



FRUIT MATURITY AND HARVEST



Litchi is a non-climacteric fruit and therefore it is advantageous to pick fruit soon after it reaches maturity. This also ensures that fruit has the maximum shelf life. Fruit left too long on the tree, until it has already started to soften, does not travel well and lacks shelf life. Immature harvested fruit shrivels and softens but does not develop flavour, and is either rejected at the market place or receives very low prices. The standards of fruit maturity have been developed.

Litchi harvest criteria can vary with local consumption patterns and distance to the market. Time from flowering combined with fullness of colour is the most common criteria. Producers must decide whether to harvest as soon as the market price ensures a reasonable return, or to leave the crop in the field to obtain maximum profit. However, litchi crop does not permit longer waiting period as it may drastically shorten the marketable life of the produce and lower the sale price. This balance is a critical factor in determining the grower's income from the crop. In practice the total harvest period is very short and the grower has very little time to make the correct decision. Litchi takes about 3 months from the time of fruit set to mature and ripen. Some varieties may take 3-3.5 months. More precisely, a heat unit submission of 1500-1650 GDD has been found sufficient for litchi maturity. If picked immature, fruits develop lower amounts of Brix, acid ratio, taste and flavour, whereas over-mature fruits lose their storage life. It is therefore, desirable to pick the fruits at the correct stage of maturity to facilitate ripening, distant transportation and maximum storage life, and thus to increase their quality and market value.

Maturity Indices

Litchi harvesting is always a delicate task. Since the fruit is not climacteric and maturation virtually stops as soon as it is harvested, therefore, if picked too early, colour and sugar/acidity ratio, both vital factors where fruit marketing and flavour are concerned, will suffer. The later the fruit is harvested the larger the edible part and the higher the total mass. Level of acidity

will drop significantly and the fruit may become rather tasteless. Following criteria may be followed to ascertain the litchi maturity.

- Skin colour is usually a determinant of ripeness. The fruit is said to be ready for harvesting when the pericarp is a uniform red, (just when the orange colour has disappeared completely or almost completely, except in the case of cultivars which produce yellow or green fruit) and the protuberances have become smoother. In varieties which produce red fruit, these should be an even deeper red at harvest time.
- A useful test of ripeness is to check the colour of the inner surface of the skin, which should also be red. Class of surface redness is prime method to judge the fruit maturity. The youngest fruit (<33 per cent red) and the oldest fruit (100 per cent red) have lower aril concentrations of total soluble solids and higher pericarp superoxide dismutase activity than intermediate fruit. The youngest fruit also have higher rates of water loss than older fruit.
- Testing is another way of determining whether the fruits are ready for picking. As litchi fruit mature, the concentrations of sugars, principally those of sucrose, glucose and fructose increase, while the concentrations of organic acids, predominantly malic acid decrease. Other criteria used to determine the correct harvest time are minimum fruit weight and the sugar/ acidity ratio. These two criteria vary depending on the cultivar and the country or climatic area in which it is grown.
- The most reliable guide to maturity is titratable acidity (TA) or the ratio of total soluble solids (⁰Brix) to titratable acidity. Recommendations vary, but a TSS:TA of 40 or greater is recommended for commercial fruit. In practice, however, most orchards of litchi are harvested on the basis of taste and general appearance.
- The flattening of the fruit segments on the skin is a good way of telling when the fruit are mature (Fig. 17.1). Over-ripe fruit are sweet, but bland. Indices used to judge maturity include fruit size, skin colour or texture, the aril sugar: acid ratio (18-21⁰ Brix), and flavour.

Harvesting

The objective of harvesting is to get the crop without damage and to send it to the market in the best possible condition. Thus, the objective is to move the crop from field to market with the minimum number of handling operations compatible with the quality requirements of the buyer; and to minimize exposure of the crop to stresses such as extremes of temperature, or of compression pressures caused by over-loading.

Although the scale of production, availability of labour and type of produce may vary, certain basic factors must be taken into account in the planning of litchi harvest operation. Equipment must be obtained, labour organized, marketable produce identified and provision of collection and removal from the field is made. Each of these tasks must be planned, managed and implemented efficiently if the value of the crop is to be fully realized.



Fig. 17.1: A mature litchi bunch ready for harvest

- **Good production planning** to ensure that crop maturity coincides with market demand. This can be achieved by proper care while selecting the variety and proper orchard management.
- **Continuous communication with buyers** to ensure exact requirements as harvest time approaches, and to let the buyers know the best time of harvest and expected quality.
- **Forward planning** to coordinate equipment, labour and transportation facilities.
- **Field supervision** to enhance the work efficiency at site. The efficiency of the harvesting operation itself depends upon the use of experienced or trained staff, and the adoption of methods which will meet the buyers' requirements. Good management of the harvest operations is usually reflect in the speed at which produce moves from field to market place, packing station or storage centre.

Training Workers for Harvesting

Training and supervision of labour are critical to a successful harvesting operation. Constant supervision is necessary to maintain quality and reduce subsequent spoilage of produce. Training is required in both general principles and crop specific techniques relating to maturity selection, maintenance of equipment, field hygiene and division of labour. Some of the more important areas are:

- Teams of workers must work systematically through a plot or field, experienced staff removing the crop and others carrying it to collection points. If crops are relatively inaccessible, as with older litchi, great care must be taken by pickers climbing on the trees if fruit is to be harvested free of damage. For this, planting densities and pruning techniques should be followed which minimize tree size.
- It is essential that crops should be harvested at the correct size and maturity for the market. The workers must be given strict specifications before entering the field and their performance supervised carefully.
- During long harvesting sessions, some individuals develop habits of slapping, pressing and rubbing produce. Others become tired and start to throw or drop produce into field containers. Such practices can cause damage to the produce and should be controlled by checking performance, by restricting the lengths of work shifts and by promoting comfortable working conditions.
- Sharp edges on rings and bracelets, and long fingernails, are significant cause of post harvest abrasions and should be removed before harvesting starts.
- Unmarketable produce must not be left in the field to rot and contaminate healthy standing crops. Routine collection of waste is an important part of the harvesting operation and all workers can contribute to this. Cleaning, sterilization or replacement of picking containers must be carried out regularly to prevent the build-up of infection.
- Each individual should be issued once only with necessary equipment and given clear instruction and training in its maintenance. It should then become that individual's responsibility to keep knives and clippers both clean and sharp and to keep other equipment such as boxes, poles, nets and bags in a good state of repair.

Harvesting Time

The time harvest of litchi in a particular day depends on the availability of transport and other facilities, weather and environmental conditions as well as market demands. The factor which assumes greatest importance depends upon the crop and the local situation.

- Most favourable condition for harvesting is early in the morning. In some areas, where markets need night transportation, it may be advisable to avoid harvest during the middle of the day.
- Keeping harvested produce in the field for long time leads to deteriorate rapidly unless specialized facilities are available.

- If the crop is to be transported to a relatively distant market, storage centre, packing station or processing facility and harvesting should be timed to allow for delivery at a convenient time.
- Harvesting can only take place when sufficient labour of the required skill and strength is available therefore manpower should be arranged adequately. Harvesting early in the morning or late in the afternoon maximizes fruit water content and reduces the risk of desiccation.

Fruit Picking

- To obtain the best quality fruit, trees with proper ripening must be selected. In peak season, most fruits can be picked from a tree in one harvest and all trees of one cultivar in an orchard may be harvested within 8-10 days. If fruits are allowed to reach a good state of ripeness or if bags have been placed around the clusters, each panicle can be cut from the tree as one.
- Harvesting may be carried out by removing whole panicles using secateurs.
- Fruits are best harvested using clippers, and placed in harvesting bags carried by the harvester.
- Picking platforms and ladders are used to reach higher fruit, and where trees are propped up, the props could be used as supports to help workers engaged in harvesting. Litchis should always be handled with care, although the skin is fairly rough, the slightest blemish could mean a loss of commercial value.
- Pulling out of bunches during harvesting has to be avoided because broken skin at the point of attachment of the branches is particularly susceptible to a decay condition. Injury caused by rough handling contributes to fast rotting and fungus infection. If harvested clean, the produce should be kept clean and not stacked on the soil, even momentarily. Clean the crates and equipments regularly in detergent.
- After rain, postpone harvesting for at least three hours of sunshine to dry out fruit as skin is susceptible to handling marks after rain.

Crates and Containers

- Harvested produce may be transferred from the harvest containers into field containers, for transport to a packing house, or to local markets.
- Wooden crates are made of boards or slats, with a capacity of up to 25 or 50 kg for manual handling, can be used to shift the produce.
- Plastic crates are now in common uses. Most are made from high density polyethylene which contains ultra-violet inhibitor (UVI), which extends the life of the container when it is exposed to sunlight. Plastic returnable crates have a longer life than wooden ones
- Sacks, plastic bags and net bags made from natural or synthetic fibres are also used where produce is transported directly from grower to market. They are relatively cheap

and require little storage space and usually provide good ventilation to their contents. However, they give little protection to their contents and when made from synthetic fibres tend to disintegrate when exposed to sunlight.

Harvesting Period in India

Litchi distribution in India has cascading production pattern commencing from the east, and spreading to the west. Litchi production commences during the first week of May in Tripura, while litchi in Bihar matures by the third week of May and continues up to the second week of June. Litchi in Uttar Pradesh and Punjab is ready for harvest during the 2-3rd week of June, while in Himachal, it comes to harvest by the last week of June, thereby extending the total season of its availability to over two months in a year. Fig. 17.2 depicts the harvesting period of litchi in India.

STATE/UT'S	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Tripura												
Assam												
West Bengal												
Bihar and Jharkhand												
Uttarakhand												
Punjab and Himachal Pradesh												

Fig. 17.2: Harvesting period of litchi in India