Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2019; 8(6): 1929-1931
Received: 18-09-2019
Accepted: 22-10-2019

Kalyani Nagraj
Horticulture Officer,
Department of Horticulture,
Dhamtari, Chhattisgarh, India

Garima Diwan
Ph.D., Scholar, IGKV, Raipur,
Chhattisgarh, India

Narayan Lal
ICAR-NRC on Litchi,
Muzaffarpur, Bihar, India

Corresponding Author:
Kalyani Nagraj
Horticulture Officer,
Department of Horticulture,
Dhamtari, Chhattisgarh, India

Effect of fruit load on yield and quality of litchi (*Litchi chinensis* Sonn.)

Kalyani Nagraj, Garima Diwan and Narayan Lal

Abstract
An experiment was conducted during 2019 at Sanjay Nikunj Gov. Horticulture Nursery, Bindra Navagoan, Dhamtari district, CG to assess the effect of crop load on fruit yield and quality of litchi cv. China. Maximum fruit weight (23.65 g) and pulp weight (14.65g) at harvest was recorded with 5 fruit load. Fruit quality was generally high in which fruit load was least but fruit load did not affect soluble solid content or acidity. Fruit weight sharply increased from 35 to 65 DAA and pulp weight increased from 45 to 65 DAA and peel weight was static from 40 to 65 DAA and seed weight increased from 25 to 45 DAA and afterwards, it became static.

Keywords: Fruit load, Fruit weight, Pulp weight, TSS, Acidity

1. Introduction
The litchi (*Litchi chinensis* Sonn.) is one of the most important evergreen subtropical fruits of India. The litchi is one of the most environmentally sensitive fruit trees and probably due to this reason its cultivation is restricted to few a country in the world and in few states in India and mainly fluctuation in temperature significantly affect fruit retention (Lal *et al.*, 2017) [4]. The major litchi producing states in India are Bihar, Uttarakhand, West Bengal, Punjab, Uttar Pradesh, Jharkhand and Tripura. In India, its commercial cultivation was restricted to the Northern subtropical parts of the country, particularly the foothills of Himalayas from Tripura to Jammu and Kashmir and Gangetic plains. The possibilities of production of litchi during December–January in the southern have been explored that can make availability of litchi fruit during off season. The foothills of the Himalayas, *i.e*. Terai belt, free from frost, offer good scope for plantation of litchi. Litchi can be cultivated up to an altitude of 1000 m above mean sea level. In these foothills, fruits mature late in the season. Recently, it is reported that litchi is also performing well in Southern parts of India when difference of temperature was less than 4 °C and humidity difference of about 6.5% during June-August (Nath *et al.*, 2015) [9]. These non-traditional areas of Southern India particularly in places above 800-900 m altitude includes Kerala, Karnataka, Tamil Nadu, Andhra Pradesh, Odisha, Chhattisgarh, Maharashtra and Gujarat. The litchi fruit consists of about 55-85% pulp, 6-27% seed and 10-28% peel which varies depending upon cultivar and climatic conditions. Litchi peel is good source of anthocyanin and it ranged from 17.7-107 mg/100g (Lal, 2018) [2]. Litchi is good source of ascorbic acid ranging from 14 to 47 mg/100g of pulp (Lal *et al.*, 2018a) [5]. Total by product in litchi is found to the tune of 19.85 to 59.54 % in different genotypes fractioning with 6.96 to 22.58 % seed and 12.89 to 36.96 % pericarp. Litchi pericarp and seed are good source of total phenolics with 7.5 - 62.2 mg GAE/g and 23.01 – 85.57 mg GAE/g, respectively (Lal *et al.*, 2018b) [6]. Litchi produces three types of flowers in a panicle and fruit load varies from 1 to 35 which have great impact on fruit size, yield and quality. Therefore, to assess the effect of crop load in litchi, this investigation was carried out.

2. Materials and Methods
An experiment was conducted during 2019 at Sanjay Nikunj Gov. Horticulture Nursery, Bindra Navagoan, Dhamtari district, CG to assess the effect of crop load on fruit yield and quality of litchi cv. China. The uniform growth and vigor planted at a spacing of 5 x 5 m were selected. The experiment was laid out in the RBD with 9 treatments with 3 replications. The observations recorded on fruit weight, pulp weight, Seed weight, TSS and Acidity. The data were subjected to analysis of variance given in Panse and Sukhatme (1967) [10]. Significance was tested by 'F' value at 5 per cent level of probability. Critical difference (CD) values were calculated wherever the F test was found to be significant.

3. Results and Discussion

Maximum fruit weight at harvest (23.65 g) was recorded with 5 fruit load followed by all increasing fruit load. It might be due to less number of competitor fruits which help to increase fruit weight in intact fruits on the tree. Prakash *et al.,* (2012) [12], Thakre*et al.,* (2016) [14] and Patel *et al.,* (2014) [11] also found that low fruit load possesses heavy fruit weight in Guava. Fruit quality was generally high in which fruit load was least but fruit load did not affect soluble solid content or acidity. The similar findings were also reported by Meland (2009) [8] in apple crop load. Litchi is pollinated mainly by honey bee (Srivastava *et al.,* 2017) [13] and success of fruit set which determine final yield depends on the source of pollen grain (Lal *et al.,* 2019a and b) [7] [3]. Fruit weight sharply increased from 35 to 65 days after anthesis (DAA) and pulp weight increased from 45 to 65 DAA. Similarly, peel weight was static from 40 to 65 DAA and seed weight increased from 25 to 45 DAA and afterwards, it became static. Lal *et al.,* (2019c) [1] reported that fruit weight increased from 25 to 65 DAA and Pulp weight increased rapidly from 55 DAA and seed weight slowly increased from 25 to 60 DAA. Peel weight increased from 25 to 55 DAA and afterwards, peel weight started to decrease.

Table 1: Effect of crop load on physic-chemical characteristics of litchi cv. China

Number of fruit per panicle	Fruit weight (g)	Pulp weight (g)	Seed weight (g)	Acidity (%)	TSS (Brix)
5	23.65	14.65	4.65	0.32	21.56
8	21.65	14.15	4.25	0.46	20.32
11	19.52	13.86	3.68	0.35	19.25
14	19.41	13.67	3.56	0.5	21.56
17	19.35	12.56	3.45	0.49	18.7
21	19.1	12.37	3.38	0.48	21.65
24	18.95	12.15	3.31	0.5	18.52
27	18.67	11.76	3.28	0.52	18.37
30	17.35	11.35	3.2	0.51	20.57
SE(m)	0.44	0.41	0.09	0.005	0.43
CD (0.05)	1.35	1.26	0.28	0.015	1.3

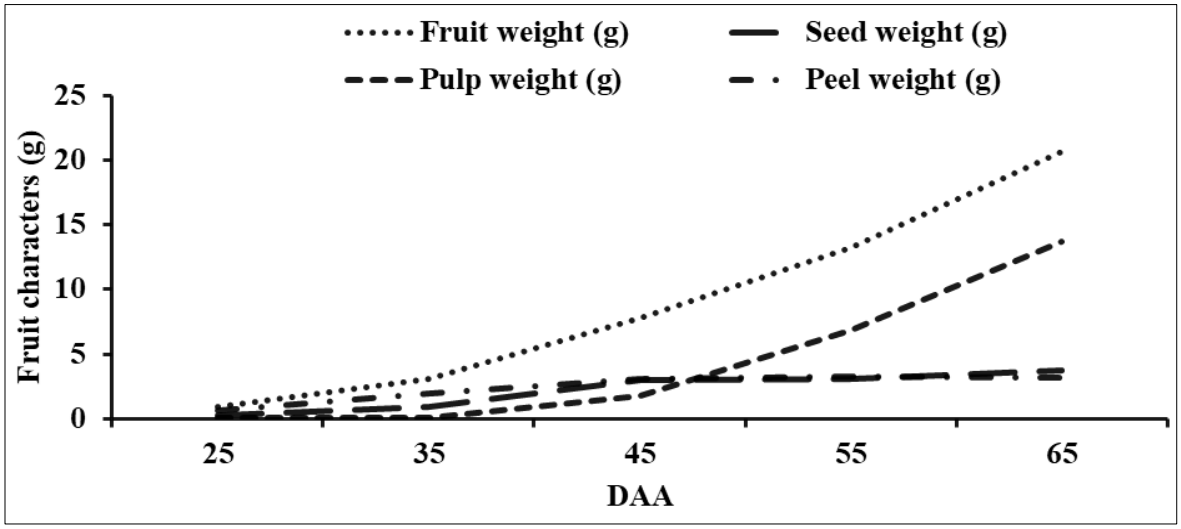

Fig 1: Changes in fruit, seed, pulp and peel weight of litchi cv. china

4. Conclusion

It is concluded that least fruit load resulted in maximum fruit and pulp weight. Fruit qualities were also enhanced by least fruit load. From the results, it is clear that the fruit weight and fruit quality of litchi for commercial production can be manipulated easily by restricted fruit load per panicle for good yield depending upon the situation.

5. References

1. Lal N, Singh A, Gupta AK, Marboh ES, Kumar A, Nath N. Precocious Flowering and Dwarf NRCL-29-A New Genetic Stock of Litchi (Litchi Chinensis Sonn.). Chem Sci Rev Lett. 2019c; 8(32):206-210.
2. Lal N. Genetic studies of litchi germplasm. Ph. D. Thesis, submitted to JNKVV, Jabalpur, MP, 2018.
3. Lal NAK, Gupta ES, Marboh A, Kumarand V, Nath. Effect of pollen grain sources on success of hybrids in Bedana Litchi. International Journal of Bio-resource and Stress Management. 2019b; 10(3):241-45.
4. Lal N, Gupta AK Nath V. Fruit retention in different litchi germplasm influenced by temperature. International Journal of Current Microbiology and Applied Science6. 2017; (12):1189-1194.
5. Lal N, Pandey SK, Nath V, Gontia AS, Sharma HL. Evaluation of litchi (*Litchi chinensis* Sonn.) genotypes for fruit quality attributes. International Journal of Chemical Studies. 2018a; 6(3):2556-2560.
6. Lal N, Pandey SK, Nath V, Agrawal V, Gontia AS, Sharma HL. Total phenol and flavonoids in by-product of Indian litchi: Difference among genotypes. Journal of Pharmacognosy and Phytochemistry. 2018b; 7(3):2891-2894.
7. Lal N, Gupta AK, Marboh ES, Kumar A, Nath V. Effect of pollen grain sources on fruit set and retention in Shahi litchi. Multilogic in science. 2019a; 9(29):152-56.
8. Meland M. Effects of different crop loads and thinning times on yield, fruit quality, and return bloom in Malus x

domestica Borkh. Elstar. Journal of Horticultural Science and Biotechnology. 2009; 84:117-121.
9. Nath VA, Kumar SD, Pandey, Tripathi PC. Litchi in winter season- a way forward. Indian Horticulture. 2015; 59:26-27.
10. Panse VG, Sukhatme PV. Statistical methods for agricultural workers. Indian Council for Agricultural Research (ICAR), New Delhi, India, 1967.
11. Patel RK, Meitei SB, Kumar A, Srivastava K, Deka BC, Deshmukh NA *et al*. Effect of leaf and fruit thinning on yield and quality of peach cv. Flordasun. The Ecoscan Special issue. 2014; 4:467-471.
12. Prakash S, Virendra Kumar, Saroj PL, Sirohi SC. Response of yield and quality of winter guava to severity of summer pruning. Indian Journal of Horticulture. 2012; 69(2):173-176.
13. Srivastava KD, Sharma SD, Pandey AKD, Analand V Nath. Dynamics of climate and pollinator species influencing litchi (*Litchi chinensis*) in India. Indian Journal of Agricultural Sciences. 2017; 87(2):266-9.
14. Thakre M, Shant Lal, Shweta Uniyal, Amit Kumar Goswami, Pratibha Prakash. Pruning for crop regulation in high density guava (*Psidium guajava* L.) plantation. Spanish Journal of Agricultural Research. 2016; 14(2):e0905, 8.