



Peaches or Nectarines

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Introduction

Nectarine (*Prunus persica* L.) Batsch, smooth skinned peach belongs to the genus *Prunus* and subfamily Prunoideae of the family Rosaceae. The cultivated peach is diploid and has a chromosome number of $2n = 2x = 16$.

Origin, History and Distribution

Peaches are thought to have originated in China, its literature dates back to 1,000 B.C and it was probably carried from China to Persia. A genetic variant of common peaches, the nectarine was most likely domesticated in China more than 4,000 years ago (Salunkhe and Desai, 1984). It was first domesticated and cultivated in the region between Terrin basin and the north slopes of the Kunlun Shah Mountains (Janik, 2003).

Area and Production

Peach is grown throughout the temperate regions of both Northern and Southern hemispheres but can also be grown in the subtropical regions with the development of low chilling peach cultivars (Kuden, *et al.*, 2004). The major contributors of nectarine production are Spain, Italy, France and USA. In India peaches are commercially grown in temperate regions (J&K, Himachal Pradesh, Uttarakhand), subtropical regions (Punjab, Haryana, Uttar Pradesh) (Lal, *et al.*, 2016). It is the most important temperate fruit crop of India with an area 19,000 ha and production 114,000 MT (Anon, 2018). In Punjab, it is largely cultivated in Amritsar, Gurdaspur, Hoshiarpur, Jalandhar, Ludhiana, Moga etc.

Nutritional content

Peach has an important place in human

nutrition (Zhao, *et al.*, 2015). The edible portion of one nectarine fruit of 100 g provides 86 g moisture, 1.2 g protein, 0.3 g fat, 10.5 g carbohydrates, 1.2 g crude fibre, 0.8 g minerals, 15 mg calcium, 41 mg phosphorus, 2.4 mg iron and 50 Kcal of energy (Gopalan, *et al.*, 1989). There is a good correlation between total phenolic compounds and antioxidant activity among peaches. Furthermore, the contribution of phenolic compounds and anthocyanins to antioxidant activity is much more important than the contribution of Vitamin C or Carotenoids (Vizzotto, 2007).

Importance and Uses

The fruit is generally consumed fresh but can also be processed in the form of jams, nectar, juice, squash, beverages and sliced or dried products, etc. Peach is a good source of ascorbic acid (vitamin C), carotenoids (provitamin A) and phenolic compounds that are powerful antioxidants known for strengthening the immunity (Tomas-Barberan, *et al.*, 2001). The peach also contains phytochemicals such as carotenoids, anthocyanins and phenolic acids (Weinert, *et al.* 1990). It is rich in fibers that helps in digestion of food and prevent constipation and also fight against abdominal ailments. It contains minerals like potassium that helps in managing the blood pressure levels. Peach fruit also stimulate gastric secretion, facilitate digestion and are recommended in reducing blood cholesterol level (Gasparatto, *et al.* 2014).

Botany

The botanical characters of peach are almost similar to that of almond. It is a low headed tree with glabrous twigs. Leaves are



broadly lanceolate, sharp serrated, shining above and somewhat lighter beneath. The petiole is usually gland bearing. Flowers are solitary, pink and appearing before the leaves. The sepals are more or less pubescent on outside. The fruit is soft at maturity. The stones are deep pitted and very hard.

Flowering and Fruiting

The flowers in peach are perfect, solitary, sessile and pink in colour. Flowering starts in the first week of February and continues till the end of February. Peaches are pollinated through insects. The mode of pollination is homogamy. Fruit setting starts in the beginning of March. Fruits are usually borne on one year old growth and also borne on short lived spurs.



Flowering in Punjab Nectarine



Flowering in Peach

Difference between Peach and Nectarine

The major difference between the peach and nectarine is that the nectarine has smooth and fuzzless skin, while the peach has fuzzy skin (McGregor, 1976). Moreover, the expression of a recessive allele is thought to be responsible for the smooth skin of nectarine fruits, which lack the fuzzy trichomes characteristics of peach fruits (Lill, *et al.*, 1989). When peaches are crossed or self pollinated, resulting seeds that carry the recessive allele for smooth skin will give rise to nectarines, while those that carry the dominant allele will be peaches.

Types of fruit

On the basis of the separation of the stone from the flesh, the varieties of peaches and nectarines can be divided into categories like freestones, clingstones and semi clingstones (Slingerland and Miles, 2009). In the freestone types, the flesh separates readily from the pit whereas, in the clingstone types, the flesh clings tightly to the pit and its colour varies from milky white to yellow. The freestone types are usually preferred for eating or for freezing, while clingstone types are used primarily for canning. In addition, based on the amount of softening of the flesh, peaches and nectarines can be either of a melting or non-melting type. Peach is a fleshy fruit consisting of a thin exocarp or skin, fleshy mesocarp and lignified endocarp (pit or stone) that encloses a seed (Brady, 1993). Botanically peach fruit is classified as a drupe, since during its development the endocarp undergoes a hardening process by secondary cell wall formation and lignin deposition.

Growth Curve in Peaches

Peach fruit development follows double sigmoid curve which consists of four phases (Tonuttiet, *et al.*, 1991). The growth curve starts after pollination and fertilization. The initial stage (S1) is characterized by a rapid growth and it is marked by a high rate of cell



division and elongation. In the next phase (S2), the endocarp starts becoming hardener to form the stone (Dardick, *et al.*, 2010). There is no net increase in fruit size at this stage. During the third phase (S3) an exponential growth of the pericarp occurs again, which is the consequence of an increase in the cell division. In the last stage (S4), the fruit reaches its final size and ripening starts. S4 consist of S4-1, in which fruit gets its final size and S4-2, when the fruit ripens in an ethylene dependent manner. S4-2 is the only stage that can take place even when fruit gets detached from the tree (Borsani, *et al.*, 2009).

Climate and Chilling Requirement

Peaches are mainly grown in midhills at a height of 1,000-1,600 meters above sea level. Peaches thrive well in the wet and humid climate with cold winter and dry summer. Peach is one of the most genetically diverse deciduous fruit species in the world and about 100 new peach and nectarine cultivars have been introduced per year over the last 10 years (Sansavini, *et al.*, 2006). The predominance cultivars of peach require chilling period of 200-850 chilling hours at or below 7.2°C for breaking the dormancy and usually flourish in the spring. Availability of chilling temperature for 100-300 hours during winter months is enough to break the dormancy of low chilling cultivars (Nijjar and Khajuria, 1979).

Soil conditions

Peach grow best in well drained and fertile soil. Loamy or sandy loam soil is considered best for successful cultivation of peach. The pH of the soil should be between 6 to 8. Heavy soils are hazardous as it makes heavy growth and results in winter injury. Moreover, poorly drained soils resulted in short duration trees with low yield crop and high cost of production.

Propagation and Planting

Peaches are commercially propagated by budding and grafting. T-budding is commonly

used among the budding methods. However, if stock and scion are of the same size, tongue grafting is recommended. Budding can be done from April to September and grafting is done during the dormant season i.e., in December-January, before the scion and stock start sprouting. Peach should be planted in the end of January when the plants are dormant. Peach plants should be planted at the distance of 6.5 meters apart.

Raising of Rootstock

Rootstock for peaches is raised from the seeds of desi peach trees. The seeds of Flordaguard, Sharbati and Khurmani are also used to grow the rootstock for peach propagation. Peach trees can also be raised on peach almond hybrid, apricot, almond and plum seedlings.

Irrigation

The critical stage of irrigation for the peach trees is fruit development period, as it starts after fruit set in March and continues during April to May till maturity depending upon the variety.

Manuring and Fertilization

The proper balance nutritional schedule is important for peach trees to maintain the tree health and productivity. In Punjab, 25 kg FYM, 500 g N, 250 g P₂O₅ and 500 g K₂O per tree to full grown tree of 5 years and above.

Training

The peach tree is trained according to the Modern Leader System. But Open Centre System may be recommended for admitting more light for better colouration of the fruits that are inside the canopy of tree.

Maturity Indices of Peach

Increasing maturity levels at harvest are characterized by decreasing flesh firmness, green colour, acidity and ascorbic acid as well as increasing yellow colour, sugars and total soluble solids (Kader, *et al.*, 1982). The



dominant acid present in peaches is malic acid and citric acid (Dhillon 2013). The major soluble sugars found in the peach are sucrose, glucose, fructose and sorbitol and these consists of about 75% of the peach soluble sugars (Cirilli, *et al.*, 2016). The total sugars content increases continuously during peach development up to full maturity and later on decreases slightly (Borsani, *et al.*, 2009).



Peach fruits (Pratap)



Punjab Nectarine fruits

Harvesting

It is a climacteric fruit, which has its ripening process controlled by the production of ethylene, a hormone with a series of specific genes which produce changes in the chemical composition and the physical characteristics of the fruit (Grierson, 1987). The peak harvesting period of Peach cultivars in plains is from early May to mid of June and in hills is from June to July. Peach is a perishable fruit well known for its poor shelf life. It does not stand long transportation and sustains

considerable transit loss. Harvesting at the proper stage of maturity is essential for optimum fruit quality and fetches better premium to the growers as well as ensure quality product to the consumer. Nectarines and peaches have to harvested when mature, but not ripe, to permit the long distance transport with minimal injuries.

Conclusion

Peach is the third most important temperate fruit in India and has a good position amongst the stone fruits. With the introduction of low chilling cultivars, the peach crop is becoming popular in sub-tropical plains of North India. This crop grows well in wet and humid climate having cold winter and hot summer. The fruits of nectarine usually develop proper colour many days prior to ripening. Consequently, the grower and the fruit contractors start harvesting the fruits erroneously at that stage, thereby resulting in marketing of poor or inferior quality fruit and high spoilage and shrinkage of fruit during storage. Conversely, the delay in picking results in over-maturation, deterioration of quality and ultimately leads to spoilage of fruits. Over-ripe fruits are extremely susceptible to mechanical damage and decay.

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