



all about  
**Litchi**

# LITCHI

***Disclaimer*** :The information on performance of recommendations given in this book holds good only when used under optimum conditions. Their performance may either change in due course of time due to several factors or can vary under different systems of management. Mishandling/negligence of the user can also result in damage/loss/non-reproducibility of results. In this regard, HPSHIVA team accepts no legal responsibilities.

Himachal Pradesh Subtropical Horticulture, Irrigation & Value Addition (HPSHIVA) Project, was conceived to harness the potential of horticulture in the subtropical climate area of the state.

The main objective of HPSHIVA project is development of sub-tropical horticulture on commercial lines in cluster approach besides providing sustainable livelihood opportunities to the farmers, who have abandoned their cultivable land because of menace of stray animals, monkeys & wild animals and to the youth population migrating to urban areas to seek wages employment.

The project is being implemented by Department of Horticulture (DoH) and Jal Shakti Vibhag (JSV) as implementing agency with the financial assistance from Asian Development Bank (ADB).

As part of consultancy services under the project, “Package of Practices” for the mandated fruit crops of HPSHIVA Project was developed by a team of experts from Dr. YSP University of Horticulture & Forestry ,COHF- Neri, Hamirpur.

The booklet is an abridged version of PoP developed specifically for **Litchi**.

## Climate

Litchi prefers moist subtropical climate for successful growth and quality fruit production. Such Condition are available at altitudes from 300-900mamsl in Himachal Pradesh. Availability of moisture in the root zone during critical developmental stages is essential for litchi cultivation. Dry weather without rains before flowering induces flower bud differentiation, blossom and consequently give high production. Rainfall during flowering time interferes with pollination and fruit setting. Seasonal variation in temperature is necessary for proper fruiting, but temperatures beyond 400 C will affect strongly the productivity and quality of fruits. Litchi is affected by frost, high temperature accompanied by low humidity and hailstorm causing direct damage to fruit bud and development of fruits. Further, cloudy weather and rain during blossoming period reduce flower development and pollination because of diseases and low activity of pollinators. Temperatures below 00 C can kill young trees, though mature orchards and trees in dormant condition can tolerate light frost but severe frost incidence hinders fruit setting.

## Topography and soil

Litchi can grow on a wide range of soils, however, its growth and yield is optimum in well drained, deep, fertile and loamy soils rich in organic matter with pH 5.0-7.0. Avoid heavy clay soils and water-logging but rocky and compacted soils with impervious layer should not be considered at all. Litchi plants need a continuous optimum moisture regime in the rhizosphere and good aeration in soils. Litchi fruit quality and productions have been associated with good level of zinc and boron in the soil. Under undulated topography planting should be done on tracing and contouring of at least one meter width.

## Recommended cultivars

*Dehradun* : Dehradun is the most suitable litchi cultivar for production of high quality fruits. This variety is mainly grown for table purpose. It is a mid-season variety and fruits start ripening in third week of June in areas adjoining Punjab and Haryana whereas, it ripens in the first week of July in the inner parts of Shivaliks. Fruits are medium in size, obliquely heart-shaped to conical, colour at maturity bright rose pink. Pulp is greyish-white, soft, moderately juicy with TSS 17%.



# Propagation

The most widely used and commercial method of propagation in litchi is air layering.

## Air layering

The best time of the year to propagate litchi by air layering in Himachal Pradesh is July- August.

- Select a healthy terminal branch with a thickness of 1.2-1.5cm on a well developed tree.
- Remove the bark to make a ring of 2.5 cm width on the branch about 40-50 cm below the apical growth.
- Rub off the cambium layer to expose the woody portion of the stem. Apply a paste of 2400 ppm (2.4 g/l) IBA to the exposed area and cover it with a layer of moist moss alongwith well rotten leaf compost and litchi orchard soil.
- Wrap the treated area with a piece of polythene sheet (20×25cm) and tie it well at both ends.
- The roots develop from the upper end of the ring after 45-60 days.
- Remove the layer by making a sharp cut about 5 cm below the lower end of the wrapped area.
- Before planting them in polybags, remove 50% of leaves, place the layers under shade for hardening and irrigate frequently.



Removing of bark and cambium should be kept intact



Media preparation for layering



Air layering



Ditching air layer from mother plant



Removing of wrapping material of air layer



Drenching of air layered ball before shifting to polybags



Shifting air layer



Growing nursery



Saleable plants

# Layout and Planting

## Spacing

Litchi should be planted at 4.0 m x 4.0 m accommodating 625 plants/ha.

## Layout

Square or rectangular planting systems should be adopted in litchi planting. The orientation of rows should be in North–South direction.

## Preparation of field, bed, planting pit and filling

- Deep ploughing should be done and raised bed (2 meter wide at bottom x 1.5 meter wide at top x 45 cm height ) should be prepared one month before planting.
- Planting should be done in pits of 60 x 60 x 60 cm size dug about a month prior to planting and disinfected by intense solar radiation. Each pit should be filled with top soil mixed with farmyard manure (20kg), neem cake (1kg), and single super phosphate (500g). After filling the pit, watering is done to allow soil to settle down.

## Planting

- Place the tree in the hole in such a way that it is slightly higher than ground level to allow for some sink.
- Do not place fertilizer in the planting hole as this can burn sensitive roots.
- Cut some leaves to reduce the rate of transpiration. This helps to reduce the transplanting shock and quick tree establishment.
- Planting should be done preferably during the rainy season but it can also be done during spring with availability of assured irrigation.
- Before planting the plant in the hole a soil from the basin of well growing tree of litchi should be mixed in the surrounding of young plant which contain mycorrhizae culture.
- Young trees need staking for avoiding breakage of limbs by wind. Use 50-80 cm long wooden sticks and tie the main branches with strings. Wooden sticks should be treated with chlorpyrifos @ 2 ml/litre for termite protection.



# Canopy Management

## Training

- Training of litchi tree during the initial stages is essential to provide the desired framework.
- Remove all branches below 30 cm.
- During the second phase, select 3-5 primary branches above 30 cm height in all directions. The selection of primary, secondary and tertiary branches should remain continuous during next three years.
- The orientation of primary branches should be towards periphery in all directions of the canopy at 60° angle with stem.
- Cut branches that compete with the central leader are together crisscross or having less than 45° angle.
- The centre height of plant should be restricted at 3.0 m.

## Pruning

- Pruning in litchi trees has been found effective in terms of increasing productivity.
- Harvesting the fruit with the panicle along with 20 cm of twig induces new flush and improves the next year bearing.
- Besides bearing twigs, light pruning of other branches by heading back upto 20 cm should be done just after harvesting.
- Pruning of centrally growing upright branches should be done periodically (Once in 2-3 years) to facilitate proper aeration and light penetration inside canopy which would help in production of better yield and quality fruits.

## Pollination

Litchi trees produce three types of flower viz. male, female and bisexual. The ratio of flowers vary with cultivar and season. The first flowers to open are male, followed by hermaphrodite functioning as females and pseudo-hermaphrodites functioning as males. It is the hermaphrodite flowers that pollinate and set fruit. Under Himachal Pradesh subtropical climatic conditions, the flowers in litchi trees emerge anytime from late January to March depending on the altitude and location. The flowering in litchi remains for about 21 days. Fruits take 60 days from setting to maturity.

Litchi needs cross pollination and honeybee is the main pollinator. 4-5 beehives (*Apis mellifera*) per hectare should be placed in the litchi orchards for improving fruit set.

## Orchard management

- The raised plant bed should be covered with mulching (plastic or organic mulch) to check the weed population, conserve the soil moisture and regulate soil temperature.
- Preferably organic mulching having 15-20 cm thick layer of uprooted weeds from the field is considered economic and better for production and quality of the produce. Apply mulch to cover the root zone in accordance to the spacing of plantation around the tree.
- Watering needs to be done regularly to maintain the soil moisture regime.

### Intercropping

During the initial five years, the intercropping of different annual crops can be under taken as secondary crop as mentioned in the table to get additional income. The crops with synergy to litchi plants coupled with regional preference should be given priority. These interspaces can be economically utilized by growing suitable short duration intercrops as listed below:

#### Crops for intercropping under high density planting of different fruit crops in sub- tropics of state

S. No.	Name of Crop	Inter Crops	Not be grown as Intercrops
1	Vegetable	Cabbage, Cauliflower, Pea, Broccoli, Radish	Potato, Tomato, Brinjal, Okra, Cucumber, Pumpkin, Bottleguard, Bittergaurd, Parval, Colocasia,Chilli, Capsicum
2	Spices	Turmeric, Ginger, Onion,Garlic, Coriander, Fennel, Fenugreek	—
3	Legumes	Lentil, Chickpea, Horse Gram (Kulth)	Beans, Soyabean, Blackgram (Urd), Greengram (Moong), Kideybeen (Rajmash)
4	Leafy Vegetable	Mustard, Spinach (Palak), Chino podium, Coriander, Fennel, Fenugreek	—
5	Fodder corps	Barley, Oat	Barseem, Jawar, Bajara



## Irrigation management

The efficient application of water to achieve high yields in litchi orchards can be achieved with drip which maintains continuous moisture regime in the rhizosphere. The drip line should be laid out at the time of planting of orchard with two drip lines having two inline drippers at 50 cm apart in each plant basin with 4.5 lph discharge. There should be a control unit/valve for each land holdings.

### Irrigation Scheduling

Month	Irrigation (litres per tree biweekly*)						
	1st Year	2nd Year	3rd Year	4th Year	5th Year	6th Year	7th Year onwards
Jan.	0.75	2.00	4.00	7.00	9.00	12.00	14.00
Feb.	1.00	4.00	6.00	15.00	16.50	18.00	20.00
Mar.	1.30	5.00	12.00	15.00	16.50	18.00	20.00
Apr.	1.50	6.50	14.00	25.00	28.00	30.00	34.00
May	2.00	7.00	16.00	28.00	30.00	34.00	38.00
June	3.50	8.00	18.00	30.00	34.00	38.00	45.00
July **	1.20	4.50	10.00	19.00	22.00	24.00	26.00
Aug. **	1.20	4.50	10.00	19.00	22.00	24.00	26.00
Sept. **	0.75	2.50	5.00	8.00	12.00	14.00	16.00
Oct.	0.75	2.50	5.00	6.00	8.00	9.00	10.00
Nov.	0.75	2.50	5.00	6.00	8.00	9.00	10.00
Dec.	0.75	2.50	5.00	6.00	8.00	9.00	10.00

**\*Approx. Amount of irrigation water may vary by 10-15 percent depending upon soil, climate and prevailing weather conditions.**

**\*\*During Rainy season from July to Sept sufficient rainfall occurs in the subtropics of the state. Therefore, under such situations there is no need of irrigating the crops except failure of the monsoon. In bearing trees irrigation and fertilization should not be given for a period of two months before flowering i.e. mid-November to January which may otherwise interfere with the flowering period.**

## Nutrition management

### Manure

Well rotten farmyard manure should be applied along with 50% P through single super phosphate (SSP) in the basin by band placement during winter months before mid February.

Age of plant (year)	1st	2nd	3rd	4th	5th	6th	7 <sup>th</sup> year onwards
FYM (kg plant <sup>-1</sup> )	10	10	15	20	25	30	35

### Nutrient recommendation

The amount of nutrients to be applied through fertilizers in high density orchard of litchi depends on the age of tree, condition of plant and type of soil. The nutrient dose (g/ tree) should be divided equally among the number of splits and applied:

Age of plant (year)	Nutrient (g tree <sup>-1</sup> )*		
	N	P	K
1 <sup>st</sup> year	45	20	45
2 <sup>nd</sup> year	90	40	90
3 <sup>rd</sup> year	135	60	135
4 <sup>th</sup> year	180	80	180
5 <sup>th</sup> year	225	100	225
6 <sup>th</sup> year	270	120	270
7 <sup>th</sup> year onward	325	150	325

**\*Application of N, P and K should be based on soil/leaf test values.**

Nutrient	After Harvest	Pre- flowering	Flowering to Fruit set	Fruit	Total
	(July- Aug)	(Jan-Feb )	( Mar-Apr)	(May-Mid June)	
N	25%	40%	20%	15%	100%
P	40%	30%	20%	10%	100%
K	25%	20%	25%	30%	100%

## Cropping

- Soil application of chelated micronutrients of 20g borax, 20g copper sulphate, 20g manganese sulphate, 20g iron sulphate, 20g zinc sulphate and 40g magnesium sulphate per tree per year in the month of January-February along with FYM application should be given.
- For better fruit set and cropping, micronutrients should be applied as foliar spray of 0.2% (2g/L) solution of the needed nutrient (fruit set and pea stage).

### Important stages for yield enhancement and quality improvement in litchi

Stage	Month	Details of work					
I	September	light tillage	Pruning of interior plant canopy	–	Need based compost and NPK application on the basis of soil test	–	Dicofol 2 ml/l (2 sprays at 15 days interval)
II	Oct -Dec	light tillage	–	Cypermet hrin 1ml/l (Spray I)	ZnSO <sub>4</sub> 0.2% ,Urea 2% (1 spray)	–	
III	Jan-Feb	–	–	Cypermet hrin 1ml/l (10-15 days after first spray)	–	–	Cypermet hrin 1 ml/l (one spray)
IV	Mar-Apr	light tillage	–	Cypermet hrin 1ml/l	Micronutrient application @ 2ml/l (12-15 days after spray 1)	Borax 2.5 g/l (2 sprays at 15 days interval)	–
V	May-June	–	–	–	Micronutrient application @ 2ml/l	Borax 2.5 g/l	–
VI	June-July	–	Light pruning along with harvesting	–	–	–	–

## Harvesting

- The fruits are harvested in bunches along with twigs having leaves. This enhances storage life of the fruits.
- The harvesting time of litchi is during peak summer season therefore, the fruits are picked early in the morning after drying of the dew.
- The harvested fruits are stored in shade to avoid discoloration.
- Harvesting during the rains is avoided as the wet fruits are damaged early.

### **Maturity indices**

The litchi fruits must be harvested at appropriate maturity time for sending to distant and local markets. Litchi is a non-climacteric fruit and therefore it does not ripen after harvesting. The fruits harvested at immature stage do not ripen properly and develop insipid taste.

- Skin colour is the most reliable criteria for assessment of harvest maturity. The fruit is said to be ready for harvesting when the pericarp becomes uniform red, (just at colour break stage i.e. the orange colour has disappeared completely or almost completely) and the protuberances have become smoother.
- For local market, the fruits should be harvested at full maturity whereas for distant markets harvesting should be done when fruits start developing rose to pink colour.
- At maturity, the tubercles on litchi fruit become less pointed and the fruits attain maximum size.
- The ideal TSS : acid ratio for harvesting of the litchi fruits is 40 or above.

## Yield

The litchi plant initiates fruit production at the age of 3-4 years and the yield increases each year. The average yield of 80-90 kg per tree is obtained from a full grown litchi tree under optimum management conditions.

# Diseases

## Leaf, Panicle and Fruit Blight

Causal organism: *Alternaria alternata*

### Symptoms

- It is an important disease of litchi nursery plants.
- The pathogen also causes panicle blight and fruit blight.
- Initially, the symptoms of disease are difficult to differentiate from potassium deficiency.
- Symptoms appear as light brown to dark brown necrosis on the tip of the leaf
- Later, the necrosis advances towards both the margins of the leaf and the affected leaves dry up completely.

### Disease cycle and Epidemiology

- Pathogen survives in diseased plants debris on which, it can persist for one to two years.
- Conidia formed on crop debris in soil act as primary source of infection.
- The conidia developed on primary spots act as secondary source of inoculum.
- Wind, water and insects help in spread of conidia to the neighbouring leaves\ plants.
- 20-25°C is the optimum temperature for infection by *A. alternata*.



Litchi leaf blight



Litchi panicle blight



Litchi fruit blight

### Management:

#### Cultural Methods

- Collection and destruction of the infected plant debris.
- Follow crop rotation for at least two years

#### Chemical methods

- Spray the crop with Copper oxychloride @3g / litre or Thiophanate methyl @ 0.5 g/litre or mancozeb (2.5g/litre) and repeat at an interval of 10 to 14 days.

## Twig Blight and Anthracnose

Causal organism: *Colletotrichum gloeosporioides*

### Symptoms

- Necrosis of leaves on new shoots, foliar blight and tip dieback are major symptoms.
- The affected leaves give scorch appearance.
- On fruits, brown pinhead lesions appear that later turn to circular dark-brown to black sunken lesions on mature fruits.

### Disease cycle and Epidemiology

- Primary source of inoculum in the spread of the disease is in the form of mycelia in infected leaves, dried twigs and fallen debris. The pathogen can survive saprophytically for a long duration in dead tree parts. Conidia produced in acervulus serve as secondary source in the spread of the disease.
- Prolonged period of rainfall during flowering helps in severe outbreak of the disease.
- The temperature range of 30-32°C and relative humidity 80-95% are favourable for infection.



Litchi twig blight



litchi anthracnose

### Management:

- Spray of Copper oxychloride (3g/litre) or Carbendazim (1g/litre) or difenconazole (0.5ml/litre) or azoxystrobin (0.25 ml/litre)
- Spray of fungicides before harvesting help in extending post-harvest life.

## Fruit Rot

**Causal organism:** *Colletotrichum spp*

### **Symptoms**

Initially symptoms are seen on injured portion of the fruits. The decayed areas get depressed and rot gradually penetrates deep into the pulp. Fruits emit an odour of fermentation.

### **Disease cycle and Epidemiology**

- Primary source of inoculum in the spread of the disease is in the form of mycelia in infected leaves, dried twigs and fallen debris. The pathogen can survive saprophytically for a long duration in dead tree parts. Conidia produced in acervulus serve as secondary source in the spread of the disease.
- Prolonged period of rainfall during flowering helps in severe outbreak of the disease.
- The temperature range of 30-32°C and relative humidity 80-95% are favourable for infection.



**litchi fruit rots**

### **Management:**

#### **Cultural Methods**

- Prevention of physical injuries during harvesting.
- Precooling and maintenance of the optimum temperature and relative humidity during storage and transport of fruits is effective.
- Use of Corrugated Fibre Boxes of 2 kg capacity for stacking for transportation.

#### **Chemical methods**

- Spray of carbendazim (1g.litre) 15-20 days before harvest.



## Root Rot and Wilt

**Causal organism:** *Fusarium solani*

### **Symptoms**

- A slow decline and a sudden death of plant occurs.
- Symptoms can occur in the whole tree or just one or two branches.
- Wilting of branch occurs followed by the decline of new growth on the affected branch in sometime. Tips may die without wilting.
- There can be temporary recovery but subsequent death. Parts of the tree flush and grow, while other sections die.
- Root rot occurs and kills the tree in some areas.
- Internal red discoloration of roots occurs and leaf shed never occurs



**litchi fruit rots**

### **Management:**

#### **Natural/ Biological Methods**

- Apply castor cake or neem cake as manures along with biocontrol agents like *Trichoderma harzianum*, *T. viride*, *Pseudomonas fluorescens* etc.

#### **Chemical methods**

- Drench rhizosphere soil with hexaconazole (1ml/litre) or carbendazim (1 g/litre).
- Do not plant litchi trees on waterlogged soils or in low-lying field.

# Insect Pest Management

There are number of insect-pests infesting litchi. Important insect-pests prevalent in sub tropical zone of Himachal Pradesh are listed below:

**Litchi fruit borer**

*Conopomorpha sinensis*

**Bradley Gracillariidae :Lepidoptera**

## Host

Also known as the litchi stem-end borer in China and the litchi fruit borer in Thailand, is the major pest in most season.

## Life Cycle

- *C. sinensis* lays yellow, scale-like eggs 0.4 x 0.2 mm long on the fruit any time after flowering, as well as on new leaves and shoots.
- Both litchi and longan are affected. The eggs hatch in three to five days, with the larva immediately penetrating the fruit, leaf or shoot. They tunnel through the flesh of the fruit that often fall from the tree.

## Damage:

- Litchi fruit and shoot borer causes losses to fruit and shoot, to the tune of 24-48% and 7-70% respectively.
- The insect damage the newly emerged shoot during the Sept-Oct resulting in failure of shoot to bloom.
- Female moth lays eggs on shoots, flowers buds; calyx and newly emerged caterpillars enter inside the fruit through peduncle and in shoots through cortex region of the new shoot.



**Adult Moth**



**Borer infestation**



**Larvae damage**

## Management:

- Bearing trees should be inspected during early flush development and sprayed if necessary. The leaf flush before flower initiation is very important as it supplies the carbohydrates needed for fruit development. If 30 to 40 percent of the larvae are parasitised, spraying is not recommended. Young, non-bearing trees do not need to be sprayed either. This also allows the parasitoids to build up in the orchard.
- Spray with spinosad (0.25ml/l) or cypermethrin (1ml/l) or indoxacarb (0.25ml/l) or imidacloprid (0.5ml/l) or cyantraniliprole (0.25ml/l) or chlorantraniliprole (0.3ml/l) at pre bloom stage.
- Spray litchi plants at fruit set and repeat spray twice with the pesticides listed above at any interval of 15 days.

**Erinose mite** *Aceria litchi* (Keiffer) Acari : Eriophyidae

*Host*  
Litchi.

*Damage:*

- The mites attack new leaves causing a felt-like erineum to be produced on the under- surface.
- This forms as small blisters but may eventually cover the entire leaf, causing it to curl.
- In severe cases, whole terminals may be deformed.
- The young erineum is silver-white, changing to light brown and dark reddish-brown, and eventually black.
- The greatest numbers of mites are found in the intermediate stages.
- Many leaves are ruined if infestations are severe. This generally causes no problems in established trees, but can debilitate young orchards. There can also be a problem if the mite moves from leaves onto the developing flowers and fruit. Fruit set can be disrupted or the fruit deforms. Such fruit are unmarketable.

*Life Cycle:*

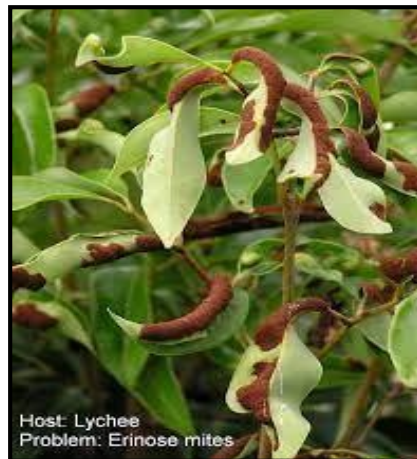
- *Females lay eggs singly on the leaf surface amongst the erineum induced by their feeding.*
- *The eggs are only 0.032 mm in diameter, spherical and translucent white.*
- *The mites are also small, only 0.13mm long and pinkish-white.*
- *All stages have only four legs, but are quite mobile and move easily from old leaves to infest new flushes. Their feeding stimulates the production of the erineum where they shelter and feed.*
- *Numbers vary with the cycle of shoot growth, and are highest in summer and lowest in winter.*
- *Planting material obtained as marcots may be infested if they have been taken from trees with the mites.*
- *Later infestations occur when the mites are moved around the orchard by direct contact between trees, or carried around by orchard workers, wind and bees.*



Microscopic view of Mite



Mite infestation in Litchi



Host: Lychee  
Problem: Erinose mites

Severe infestation of litchi mite



**Management:**

- Numerous species of predatory mites, particularly those from the Phytoseidae, have been recorded with *A. litchii*.
- Branches infested with the mite should be cut off and burnt.
- The mites can be controlled by applying insecticides when they move from the older leaves to a new flush. The leaves should be checked regularly for symptoms over summer and autumn.
- Chemicals recommended include are fenazaquin (0.5ml/l) or fenpyroximate (0.5ml/l) or spiromesifen (0.5ml/l).

# Physiological Disorder

## **Fruit cracking:**

Fruit cracking is dominant disorder in litchi causing 5-70% losses. It is seen in orchards experiencing moisture stress after fruit set and if the drought is severe enough, fruit development is affected.

### *Symptoms:*

- The symptoms may vary from short cracks, generally skin deep to larger ruptures extending to most of the length of the fruit.
- As the underlying aril gets exposed to dry air, it withers rapidly.
- The cracks on the skin may be longitudinal or horizontal

### *Causes :*

- This may occur as a varietal character.
- The disorder is promoted by high temperatures, low humidity and low soil moisture conditions during fruit development. Sharp fluctuations in the day and night temperature coupled with heavy irrigation after dry spells contribute towards fruit cracking.
- Deficiency of nutrient like Calcium and Boron.
- Hot wind during summer and over maturity of fruits.

### *Management:*

- Apply calcium @ 2 g/l as spray and Gibberellins @ 20 mg/l.
- Spray NAA@ 20 mg/litre.
- Constant moisture and appropriate humidity are needed at the time of fruit maturity. Irrigation at 30-40% depletion of available soil moisture is quite helpful in reducing cracking of fruits.
- Installation of drip as well as micro sprinkler below the canopy area has been reported to be effective in reducing the fruit cracking.
- Mulching plays a big role in stabilizing the temperature and moisture level in root zone.
- Planting wind break around the orchard provides protection from desiccating hot winds.
- Boron sprays in the form of Boric acid @ 2g/l at the initial stage of aril development with enough soil moisture in the root zone checks fruit cracking significantly.

## Sunburn

Sunburn also known as lesion browning or pericarp necrosis is a serious problem in litchi producing areas. Climatic factors and cultivars in particular growing areas are determinants for incidence and severity of sunburn.

### *Causes :*

- This disorder is physiologically related with PPO (Poly-phenol Oxidase) activity.
- Sunburn is pronounced in ill managed orchards having sandy or sandy loam soils or light soils receiving/exposed to high temperature (>40°C) and very less RH (<50%)

### *Management:*

- Irrigation at regular interval during the fruit growth and ripening stage reduces the sunburn.
- Planting wind break around the orchard provides protection from desiccating hot winds, thereby reduce sunburn.
- Irrigation through sprinkler system during hot hours increases humidity, cools the orchard atmosphere and thus decreases the incidence of sunburn.
- In light and sandy soil only light irrigation with increased frequency (4-5 days interval) is found beneficial.
- Feeding trees with sufficient quantities of organic manures particularly compost, FYM, cakes, green manure, vermi-compost along with applied irrigation at regular interval during fruit development and ripening stage have been found useful.

## Retarded/ Underdeveloped Fruits

- The fruit size remains smaller than the normal and juice content or aril development is also very poor. This type of fruits remain in glossy pale green in colour for a longer period, and reddish colour appears and drop prematurely.
- Lack of proper fertilization because of less visits of pollinators may lead to improper fruit set and retarded fruit growth. Insect-pests attack and physical jerk also cause retarded or underdeveloped fruits.
- Lack of moisture during developmental stage promotes the development of retarded fruits.

### *Management:*

- Ensure proper nutritional management of orchard.
- Putting enough number of honey bee colonies during flowering to fruit set stage increases fruit set with better fertilization leading to normal and healthy fruit growth.
- Spraying plain water in early morning hours of the day during the advanced stage of growth and development have been found highly effective in better growth of fruit and quality.
- Arrangements of sprinklers system of irrigation has also been found to be effective in reducing this disorder.

# Post-Harvest Management

## Grading

The quality of litchi for export Should be:

- i. Fruit sound, fresh in appearance, clean, free from any visible foreign matter, free from pests and damage and abrasion.
- ii. Should have minimum equatorial diameter of 23 mm.
- iii. Should comply with the residue levels of heavy metals, pesticides and other food safety parameters as laid down by the Codex Alimentarius Commission for exports.

## Packaging

- The litchi bunch must include more than three attached and well-formed fruits. The branch must not exceed 15 cm in length.
- The fruits are packed in wooden boxes, baskets or cardboard boxes for sending to local or distant markets.
- Cardboard boxes are generally used for export of litchi fruits.
- The most commonly used packing size for litchi fruits is 10-20 Kg/ pack. Each bunch inside a box is packed separately

## Storage

- Litchi fruits can be stored at room temperature for 3-4 days, thereafter, the fruits start turning brown.
- The fruits can be stored for 3-5 weeks by packing in perforated polythene bags at 90- 95 % relative humidity.
- Fruits treated with 2% sodium hypochlorite can be stored satisfactorily in perforated polythene bags at 0-300 C for 25 days.
- Controlled atmosphere storage (3-5% O<sub>2</sub> and 3-5% CO<sub>2</sub>) reduces skin browning and slows down the losses of ascorbic acid, acidity, and soluble solids. Exposure to oxygen levels below 1% and/or carbon dioxide levels above 15% may induce off- flavors and dull grey appearance of the pulp





For more details contact:

**Project Management Unit (PMU) HPSHIVA**

Directorate of Horticulture,  
Department of Horticulture, Himachal Pradesh,  
Navbahar, Shimla, 171002 (India)

Tel : (0177) 2841120

E-mail: [pmuhpshiva@gmail.com](mailto:pmuhpshiva@gmail.com)

