



IMPORTANCE AND DISTRIBUTION



Litchi (*Litchi chinensis* Sonn.: Sapindaceae) is a sub-tropical evergreen fruit crop which has highly specific climatic requirements. Probably due to this reason, its cultivation is restricted to only few subtropical countries in the world, where it is grown commercially. The major litchi growing countries are China, Israel, Australia, Thailand, Taiwan, India, Vietnam, parts of Africa and at higher elevations in Mexico and Central and South America. World production of litchi is estimated to be around 2.11 million tons, with more than 95% of the area and production share of Asia. A relatively small amount of litchi is produced in the United States, Mexico, and Central and South America. The top five world litchi producing countries are China, India, Taiwan, Thailand, and Vietnam. India and China account for 91 per cent of the world litchi production but it is mainly marketed locally. India enjoys a prominent position in the litchi map of the world both, in terms of production and productivity. Over the years, India has recorded significant growth in production and productivity of litchi, though the trend is not consistent. Both, the Indian and the world markets for litchi are fast expanding.

China is the largest producer of litchi where production season extends from mid May to mid-August. India, where litchi was introduced in the 18th century, is the second largest litchi producer with relatively higher productivity compared to other growing regions having production period from the first week of May to the first week of July. India accounts for about one-fifth of the global production. Taiwan is the third largest litchi producer with a production period extending from June to August. Thailand is the fourth largest litchi producer, with a production season running from April to June. Vietnam is next in the order having harvesting period from May to June. Other notable producers include South Africa, Australia, Mexico, Florida, Hawaii and California. Country wise major litchi cultivars are presented in Table-1.1.

There has been substantial increase in area and production of litchi in the last 50 years. Area has increased from 9,400 hectares in 1949-50 to 74400 hectares in 2009-10. The contribution of litchi to total area under fruit has increased from 0.75 to 1.30 per cent. Increase in area between 1991-92 and 2007-08 (16 years) has been 40.30 per cent, while production increased during the same period is to the tune of 71.67 per cent. Productivity also recorded

Table-1.1: Major litchi producing countries and major cultivars

S.No.	Country	Major cultivars
1	China	Bah Lup, Baitang-ying, Fay Zee Siu, Haak Yip, Kwai May (Red), Lanzhu, No Mai Chee and Wai Chee
2	Australia	Fay Zee Siu, Kwai May Pink, Salathiel, Souey Tung, Tai So and Wai Chee
3	India	Bedana, China, Culcuttia, Late Bedana, Longia and Shahi
4	Indonesia	Local selection
5	Israel	Mauritius
6	Madagascar	Madras and Mauritius
7	Philippines	Sinco, Tai So and ULPB Red
8	South Africa	Mauritius, McLean's Red
9	Thailand	Chacapat, Haak Yip, Kom, Tai So, Wai Chee
10	USA	Brewster, Haak Yip, Kwai Wai, No Mai Chee, Shan Chi
11	Vietnam	Vaithieu

Source: The litchi crop in Asia and the Pacific, Regional Office for Asia and the Pacific, FAO corporate document repository. <http://www.fao.org/docrep/>

an increase of 22.44 per cent during the same period. Evidently, production and productivity of litchi is constantly increasing in the country (Table-1.2).

Table-1.2: State wise Area, Production and Productivity of litchi

State	2007-08			2008-09			2009-10		
	Area (000 HA)	Production (000MT)	Pdy. (HA/MT)	Area (000 HA)	Production (000MT)	Pdy. (HA/MT)	Area (000 HA)	Production (000MT)	Pdy. (HA/MT)
Bihar	29.8	223.2	7.5	30.5	216.9	7.1	30.6	215.1	7.0
West Bengal	8.1	77.8	9.6	8.4	81.2	9.7	8.4	82.4	9.8
Jharkhand	3.3	16.5	5.0	4.3	20.3	4.8	4.3	51.1	12.0
Assam	4.8	34.0	7.1	4.8	34.9	7.2	5.1	39.2	7.7
Punjab	1.5	19.3	12.9	1.5	21.3		1.6	22.4	14.1
Chhattisgarh							3.0	17.8	6.0
Orissa	4.0	12.8	3.2	4.2	13.0	3.1	4.3	17.1	4.0
Tripura	2.6	14.4	5.5	2.8	14.4	5.1	2.8	17.0	6.1
Uttarakhand	8.8	15.1	1.7	8.8	15.3	1.7	9.1	15.7	1.7
Others	6.2	5.3	0.9	6.6	6.2	0.9	5.2	5.5	1.1
Total	69.1	418.4	6.1	71.9	423.4	5.9	74.4	483.3	6.5

Source: Indian Horticulture Database, 2010

Being specific in climatic and soil requirements, litchi has limited distribution. It is grown in the states of Bihar, Tripura, West Bengal, Uttar Pradesh, Punjab and Haryana. Of the total production of litchi in India, 44.5 per cent is contributed by Bihar. The second largest litchi producing state is West Bengal followed by Jharkhand and Assam (Table-1.3). Productivity is highest in Punjab followed by West Bengal and Bihar.

Cultivation intensity of litchi varies even within state. Based on cultivation intensity, the place specific distribution of litchi is given in Table-1.4.

In India, litchi maturity commences first in Tripura followed by West Bengal and then in Bihar. The first and second week of May is the time for harvest in the eastern region, while litchi of Bihar matures in the 3rd-4th week of May and continues up to the first week of June.

Table-1.3: Area, Production and Productivity of litchi in India

Year	Area (000 Ha)	% of total fruit area	Production (000MT)	% total fruit production	Productivity (MT/Ha)
1991-92	49.30	1.70	243.80	0.90	4.90
2001-02	58.10	1.40	355.90	0.80	6.10
2002-03	54.10	1.40	476.40	1.10	8.80
2003-04	53.70	1.10	478.50	1.00	8.90
2004-05	60.00	1.20	368.60	0.70	6.10
2005-06	63.20	1.20	391.10	0.70	6.20
2006-07	64.90	1.20	402.60	0.70	6.20
2007-08	69.20	1.30	418.40	0.70	6.00
2008-09	72.00	1.20	423.00	0.60	5.90
2009-10	74.40	1.20	483.00	0.70	6.50

Source: Indian Horticulture Database, 2010

Table-1.4: Cultivation intensity of litchi in different parts of India

Cultivation	Production areas (District / State)
Concentrated	Muzaffarpur, Samastipur, Vaishali, Sitamarhi and Motihari in Bihar, Dehradun, Udham Singh Nagar and valley of Pithoragarh in Uttaranchal, Saharanpur and Kushinagar in U.P., Ranchi and Hazaribagh in Jharkhand, Murshidabad, Maldah, 24 Parganas and Coochbehar in West Bengal.
Medium concentrated	Darbhanga, Shivapuri and Begusarai in Bihar, West Tripura in Tripura; Ghorakhpur and Basti in Uttar Pradesh, Gumla and Lohardaga in Jharkhand, Sarguja in Chattisgarh, Kangara valley in Himachal Pradesh.
Sporadic	Gurudaspur in Punjab, Kachhar in Assam, Garhwal in Uttaranchal, Ooty and Nilgiri in Tamil Nadu; North and South Tripura in Tripura, Nadia in West Bengal, Panchmarhi in Madhya Pradesh, Angul in Orissa, Ambikapur in Chattisgarh

Source: Litchi: M. Rai, Vishal Nath and P. Day (editors), CHES-IIHR, ICAR, Plandu, Ranchi

Litchi in Uttar Pradesh and Punjab is ready for harvest during the 2nd-3rd week of June. In Himachal Pradesh, litchi of the same cultivar is harvested in the last week of June.

Litchi is known for its taste and flavour and rules the domestic market as “Queen of fruits” during the season. However, set of fruits like mango and grapes dominate the domestic and export trade and have strong competition with litchi fruits during the same season. This can be attributed to numerous factors including research and development efforts, production technologies, infrastructure and institutional support extended by the government policy and cooperation among cultivators for earlier crops. Absence or underplay of similar institutional and infrastructure facilities for a number of other fruits having similar production advantage is responsible for impeding the diversification of the Indian export fruit basket. Litchi is one such fruit, which is widely grown and has a vast untapped potential in the domestic and global market. It offers immense scope to boost exports, through appropriate institutional support and has major demand in Middle East countries. A limited quantity of litchi is also exported to European market. Less than 5% of the world’s litchi production, or approximately 100,000 tons, enters into world trade on an annual basis which is expected to increase in the coming years. During the Indian litchi season (May to June), good quality litchi is not available from other parts of the world except from Thailand (May and June) and Israel (July). In spite of these advantages, India has negligible share (less than 1%) in the world trade.

The fresh fruit market dominates the trade, followed by dried and canned fruit. The main importing countries are the European Union, the United States, Hong Kong, Singapore, Japan, and Canada. The main exporting countries are China, Taiwan, Thailand, Madagascar, South Africa, Australia, and Mexico (Table-1.5).

Table-1.5: Export of litchi from India (Value in lakh and Quantity in tonnes)

Country name	Quantity (2005-06)	Value (2005-06)	Quantity (2006-07)	Value (2006-07)	Quantity (2007-08)	Value (2007-08)
Nepal	143.98	18.98	33.83	9.67	142.74	45.71
U.A.E.	10.40	6.55	17.30	12.69	16.10	13.78
U.K.	0.00	0.00	0.03	0.01	1.22	3.06
Bahamas	0.00	0.00	0.00	0.00	0.84	0.51
Bahrain	13.83	5.68	0.00	0.00	0.42	0.25
Canada	0.00	0.00	0.00	0.00	0.20	0.12
Oman	0.00	0.00	0.00	0.00	0.08	0.05
Saudi Arabia	1.10	0.34	0.00	0.00	0.00	0.00
Vietnam	28.00	17.28	0.00	0.00	0.00	0.00
Germany	0.65	0.08	0.00	0.00	0.00	0.00
Others	520.88	4.45	1609.98	141.99	0.00	0.00

Source: APEDA, Website, 7.1.2009

Litchi is a delicious fruit having aromatic pulp with sweet and acid taste. Litchi is largely preferred as table fruit. It is also used for canning, which has made its impact in international trade. 'Litchi Nut' a dried product of whole litchi fruit is also potential product world wide. High quality flavoured squashes can be prepared from litchi. Litchi is a non-climacteric fruit hence; it is not expected to increase in soluble solids once it has been picked. Depending upon variety and climate, the fruits contain 60% juice, 8% rag, 19% seed, and 13% skin. The moisture varies from 77-83 per cent with variable level of TSS (15.90- 20.10⁰ Brix). The acid content varies from 0.2 per cent to 0. 64 per cent. Litchi is not a significant dietary source of protein (only 0.8-0.9 per cent) and poor source of fat (0.30-0.50 per cent). It is not a good source of thiamine, riboflavin, calcium, phosphorus and iron. It lacks provitamin A. It is a good source of ascorbic acid with a level of 27.8 mg/100 g. The daily vitamin C requirement for the average adult can be met by consuming 14-17 litchis. The consumption of a litchi fruit would meet 2-4% of the dietary reference intakes (DRI) for P, K, Mg, Fe, Zn and Mn and provide 22% of the DRI for Cu. Most of the energy in a litchi is in the form of carbohydrate (sugar). Litchis are high in heart-healthy polyphenols, containing 15% more than grapes, a fruit commonly referenced as high in polyphenols. A new pharmaceutical composition and processes have been prepared for treating and preventing diabetes. The pharmaceutical composition of litchi is composed of three ingredients i.e. Oleanolic acid, Saponins and Kuguasu which is nontoxic. It appears that the high ascorbic acid and sugar content are the chief nutritional constituents of litchi as presented in Table-1.6.

Litchi is said to relieve coughing and to have a beneficial effect on gastralgia, tumors and enlargements of the glands. Chinese people believe that excessive consumption of raw litchi

causes fever and nosebleed. In India, the seeds are powdered and administered in intestinal troubles. Decoctions of the root, bark and flowers are gargled to alleviate ailments of the throat. Litchi roots have shown activity against one type of tumor in experimental animals in the United States Department of Agriculture/National Cancer Institute Cancer Chemotherapy Screening Program.

Now-a-days, many farmers in North India wish to invest in litchi as this crop has ready market, high yield and demand in local as well as export market and can be easily grown in suitable climate. Today, the litchi cultivating areas are being notified as litchi belt for commercial production. In these areas, regulatory norms are being developed to provide safe environment and logistic support system to have better production and marketing as special zone. Litchi is sensitive to the growing environment; therefore, any change in environmental factors severely affects the productivity and fruit quality. In some areas, litchi is the livelihood for many people as it provides both on-farm and off-farm employment. Small and marginal farmers get additional income from litchi plants in their homesteads. Thus, litchi cultivation is the livelihood security for a large population, especially in the state of Bihar. Commercial litchi plantation creates 'a source of job opportunity' for the people associated with growing and managing orchards, harvesting and post harvest handling, packing, transportation, export and value addition. Commercial litchi production is attaining the status of an industry in certain pockets with forward and backward linkages.

On the production side, the major problems are poor plant establishment, less fruiting span, low and irregular yields due to poor flowering and fruit set. Likewise, fruit cracking, browning and rotting of fruits, fruit borer and mite, poor shelf life and lack of suitable varieties with early and late maturity and good quality fruits are some of the factors hindering the growth of litchi industry at commercial scale.

A profitable litchi industry depends on the production capacity of orchards. Lack of proper planning at initial stage and orchard management practices at later part may lead to various kinds of production related problems in the established litchi orchard. Trees must be in position to produce sufficient quantity of fruits every year for market balance. Therefore, it is important that the trees are managed with scientific tree management system. Besides, the crop growing conditions, the cultural practices and the cultivar selection determine the quality of

Table-1.6: Nutritional components of Litchi aril (Food Value Per 100 g of Edible Portion*)

Constituents	Fresh aril	Dried aril
Calories	63.00-64.00	277.00
Moisture	81.90-84.83%	17.90-22.30%
Protein	0.68-1.0 0g	2.90-3.80 g
Fat	0.30-0.58 g	0.20-1.20 g
Carbohydrates	13.31-16.40 g	70.70-77.50 g
Fiber	0.23-0.40 g	1.40 g
Ash	0.37-0.50 g	1.50-2.00 g
Calcium	8.00-10.00 mg	33.00 mg
Phosphorus	30.00-42.00 mg	–
Iron	0.40 mg	1.70 mg
Sodium	3.00mg	3.00 mg
Potassium	170.00 mg	1,100 mg
Thiamine	28.00 mcg	–
Nicotinic Acid	0.40 mg	–
Riboflavin	0.05 mg	0.05 mg
Ascorbic Acid	24.00-60 .00mg	42.00 mg

*According to analyses made in China, India and the Philippines.

litchi at a particular location. Mineral deficiencies, improper water and nutrient management, poor pest management and cultural neglect eventually affect the yield and quality.

The present level of litchi production with increased quantum of post harvest losses due to fast deterioration and lack of quality produce are attributed to be the main reason not to meet the demand as well as economic return to the grower. The major production and post harvest constraints in litchi production in India have been listed as under.

- Slow rate of adoption of improved techniques
- Poor orchard management
- Tendency of imbalance bearing in few leading cultivars
- Incidence of pests and post harvest diseases
- Loss due to physiological disorders
- Difficulty in harvesting as poor status of mechanization
- Low yield potential and decline in quality production of existing orchards
- Greater post harvest losses due to poor infrastructure and market support system

The following factors may cause future problem and loss to any farmer having a litchi plantation, or planning to venture into litchi industry.

- Poor understanding of litchi growth pattern and behavior leading to unscientific plant, pest and produce management.
- Litchi cultivation under unsuitable geographical location and unsuitable cultivars under poor growing conditions.
- Poor orchard planning, such as deciding appropriate spacing based on requirement like high density or regular density, methods of layout, pit preparation, pit mixture and pit filling, improper production or procurement of planting material, odd time of planting, post planting neglect, faulty tree frame and fruiting arms, etc.
- Non adoption of proper orchard management techniques like tree basin and orchard floor management, pruning, weeding, methods for ensuring regular bearing and its further impact on tree health, water and nutrient management methods and schedule.
- Poor skill of pest and disease identification and their management.
- Poor knowledge about maturity standard, harvesting time and method, anticipated production volume at particular time and prices at farm gate, wholesale and retail markets. Unscientific post harvest handlings at field level and at packing house.
- Poor knowledge about methods to withstand the post-harvest abuses of the marketing and distribution process as markets can accept 'only limited quantities'.
- Unawareness of pest clinic information services, directory information services, policy information services and market information services.
- Poor market and transport infrastructure from site of production to place of disposal.

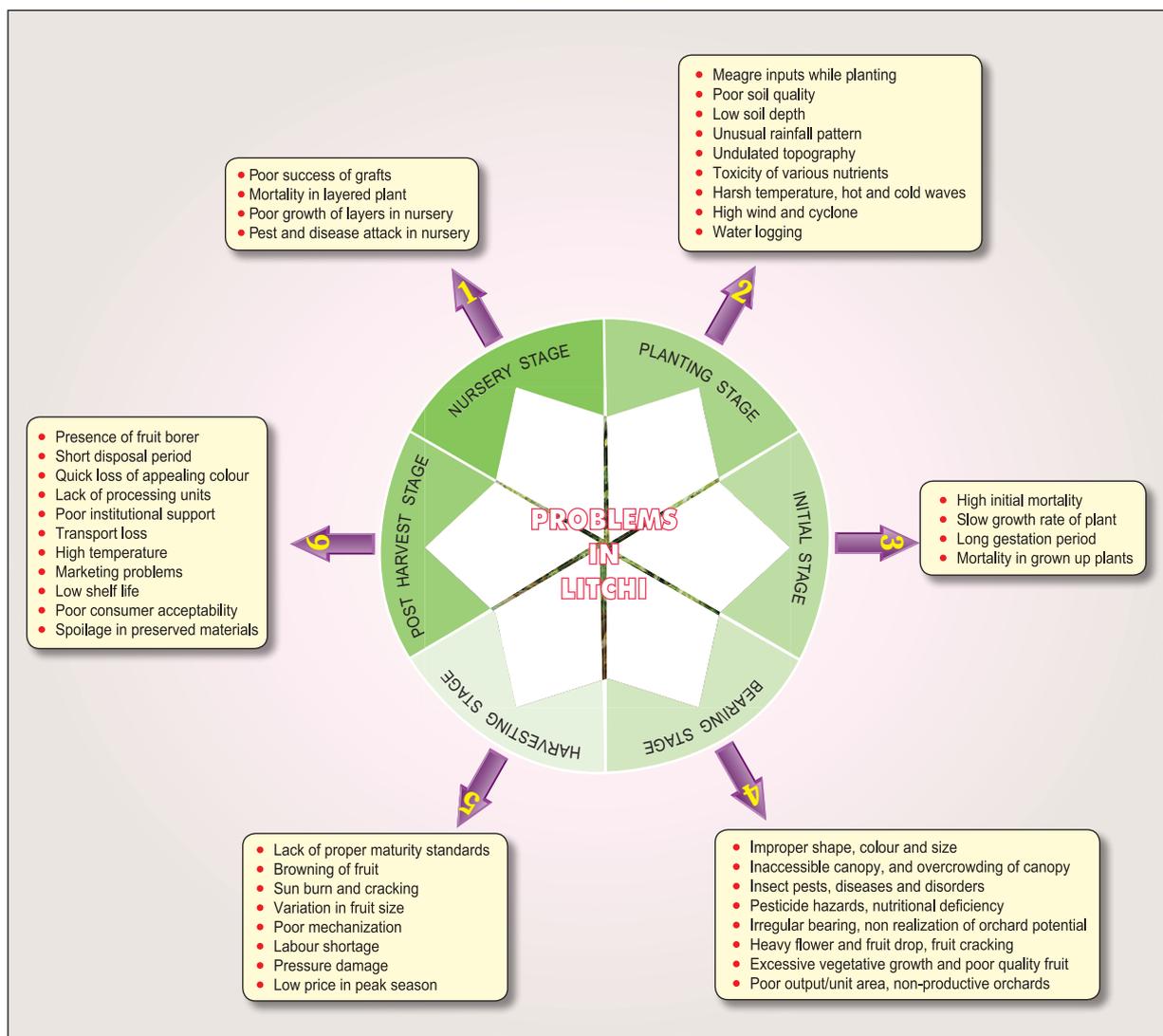


Fig. 1: Probable problems and losses in litchi

- Mounting pressure of climate change and related impact on litchi flushing behaviour and fruiting pattern and quantum.

Considering the importance of this fruit crop in the country, efforts have been made to provide technological support through research and promoting production, post-harvest management and marketing, including export, through various development programmes and schemes. Keeping the constraints that prevail and opportunities that exist in India as a whole and Bihar, in particular, the FAO has initiated a Technology Support Project for ‘Improving productivity and quality of litchi in Bihar’ which has been implemented at cluster level in litchi growing districts of Bihar. Based on up to date knowledge, and experience gained during the implementation of the project an effort has been made to develop this book perceiving the



“good horticultural practices as tools for prevention of problems and losses at later stage” in litchi production. Attempts have also been made to enlighten the readers regarding preventive practices that can be adopted to avoid the losses and curative options that can mitigate the problems. The information furnished in the manuscript is based on the working experience, survey of available literature and applied aspects of core research.