 ml/tree), which were replicated thrice and two trees were allotted to each treatment. Different concentration of paclobutrazol was applied as soil drench to the Alphonso tree having more than 30 years of age. Required quantity of product should be diluted in clean water (10 to 15 lit.) and applied in 5 cm to 10 cm deep furrow maid under the canopy of the tree during first fortnight of August.

Parameters on time require to panicle emergence, full bloom, final harvesting from the date of treatment application, fruit setting and yield attributes were recorded during investigation. The data collected were subjected to the statistical analysis, according the procedure described by Panse and Sukhatme (1967) for proper interpretation and significance of difference was tested by (F) test at 5% probability level. Phytotoxic effect or abnormality over leaf and fruit surface was observed by visually as well microscopically.

Result and Discussion

A significant difference was observed among all different treatments with respect to days require for panicle emergence, days required for full blooming as well as total days required for final harvest (date of treatment application to final harvesting). Among all the parameters tabulated in Table-1, earliness (125.79, 17.83 days and 246.83 days, respectively) was found in treatment T_8 (Paclobutrazol 23% W/W 18.4 g a.i. (80 ml/tree) but it was

statistically at par with T_6 and T_7. Soil drenching of paclobutrazol given to regulate cropping tended to reduce the vegetative growth by antagonize the action of gibberellins may be the reason of advancement in flowering and reduction in duration of final harvest. Similar kind of results were noted by Mouco and Albuquerque, 2005 in cv. Haden and Padhiar, 1999 in different cultivars under South Gujarat condition.

Table 1. Influence of different concentrations of Paclobutrazol 23% W/W SC formulation on flower initiation and fruit setting of mango cv. Alphonso.

Treatments	Require Days to Panicle emergence from the date of treatment application	Total Days to Full bloom (days) from panicle initiation	Number of fruits set /panicle			Total Days to final harvest from the date of treatment application
			Pea	Marble	Harvest	
T_1	165.04	31.02	5.81	1.82	1.02	277.89
T_2	155.73	27.85	6.38	2.01	1.21	273.57
T_3	153.52	26.25	6.80	2.15	1.26	269.77
T_4	151.23	24.73	7.11	2.33	1.32	265.96
T_5	150.33	24.12	7.03	2.30	1.34	264.45
T_6	135.18	21.90	8.19	2.40	1.48	255.55
T_7	134.81	21.37	7.52	2.35	1.40	252.71
T_8	125.79	17.83	8.64	2.74	1.65	246.83
CD %	**10.41**	**4.10**	**1.05**	**0.29**	**0.15**	**10.74**
CV	**6.15**	**14.20**	**12.62**	**10.94**	**9.65**	**3.53**

Maximum number of fruit set per panicle (Table-1) at pea stage (8.64 fruits), marble stage (2.74 fruits) and at harvesting stage (1.65 fruits) was recorded by the application of paclobutrazol 23% W/W SC @ 18.4 g a.i./tree (i.e. 80 ml/tree), while least setting were noted in untreated check-control (5.81 fruits, 1.82 fruits and1.02 fruits respectively). Padhiar (1999) was also in the conformity with the results obtained.

The Maximum average of two year fruit yield (190.92 kg/tree) and yield benefit over control (30.50 %) were recorded in T_6 -treatment, while the lowest was noted in untreated check. However, application paclobutrazol was found to be effective to increase two year average fruit production as compared to untreated trees even though biennial bearing and climatic condition (Vahora, 2010). A perusal of data revealed that the highest number of fruits per tree (1219.33 fruits) was obtained in treatment T_8 (application of paclobutrazol 23% W/W @ 18.4 g a.i. 80 ml /tree), which was statistically at par with T_6 (1097.00). The Untreated check was recorded least number of fruits per tree (698.17 fruits) and yielded 132.70 kg/tree.

Table 2. Influence of different concentration of Paclobutrazol 23% SC formulation on yield attributes and phyotoxicity on plant part of mango cv. Alphonso.

Treatments	Average Yield (kg/Tree)	Yield Benefit over control (%)	No of fruits	Average fruit weight (g)	Pulp: skin	Phytotoxicity over leaves	Phytotoxicity over fruits
T_1	132.70	***	698.17	214.64	4.29	Not Found	Not Found
T_2	138.40	4.12	878.17	195.48	3.77	Not Found	Not Found
T_3	146.22	9.25	914.83	200.64	3.95	Not Found	Not Found
T_4	177.43	25.21	928.50	207.13	4.19	Not Found	Not Found
T_5	154.27	13.98	950.00	204.51	4.09	Not Found	Not Found
T_6	190.92	30.50	1097.00	224.66	4.53	Not Found	Not Found
T_7	154.55	14.14	1023.67	190.94	3.65	Not Found	Not Found
T_8	149.33	11.14	1219.33	179.30	3.19	Not Found	Not Found
CD %	**12.36**		**152.06**	**14.86**	**0.43**		
CV	**22.21**		**13.65**	**6.36**	**9.45**		

Due to extensive bearing the average fruit weight and pulp:skin were reduced (Tandel and Patel,2011) that the least were noted in the T_8 while the highest in T_6 and T_1 among all the treatments. Reduction in fruit size at higher concentration may be due to higher number of fruit retention and more fruits per panicle as well as tree which might have caused competition among the fruits and also source-sink relationship during different growth and development stages. Reduction of fruit size in different cultivars of mango was also reported by Kulkarni (1988), Hiller and Rudge (1991), Burondker *et al.* (2000) which support present findings. Soil application of various concentration of paclobutrazol 23% W/W SC formulation did not observed any Phytotoxic effect over leaves as well as fruit surface.

Looking to the economics of the all treatments, the highest BCR (5.44), **Net realization** (3, 66,161 ₹/ha) and Net benefit over control (56.80 %) were noted in treatment T_6- paclobutrazol 23% W/W SC @ 9.2 g a.i./tree i.e. 40 ml/tree. This may be due to earliness and superior quality of fruits, which provides opportunities to fetch higher market price than that of glut season.

From the above summery, it could be T_6 - paclobutrazol 23% W/W SC @ 9.2 g a.i./tree (i.e. 40 ml/tree) was found better with respect to regulating the flowering, fruit yield as well as quality of the fruit without any phytotoxic effect.

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Table 3. Economics of different treatments

Treatments	Treatment cost (₹)	Cultivation cost (₹)	Harvest cost (₹)	Total cost (₹)	Average Yield (T/ha)	Selling Rate (₹/kg)	Total income (₹)	Net realization (₹)	BCR	Net Benefit over control (%)
T_1	00000	45500	8626	54126	13.27	16.00	212320	158195	3.92	***
T_2	12600	45500	8996	67096	13.84	18.00	249128	182031	3.71	13.09
T_3	16800	45500	9504	71804	14.62	18.75	274161	202357	3.82	21.82
T_4	18600	45500	11533	75633	17.74	20.00	354860	279227	4.69	43.35
T_5	20400	45500	10028	75928	15.43	22.00	339394	263467	4.47	39.96
T_6	24600	45500	12410	82510	19.09	23.50	480004	366161	5.44	56.80
T_7	27000	45500	10046	82546	15.46	25.25	390245	307699	4.73	48.59
T_8	48600	45500	9707	103807	14.93	26.00	388267	284460	3.74	44.39
Plant protection measures :24000 ₹			Protection Spray cost: 4200 ₹				Labour Charges: 10000 ₹			
Fertilizers cost :5000 ₹			Pruning Cost : 500 ₹				Cultivation: 1800 ₹			
Paclobutrazol 23% W/W: 6000 ₹			Harvesting Cost :65 ₹/100 kg				Drenching treatment: 600 ₹/ha			