

Effect of Chemicals and Cincturing on Quality of Litchi Fruit cv. Bombai

D. Mandal^{1*}, A. Sarkar² and B. Ghosh³

¹Dept. of Horticulture, Aromatic & Medicinal Plants, Mizoram University, Aizawl, Mizoram (796 004), India

²Dept. of Horticulture, Nagaland University, Medziphema, Nagaland (797 004), India

³Faculty of Horticulture, Bidhan Chandra Krishi Viswavidyalaya, Mohanpur Nadia, West Bengal (741 252), India

Corresponding Author

D. Mandal

e-mail: debashismandal1982@gmail.com

Article History

Article ID: IJEP158

Received in 30th January, 2017

Received in revised form 12th February, 2017

Accepted in final form 18th February, 2017

Abstract

Indian litchi has got tremendous importance so far the domestic as well as the international markets are concerned because of its appearance, size and quality. In India, West Bengal is the second largest litchi producing state after Bihar where the commercial cultivation is based on single cultivar 'Bombai'. The present study was performed with an objective to measure the effect of certain chemicals viz. Paclobutrazol (25% w/v) @ 2 ml and 3 ml a.i. m⁻² of canopy spread, Ethrel (40%) @ 1.0 ml and 2.0 ml l⁻¹, KNO₃ 1.0% and 2.0% along with cincturing (during September and October) against untreated plant on quality fruit production. The plants treated with ethrel @ 2 ml l⁻¹ produced maximum fruit weight (21.94 g), pulp weight (16.17 g) and juice content (62.79ml per100g pulp). The Total Soluble Solids (TSS) and TSS:acid ratio was also found highest 20.15 °Brix and 40.95 under this treatment. However, cincturing during September also enhanced the fruit weight (21.39 g) compared with control (19.57 g).

Keywords: Cincturing, ethrel, fruit production, juice, litchi, quality, TSS

1. Introduction

The litchi is one of the most important evergreen subtropical fruit plants of family sapindaceae having excellent fruit quality, pleasant flavor, juicy aril and attractive appearance. In litchi production India ranks second after China. Nowadays apart from domestic market Indian litchi has got immense importance in export market also because of its taste, appearance and quality. As the harvesting period of the crop in India is different from the litchi producing countries of the southern hemisphere, so it makes Indian litchi profitable in the European market. So in this outlook quality production of litchi has become a important scientific venture. But, it is also true that sometimes the crop suffers from irregularity in flowering which ultimately hinders the production. Reports are there that the techniques like cincturing (Young, 1956; Menzel and Simpson, 1987) and application of chemicals like paclobutrazol (Liang and Yu, 1991), ethrel (Chen and Ku, 1988), KNO₃ (Mitra et al., 2001) are used for induction of flower. The present study was accomplished to measure the impact of flower inducing treatments on quality production of litchi.

2. Materials and Methods

The present investigation was carried out at farmer's field, Beniagram, New Farakka, Murshidabad, West Bengal during

2006 to 2008. The twenty five years old litchi plants of cv. Bombai were planted at 10×10 m² spacing were used for the experiment. Nine different treatments viz. Soil application of paclobutrazol (C₁₅H₂₀ClN₃O, 25% w/v) at 2ml and 3 ml a.i. m⁻² of canopy spread, foliar spray of ethrel (40%) at 1 and 2 ml l⁻¹ and potassium nitrate (KNO₃) at 1.0 and 2.0%, cincturing during the month of September and October and control. All the treatments were replicated four times and laid out in randomized block design. Biochemical characters of fruits were estimated by standard procedure given by Rangana (1997) and AOAC (1984). Data recorded were analyzed statistically as per the procedure given by Gomez and Gomez (1983).

3. Results and Discussion

This is evident from the Table 1, that out of the applied treatments, ethrel (2 ml l⁻¹) followed by ethrel (1 ml l⁻¹) and cincturing (during September) have resulted good in terms of fruit physical and quality parameters. There was significant variation in fruit weight, pulp weight and juice content of the fruits due to different treatment. Ethrel (2 ml l⁻¹) showed highest fruit weight (21.94g), pulp weight (16.17g) and juice content (62.79 ml per 100g of edible pulp) compared to control (19.57 g, 14.15 g and 53.27 ml 100 g⁻¹ of edible pulp). The positive effect of ethrel on fruit ripening and quality of



Table 1: Fruit physical characters due to application of chemicals and cincturing in litchi cv. Bombai

Treatment	Fruit weight (g)	Pulp weight (g)	Peel weight (g)	Stone weight (g)	Juice (ml 100 g ⁻¹ of edible pulp)
T ₁ : Paclobutrazol @ 2 g a.i.	20.56	14.92	2.88	2.76	57.61
T ₂ : Paclobutrazol @ 3 g a.i.	20.82	15.14	2.92	2.77	58.19
T ₃ : Ethrel @ 1 ml l ⁻¹	21.57	15.75	3.04	2.79	60.86
T ₄ : Ethrel @ 2 ml l ⁻¹	21.94	16.17	3.09	2.68	62.79
T ₅ : KNO ₃ @ 1%	21.03	15.28	2.95	2.81	59.17
T ₆ : KNO ₃ @ 2%	20.80	15.10	2.92	2.79	58.01
T ₇ : Cincturing (September)	21.39	15.76	3.02	2.61	60.43
T ₈ : Cincturing (October)	20.82	15.20	2.93	2.69	58.69
T ₉ : Control	19.57	14.15	2.73	2.70	53.27
SEm±	0.65	0.26	0.31	0.27	1.00
CD (p=0.05)	1.87	0.76	NS	NS	2.94

litchi fruit was also described by Bhattacharya and Mohan (1977). However, cincturing (during September) also resulted good in terms of fruit physical characters like fruit weight (21.39 g), pulp weight (15.76 g) and juice content (60.43 ml per 100 g of edible pulp). Cincturing by altering the distribution of metabolic has demonstrated the beneficial effects on flowering, productivity and fruit characters in litchi (Sanyal

et al., 1996). Similar kind was observation was reported by Rani and Brahmachari (2002). In the fruit biochemical parameters (Table 2), ethrel (2 ml l⁻¹) significantly increase the fruit TSS (20.15 °B), vitamin C (45.55 mg 100 g⁻¹ edible pulp), anthocyanin (51.92 mg 100 g⁻¹ of peel) and TSS:acid ratio (40.95). She and She (1997) found the significant effect on fruit quality by spraying of ethephon at 1 g l⁻¹ during November.

Table 2: Fruit quality characters due to application of chemicals and cincturing in litchi cv. Bombai

Treatment	TSS (°B)	Acidity (%)	Vit. C (mg 100 g ⁻¹ of edible pulp)	Anthocyanin (mg 100 g ⁻¹ of peel)	TSS:acid ratio
T ₁ : Paclobutrazol @ 2 g a.i.	20.56	14.92	2.88	2.76	57.61
T ₂ : Paclobutrazol @ 3 g a.i.	20.82	15.14	2.92	2.77	58.19
T ₃ : Ethrel @ 1 ml l ⁻¹	21.57	15.75	3.04	2.79	60.86
T ₄ : Ethrel @ 2 ml l ⁻¹	21.94	16.17	3.09	2.68	62.79
T ₅ : KNO ₃ @ 1%	21.03	15.28	2.95	2.81	59.17
T ₆ : KNO ₃ @ 2%	20.80	15.10	2.92	2.79	58.01
T ₇ : Cincturing (September)	21.39	15.76	3.02	2.61	60.43
T ₈ : Cincturing (October)	20.82	15.20	2.93	2.69	58.69
T ₉ : Control	19.57	14.15	2.73	2.70	53.27
SEm±	0.65	0.26	0.31	0.27	1.00
CD (p=0.05)	1.87	0.76	NS	NS	2.94

4. Conclusion

The plants of litchi cv Bombai treated with ethrel @ 2 ml l⁻¹ produced maximum fruit weight (21.94 g), pulp weight (16.17 g), juice content (62.79 ml 100 g⁻¹ pulp), TSS (20.15 °Brix) and TSS:acid ratio (40.95). Cincturing during September also enhanced the fruit weight (21.39 g) compared with control (19.57g).

5. References

AOAC., 1984. Official Methods of the Analysis of the

Association of Official Analytical Chemist. Washington, D.C., 14th Edn.

Bhattacharya, R.K., Mohan, N.K., 1977. Effect of ethrel on ripening and fruit quality of litchi (*Litchi chinensis* Sonn.). South Indian Horticulture 25(3), 91–94.

Chen, W.S., Ku, M.L., 1988. Ethephon and kinetin reduce shoot length and increase flower bud formation in lychee. Horticulture Science 23(6), 1078.

Gomez, K.A., Gomez, A.A., 1983. Statistical Procedures for Agricultural Research, 2nd Edn., John Willey and Sons,



- New York. 20-29.
- Liang, G.J., Yu, G.X., 1991. Effects of PP₃₃₃ on mature, non-flowering and leaflet on panicle of litchi trees. *Scientia Horticulture* 48 (3-4), 319-22.
- Menzel, C.M., Simpson, D.R., 1987. Effect of cincturing on growth and flowering of lychee over several seasons in subtropical Queensland. *Australian Journal of Experimental Agriculture* 27(5), 733-38.
- Mitra, S.K., Sanyal, D., Huang, H.B., Menzel, C., 2001. Effect of cincturing and chemicals on flowering of litchi. *Acta Horticulture* 558, 243-246.
- Rangana, S., 1997. *Handbook of Analysis and Quality Control for Fruits and Vegetable Products*. Tata McGraw Hiils Publishing Co. Ltd., New Delhi., 102-103.
- Rani, R., Brahmachari, V.S., 2002. Effect of growth substances and girdling on fruit set, fruit drop and quality of litchi (*Litchi chinensis* Sonn.) cv. China. *Horticultural Journal* 15 (3), 1-8.
- Sanyal, D., Biswas, B., Mitra, S.K., 1996. Studies on flowering of litchi cv. Bombai and effect of chemicals and cincturing. *Haryana Journal of Horticultural Sciences* 25(1), 29-34.
- She, D., She, D.C., 1997. The integrated cultural techniques for high and stable production of adult litchi trees. *South China Fruits* 26(4), 28-29.
- Young, T.W., 1956. Response of lychees to Girdling. *Proceedings of Florida State Horticulture Society* 99, 42-47.