



Short Note

## Biochemical Changes in Fruit Quality Through Paclobutrazol Application on Acid Lime (*Citrus aurantifolia* Swingle)

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Field experiment was conducted to find out the impact of soil applied paclobutrazol on fruit quality of five year old acid lime trees. The experiment was conducted in a randomized block design with four replications. Four concentrations of paclobutrazol viz., 1.25, 2.50, 3.75, and 5.00 g a.i/tree were applied as soil drench before flower bud formation during main season of the year 2008 – 2009. The results of the experiment revealed that the titrable acidity, ascorbic acid and total sugars content of fruits were improved by soil application of paclobutrazol. Soil application of paclobutrazol 5.00 g a.i / tree recorded higher titrable acid content in the main (9.59 and 8.91 per cent) and off season (9.38 and 8.75 per cent) and higher total sugars (reducing and non-reducing) in the main (1.15 and 1.13 per cent) and off season (1.13 and 1.12 per cent) during the year 2008 - 09 and 2009 – 10, respectively, whereas paclobutrazol 2.50 g a.i/tree recorded higher ascorbic acid content in the main (31.2 and 29.9 mg/100g) and off season (30.7 and 29.5 mg/100g) during the year 2008 - 09 and 2009 – 10, respectively.

**Key words:** Acid lime, paclobutrazol, fruit quality, acidity, ascorbic acid.

Acid lime (*Citrus aurantifolia* Swingle) known as Kagzi lime is rich in vitamin C and extensively used for culinary purposes. It has several medicinal properties viz., an appetizer, stomachic, antiscorbutic and antihelminthic. Paclobutrazol, a growth retardant has been found to be useful to alter plant growth, flowering and quality of fruits not only in acid lime but also in various horticultural crops (Burondkar and Gunjate, 1991; Kanchave and Bhosale, 2007). To overcome fluctuations in production of acid lime, this gibberellin bio-synthesis inhibitor can be used to manipulate the cropping possibly by induction of off-season flowering for a constant and increased yield in young orchards (Baskaran *et al.*, 2010)

### Materials and Methods

The experiment was conducted at Horticultural College and Research Institute, Periyakulam located at 10° N Latitude and 77° E Longitudes at an altitude of 300 m above MSL. The soil was sandy loam in texture. Uniform size trees were selected for the study and during the entire period of experimentation all the trees were given uniform cultural practices including fertilizer application, pest and disease control. The trees were treated with paclobutrazol at 1.25, 2.50, 3.75, 5.00 g a.i./tree with a control. The experiment was conducted in a randomized block design with three replications.

The required quantity of paclobutrazol was applied as soil drench diluting with five liters of water and poured around the root zone by making 4 -5 holes using a crow bar before flower bud formation and then the trees were irrigated immediately. The

treatments were imposed during main season of the year 2008 - 09 and again in 2009 – 10.

### **Results and Discussion**

The total soluble solids (TSS), acidity, TSS/Acid ratio, ascorbic acid, reducing sugars and total sugars were higher in the fruits produced by paclobutrazol treated trees. This finding is in conformity with that of Greene (1986) in apple and Patel *et al.* (2003) in mango.

In the present investigation, the internal quality of fruits like total soluble solids (TSS), titrable acidity (Table 1), total sugars (both reducing and non-reducing sugars) were significantly increased by paclobutrazol application. The

highest value of the above quality parameters was recorded by soil application of paclobutrazol at 5.00 g/tree. The increase in quality parameters was possibly due to slow break down of polysaccharides to monosaccharides. Fruit quality parameters might have thus improved due to division of photosynthates towards the fruit (Shinde *et. al.*, 2008; Neelam singh *et. al.*, 2011 )

The highest TSS/Acid ratio and ascorbic acid content of fruits was recorded by paclobutrazol 2.50 g/tree (Table 2 & 3). Better chemical composition of fruits may be attributed to better absorption by roots and active translocation in the xylem to leaves and buds. The results corroborate the findings of Singh and Dhillon (1992) in mango. Fruit quality may have thus improved due to diversion of photosynthates towards the fruit (Wani and Lone, 2007).

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**Table 1. Effect of paclobutrazol (PP<sub>333</sub>) on titrable acidity (%) of acid lime during main and off season**

Treatment	Main season		Pooled	Off season		Pooled	Pooled Mean
	(2008-09)	(2009-10)	Mean	(2008-09)	(2009-10)	Mean	
Paclobutrazol 1.25g (T <sub>1</sub> )	6.83	6.56	6.70	6.50	6.20	6.35	6.53
Paclobutrazol 2.50g (T <sub>2</sub> )	7.44	7.24	7.34	7.29	7.13	7.21	7.28
Paclobutrazol 3.75g (T <sub>3</sub> )	7.82	7.50	7.66	7.65	7.35	7.50	7.59
Paclobutrazol 5.00g (T <sub>4</sub> )	9.59	8.91	9.25	9.38	8.75	9.07	9.16
Control (T <sub>5</sub> )	7.36	7.17	7.27	7.34	7.15	7.25	7.26
SEd	0.26	0.23	0.24	0.26	0.21	0.22	0.18
CD(0.05)	0.57	0.49	0.51	0.57	0.46	0.48	0.37

**Table 2. Effect of paclobutrazol (PP<sub>333</sub>) on TSS / Acid ratio of acid lime during main and off season**

Treatment	Main season		Pooled	Off season		Pooled	Pooled Mean
	(2008-09)	(2009-10)	Mean	(2008-09)	(2009-10)	Mean	
Paclobutrazol 1.25g (T <sub>1</sub> )	0.92	0.99	0.96	0.95	1.01	0.98	0.97
Paclobutrazol 2.50g (T <sub>2</sub> )	0.94	1.04	0.99	0.95	1.03	0.99	0.99
Paclobutrazol 3.75g (T <sub>3</sub> )	0.92	0.99	0.96	0.90	0.97	0.94	0.95
Paclobutrazol 5.00g (T <sub>4</sub> )	0.75	0.86	0.81	0.75	0.79	0.77	0.79
Control (T <sub>5</sub> )	0.90	0.99	0.95	0.89	0.89	0.89	0.92
SEd	0.02	0.02	0.02	0.02	0.01	0.02	0.01
CD(0.05)	0.04	0.04	0.04	0.04	0.03	0.03	0.03

**Table 3. Effect of paclobutrazol (PP<sub>333</sub>) on ascorbic acid (mg/100g) content of acid lime during main and off season**

Treatment	Main season		Pooled	Off season		Pooled	Pooled Mean
	(2008-09)	(2009-10)	Mean	(2008-09)	(2009-10)	Mean	
Paclobutrazol 1.25g (T <sub>1</sub> )	27.2	27.0	27.1	27.0	26.9	27.0	27.0
Paclobutrazol 2.50g (T <sub>2</sub> )	31.2	29.9	30.6	30.7	29.5	30.1	30.3
Paclobutrazol 3.75g (T <sub>3</sub> )	30.6	29.8	30.2	30.3	29.4	29.9	30.0
Paclobutrazol 5.00g (T <sub>4</sub> )	30.2	29.7	30.0	29.8	29.6	29.7	29.8
Control (T <sub>5</sub> )	29.0	27.8	28.4	28.9	27.6	28.3	28.4
SEd	0.9	0.9	0.9	0.9	0.9	1.0	1.1
CD(0.05)	1.9	1.9	1.9	1.9	1.9	2.1	2.3

## Conclusion

The results revealed that soil application of paclobutrazol 5.00 g a.i / tree recorded higher titrable acid content, total sugars (reducing and non-reducing) in the main and off season during the year 2008 - 09 and 2009 – 10, respectively, whereas paclobutrazol 2.50 g a.i/tree recorded higher ascorbic acid content in the main and off season during both the years.

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