Litchi: A Sub-Tropical Fruit Crop for Lower Pulney Hills of Tamil Nadu

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The Litchi (*Litchi chinensis Sonn*) an important sub-tropical evergreen fruit crop belonging to family *Sapindaceae*, is believed to have originated in China, where it has been grown in Southern Guangdong State for thousands of years. It is highly specific to climatic requirements and probably due to this reason its cultivation is restricted to few countries in the world. In India, Litchi was introduced in the 18th century through Burma, and from there, it spread to many countries. India and China account for 91 per cent of the world Litchi production but it is mainly marketed locally.

Climate and Soil

Since, flower bud differentiation, flowering, fruit set, fruit quality and flavour development in Litchi is influenced significantly by temperature and humidity, it has adapted well in the sub-tropics where summer months are hot and wet and winter months are dry and cool. Hot summers free from hot wind and winters free from frost are essential.

Litchi cultivation is highly successful in areas having minimum temperature of 10°C from December to February and 38°C from April to June. However, temperature of 32° C during these months is considered to be optimum. In Litchi growing areas in India the temperature varies from 21° C to 37.8°C during flowering and fruiting.In India, Litchi is grown successfully on a wide range of soil types, which include sandy loams, laterite, alluvial sand, and calcareous soil, but the best Litchi orchards are seen in alluvial sandy loam soils with good drainage and access to the water table. The performance of orchards is very poor on clay soil with poor drainage. The pH of soils ranges from 6.0 to 7.5.

Production of planting material

Litchi is generally multiplied by vegetative methods of propagation as plants raised through sexual method (by seed) grow slowly, have a long juvenile period and do not produce fruit true to the type. The most commonly practiced method of vegetative propagation is air-layering.

Table 1: Varietal Distributions of Litchi in Different States in India

States	Varieties
Bihar	Deshi, Purbi, China, Kasba, Bedana, Early Bedana, Late Bedana, Dehra Rose, Shahi, Manragi, Maclean, Longia, Kaselia and Swarna Rupa
Uttar Pradesh	Early Large Red, Early Bedana, Late Large Red, Rose Scented, Late Bedana, Calcuttia, Extra Early, Gulabi, Pickling, Khatti, Dehra Dun, Piyazi
West Bengal	Bombai, Ellaichi Early, China, Deshi, Purbi and Kasba
Haryana / Punjab	Early Seedless, Late Seedless, Seedless-1, Seedless-2

Air-layering

Air-layering, known as 'marcottage' in China and 'goottee' in India, is commercially practiced for large scale multiplication. For preparation of the air-layer a healthy terminal branch receiving good sunshine with a thickness of about 1.2-1.5 cm is selected and a 2.5 cm ring is made by removal of bark about 45-50 cm below the apical growth. The cambium layer is rubbed off and the woody portion is exposed. Rooting hormone (1000 ppm IBA) is used as paste or powder. A layer of moist sphagnum moss or coir pith is placed and wrapped with a piece (20 x 25 cm) of 400 gauge polythene sheet and tied properly at both ends to ensure supply of proper moisture which facilitates the development of roots. After about 50-60 days, the adequate root system develops from the upper end of the ring, which is visible through the polythene film. The layer is removed by making a sharp cut about 5 cm below the lower end of the ring, preferably in 2-3 stages. The detached layers are planted in partial shade. June is considered to be best time for air-

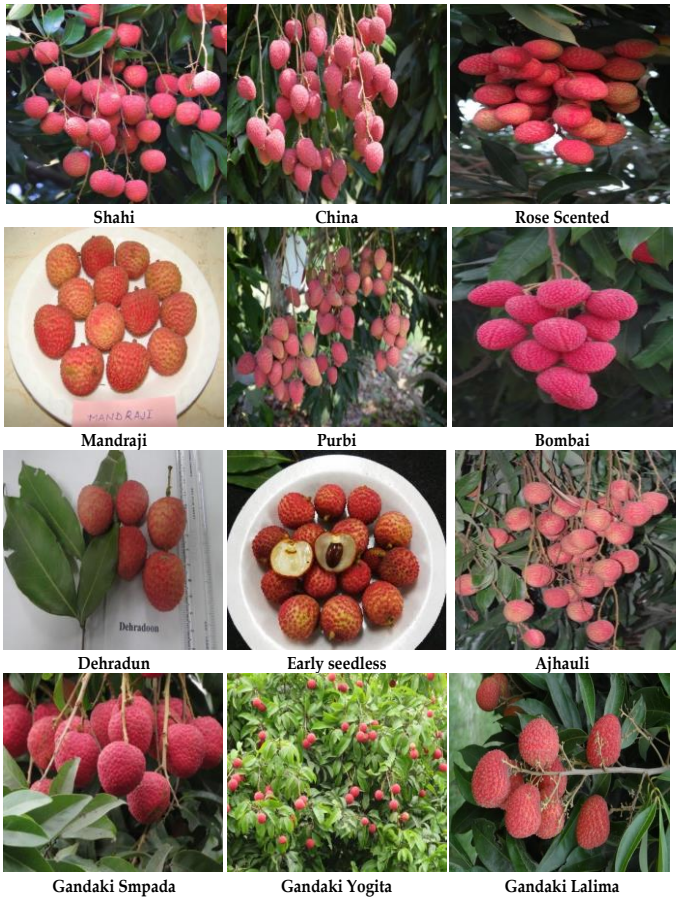
layering. In order to enhance the success of the detached layer, defoliation of leaves up to 50 percent is advocated.

Establishment of orchards

Orchard establishment is a highly specialized activity, which requires proper planning, selection of site, land preparation, layout, planting of saplings, as well as orchard protection and management.

Cultivars

Commercial Cultivars



Planting

Pits 90 x 90 x 90 cm in dimension are dug at the spacing decided for the orchard. Pit opening is normally recommended in April-May to have a sterilization effect for about 3 days. Before the onset of monsoon pits are filled with topsoil mixed with about 40 kg decomposed compost, 2 kg neem/karanj cake, 1 kg bone meal/single super phosphate and 200-300 g muriate of potash. Incorporation of about 2 baskets of soil from the root zone of old Litchi trees encourages the mycorrhiza growth. Planting is done during June to July. At the time of planting a hole the size of ball of earth is made in the centre of the pit at the marked point where the plant is fixed and the soil is pressed to remove air. Watering is done immediately after planting for proper establishment. Subsequently the plant is regularly irrigated till it is properly established.

Spacing and planting system

Square system at a distance of 9-10 m within and between the rows has been practiced. However, planting of Litchi in a double hedgerow system at a distance of 4.5 x 4.5 x 9 m accommodating 329 plants/ha has been found to be the best and gave higher yield of equally good quality fruits up to 16 years of plantation.

Training and pruning

Training of the plant in the initial stage is essential to provide the required framework. Three to four branches 60-75 cm from ground opposite to each other are allowed to form the proper frame of the tree. Non-fruiting unproductive branches inside the canopy in growing and mature trees should also be pruned. Dried, diseased and scissors-shaped branches should also be periodically removed. Light pruning after harvest has been found congenial for better growth, fruiting and yield. While harvesting the fruit the panicle is plucked along with 8-10 cm of twig to promote new flush and better bearing for the succeeding year.

Manure and fertilizer

Among the several factors associated with production of Litchi, balanced nutrition is considered to be the most important which determines productivity and quality. FYM: 60 kg. Application of FYM: 60 kg, 600-800 g N, 200-300 g P_2O_5 and 400-600 g K_2O per plant is recommended for 12–15-year-old trees. Nitrogen and Potassium should be applied in 2-3 splits and P_2O_5 in two splits. Excessive application of nitrogenous fertilizer before flowering should be avoided. Phosphorus application at the time of flower bud differentiation improves flowering and fruiting. In acidic soil application of 10-15 kg lime/tree once in 3 years has been found to increase the yield.

Irrigation, mulching and water conservation

Water requirement ranges from 600-800 mm. Litchi being an evergreen plant, the maintenance of optimum soil moisture is critical for growth, development and fruit production The young plants should be irrigated during dry periods and winter months at intervals of 3-5 days.

Physiological Disorder- Fruit Cracking

The splitting or cracking of fruits is quite common in almost all the Litchi growing areas of India, particularly under dry conditions. Excessive soil moisture aided by fluctuations in temperature and humidity may aggravate fruit splitting. Not much world has so far been done on this problem. However, the following measures are generally considered appropriate to minimize fruit splitting.

1. Regular irrigation in orchards helps in maintaining growth and expression in fruit.
2. In the absence of rain during summer, water spray proves useful in keeping the ambient atmosphere of the fruit unit, as moisture has a good local effect on the fruit against splitting.
3. The Litchi plants should be trained to keep them low headed. Such trained plants with dense foliage, withstand more heat and desiccating winds as compared to tall trees and thus fruit splitting is the list in their case.
4. Varieties which are less prune to splitting should be planted. Early varieties like Dehradun and Saharanpur split more than the mid-season of late varieties.
5. The plants can be guarded immensely against high temperature by sowing Jantar or Arhar along the tree rows or in the periphery of the plant basine. These helps to minimized splitting of fruits, beside protecting fruit trees from vagaries of hot weather.
6. NAA and 2,4,5-T (35-100ppm) are effective in checking fruit splitting and increasing fruit size.

Harvesting of fruits and yields

Maturity standard

Litchi being a non-climacteric fruit requires to be harvested after attaining full maturity on the tree. Studies have been conducted to determine the maturity standard for different cultivars under different agro-climatic conditions. The colour of fruit is an important criterion to decide the harvesting stage.

Harvesting

The fruits are harvested in bunches along with a portion of the branch and a few leaves. At the time of harvesting care is taken to harvest the selected bunch, which has attained the desirable maturity as determined by colour development and taste of the pulp. For distant market fruits are harvested when TSS attains 19° Brix and acidity 0.3 to 0.4 percent. The harvesting period is generally May-June, depending upon cultivar and location. However, in the hills of southern India Litchi is harvested in November-December.

Yield

The yield of Litchi varies according to the age of the tree, agro-climatic condition and maintenance of the orchard. Usually about 80-150 kg fruit/tree is obtained from 14–16-year-old trees. However, from a fully grown tree a yield of 160-200 kg/tree has also been recorded.

Table 2: Cultivars and their characteristic features

Cultivars	Cracking (%)	Estimated Fruit Yield (Kg/ plant)	Length (cm)	Shape Index	Fruit Weight (g)	Pulp (%)	TSS 00 Brix	Acidity (Citric Acid-100g)	Total Sugar (g/100g)
Ajhauli	27.58	72.42	3.48	1.15	15.29	63.13	20.22	0.3	12.53
Bedana	0.24	32.75	3.32	0.94	16.33	70.68	19.33	0.28	10.2
China	0.33	95.33	3.4	1.1	14.77	58.46	20.22	0.29	10.95
Dehra Dun	14.27	67	2.82	1.17	16.77	71.74	20.75	0.41	11.87
Dehra Rose	10.01	74.87	3.34	1.13	19.63	74.12	21.27	0.37	12.19
Deshi	13.63	83.03	3.5	1.18	15.94	66.65	22.82	0.37	13.48
Green	24.44	84.72	3.57	1.27	16.7	61.35	21.42	0.33	11.55
Kasba	0	37	3.78	1.12	25.93	72.23	20.23	0.4	11.24
Late Bedana	0	54.22	3.36	1.06	16.7	75.08	18.17	0.27	10.38
Longia	0	63.85	3.17	1.16	13.84	67.51	19.27	0.28	11.5
Purbi	0.95	80.65	3.31	1.07	20	71.73	20.1	0.29	11.04
Rose Scented	8.85	88.05	3.63	1.16	19.39	69.05	20.37	0.37	12.98
Shahi	12.25	100.3	3.4	1.21	19.47	74.78	22.3	0.38	12.97
Trikolia	12.03	42.37	3.37	1.14	17.35	70.83	22.43	0.36	12.7

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