# Peach cultivation technology

# SCIENTIFIC CLASSIFICATION

- Scientific name: *Prunus persica*
- Family: Rosaceae
- Origin: China or Persia
- Chromosome No. : 2n=16
- Common name: Shanti, Nirudho, Amaithi
- Kingdom: Plantae
- Order: Rosales
- Genus: Prunus
- Subgenus:Amygdalus
- Species: *P . persica*

# Introduction

- Introduction of the cultivated peaches probably took place in the latter half of the 19th century.
- Important historical peach-producing areas are China, Japan, Iran, Turkey, and other countries in the Mediterranean region, where they have been grown for thousands of years. More recently, the U.S.A., Canada and Australia have also become important.
- Oceanic climate areas like the Pacific Northwest and the British Isles are generally not satisfactory for peach growing due to inadequate summer heat, though they are sometimes grown trained against south-facing walls to catch extra heat from the sun.
- Today, it is being grown in the midhill zone of the Himalayas extending from Jammu and Kashmir to Khasi hills 1000-2000 m above mean sealevel
- It is also being grown to a limited scale in the hills of south India and in the north-eastern region of the country. Besides, low chilling peaches are grown in sub mountainous region and Punjab, Haryana, Delhi and the Western Uttar Pradesh.

- *Prunus persica* grows to 4–10 m (13–33 ft) tall and 6 inch (Stem) in diameter.
- The leaves are lanceolate, 7–16 cm (2.8–6.3 inch) long, 2–3 cm (0.79–1.2 inch) broad, pinnately veined.
- The flowers are produced in early spring before the leaves; they are solitary or paired, 2.5–3 cm diameter, pink, with five petals.
- The fruit has yellow or whitish flesh, a delicate aroma, and a skin that is either velvety (peaches) or smooth (nectarines) in differentcultivars.
- The flesh is very delicate and easily bruised in some cultivars, but is fairly firm in some commercial varieties, especially when green.
- The single, large seed is red-brown, oval shaped, approximately 1.3–2 cm long, and is surrounded by a wood-like husk.
- Peaches, along with cherries, plums and apricots, are stone fruits (drupes).

# Uses

- It is rich in proteins, sugar, minerals and vitamins.
- Peach is a delicious, juicy and highly palatable fruit.
- It is a rich source of vitamin A, iron and protein.
- The fruit is generally consumed fresh but delicious squash can also be prepared.
- The fruit of some choice varieties can be canned with good success. The cultivars Shan-i-Punjab and Flordared are suitable for canning.
- The peach often plays an important part in Chinese tradition and is symbolic of long life.
- Freestone peaches are sold fresh, and clingstones are virtually all canned.
- About 98% of nectarines are marketed fresh.
- The utilization breakdown is as follows Fresh - 45-55%, Canned - 35-40%, Frozen - 5%.

# Climate

- In India, peach is mainly grown in mid hills at a height ranging from1000-1600 meters above sea level and certain varieties that are grown in subtropical areas require only 250-300 hours of chilling during the year for proper flowering and fruiting.
- Peaches do well in wet and humid climate with cold winter and dry summer.
- The varieties of superb quality and good taste do not grow well in plains, because their chilling requirements are not met with.
- They also require protection from hot desiccating wind. On the other hand peaches do not grow well where winter temperature falls below the freezing point as it gets injured.
- The cultivar Flordasun has low chilling requirements of about 300 hours only at or below 7.2 °C.
- The annual rainfall of 45 cm is sufficient for peach. Spring frost is more harmful for peach cultivation.

# Soil

- Deep sandy loam soil rich in organic matter is best for its successful cultivation.
- Peaches are highly susceptible to water logging and prefer perfect drainage.
- Fertile and heavy soils are hazardous as it makes heavy growth and hence results in winter injury.
- The pH of the soil should be between 5.8 to 6.8.
- Acidic and saline soils are unfit for peach cultivation.

# Varieties

There are thousands of peach cultivars worldwide, and far more are cultivated in economic quantities than for many other tree fruits. Cultivars fall into one of three major groups:

(1) Nectarines:

- The nectarine is a cultivar group of peach that has smooth, fuzzless skin. Though grovers treat fuzzy peaches and nectarines as different fruits, they belong to the same species.
- Nectarines have arisen many times from fuzzy peaches, often as bud sports.
- Nectarines can be white, yellow, clingstone, or freestone.
- Regular peach trees occasionally produce a few nectarines, and vice versa.
- Labeled and marketed differently from peaches, nectarines are simply fuzzless peaches.

(2) Freestone peaches:

- Fresh market peaches.

(3) Clingstone peaches:

- Used primarily for canning.
- The adherence of the flesh to the stone doesn't affect canning quality, but firm flesh texture is linked to the clingstone trait, so clingstones are used for canning.

# LOW-CHILL PEACH CULTIVARS

- Florada prince
- UF Gold
- Tropic Beauty
- Floradaglo

# PEACH VARIETIES RECOMMENDED FOR DIFFERENT STATES:

| State | Early | Mid season | Late |
|---|---|---|---|
| HP | Alton, World's Earliest, Early White Giant, Redhaven, Stark Red Gold | July Elberta, Kanto 5, Shimizu Hakuto, Sunhaven | J.H. Hale |
| J & K | Peshwarj, Quetta, July Elberta, Saharanpur Prabhat | J. H. Hale, Alexander and CO Smith | |
| U P (Mid hills) | Early Candor, Redhaven, Sunhaven | July Elberta, Alexander, Crawford Early | Parrot Delux, J. H. Hale, |

- In midhills of Himachal Pradesh Stark Earlyglo, Stark Early, White Giant, Starting Delicious and Candor are new promising varieties.
- In subtropical regions of north India Floradasun, Dawn Rambler and Dawn Rose are grown.
- For tarai region of Uttar Pradesh; Safeda Early Cream and SRE 6 for; and Prairie Dawn are cultivated. Pratap:
- It matures in 76 days, a week earlier than the Flordasun cultivar.
- The colour of its fruit is yellow with red blush and flesh colour is also yellow with red coloration.
- It yields 70 kg fruits/ plant and its average fruit weight and keeping quality are better than Flordasun. Also its trees remain smaller in size as compared with Flordasun.

**Flordasun:**

- The tree is vigorous and comes to bear within two years after planting in the field.
- It is a free-stone variety with yellow flesh.
- The fruit is medium in size (4-5 cm in diameter) and weighs about 80 g.
- It has excellent flavour, attractive akin colour and ripens evenly at lip and suture.
- The average yield is about 75 kg/tree/year.

**Shan-i-Punjab:**

- This is another early cultivar, maturing in the first week of May.
- Tree is vigorous in growth.
- It produces large fruits of 5-5.5 cm diameter, weighing about 90 g each.
- Colour of the fruit is yellow with red blush, juicy and sweet, with excellent taste, and free-stone.
- The fruit is quite firm in texture and can withstand transportation.
- In addition to its table use, this cultivar is suitable for canning. The average yield is about 70 kg/ tree.

## Floradared:

- It is an excellent mid-season table peach maturing in beginning of June.
- Tree is vigorous in growth fruit large, almost red at maturity, juicy with soft white flesh and free-stone.
- The average yield is about 100 kg/ tree.

## Sun Reel:

- A smooth skinned peach, which matures in middle of May and is, therefore, quite early.
- Fruits almost red in colour, very attractive but smaller in size.
- The flesh is firm, yellow and free stone. Like the cultivar Shan-i-Punjab, fruits of this cultivar can withstand transportation and are quite suitable for canning in addition to their suitability for table use.

## Sharbati:

- The tree is spreading and vigorous.
- Fruits are large, greenish yellow with rosy patches, very juicy with excellent taste and flavour. Ripens in the first week of July.
- The average yield is about 100 to 120 kg/ tree.

## Khurmani:

- The tree is medium and upright in growth.
- It blooms in early February and fruit ripens slightly earlier than Sufeda.
- The fruit is large with while, soft and juicy flesh.
- Fruits weight about 70 g and is attractive with red colouration and is also slightly pointed at base.

- Peach is commercially propagated through grafting or budding.
- Peach seedlings are generally used as rootstock.
- The plum, apricot and almond seedlings may be used. Some nurseries also use Behmi (*P . mitra*) as rootstock for peach.
- The wild species produce more vigorous and hardy seedlings than the cultivated varieties.
- The peach seedlings are preferred in the hills. Before sowing, the seeds are stratified at 4˚-10 ˚C for 10-12 weeks in the moist sand.
- The stratification of peach seeds is done under natural conditions and cold storage at 10 ˚C or below.
- The seeds may be treated with thiourea (0.5%) or GA (200 ppm) or IBA (100 ppm) reduces the stratification period and increase germination percentage and seedlings growth.
- The stratified seeds are then sown in well prepared beds about 5 cm deep and 15 cm apart at a row- to- row spacing of 20 cm.

- For protection the seed-beds are mulched with 6-10 cm thick dry grass.
- Light irrigation should be given to avoid desiccation of seeds.
- Seeds start germinating in March.
- The seedlings become beddable in June, if they are grown in fertile soil with full care, they become graft able in the following winter.
- Peaches are propagated commercially by tongue or cleft grafting and T-budding or ring budding.
- In hills, tongue grafting during January- February and T-budding during May June are performed. However, in plains grafting is performed during November January and budding during April-June and September.

# Cultivation

## Planting

- The planting is done in winter season.
- The planting should be cleared that is without bushes and weeds.
- The land is ploughed or dug and arrangement of drainage be made in advance of planting.
- In hilly areas, contour planting system is adopted in steep slope, otherwise terraces may be prepared. In plains, square system of planting is common.
- Pits of 1 m x1 m x 1 m size at a distance of 4.5 m in hills are, dug during September –October.
- The pits should be refilled with fertile to soil mixed with 40 kg well rotten farmyard manure. And 10 liters solution of Chlorpyriphos (1ml/litre) to each pit to avoid any damage from insects.
- In high density plantation, the distance can be reduced to 3 m x 3 m. In Tatura trellis and Meadow system, peach is planted at a distance of 5 m x 1 m (2000 plants/ha) and 2 m x1 m (5000 plants/ha) respectively.

# Training

- Of the conventional training systems, modified leader and open centre are usually adopted to train peach trees. If sunlight exposure is a limiting factor (hills), vase or open centre system of training is generally used.
- In this system at the time of planting, stem is cut 60-80 cm from the ground level and only 3-4 branches are allowed to develop on it. In the following dormant season, these 3-4 branches arising in opposite direction with wide angled crotches are headed back.
- The unwanted branches are thinned out. In the second year scaffold, diseased weak and dry shoot are thinned out and 2 or 3 secondary laterals are selected at this stage.
- All the side branches which grow towards the ground, centre of the tree or vertically straight should be thinned out.
- The main stem kept clear up to 45 cm above the ground.

# Pruning

- Peaches require heavy and regular pruning because fruiting occurs laterally only on previous season's growth which bears only once in its life time.
- The pruning of peach has two important components-thinning out and heading back of the shoots.
- Pruning should be done so as to produce 25-50 cm of growth annually under temperate condition, which is sufficient for maintaining optimum productivity.
- During early bearing, the selected shoots should be lightly pruned by removing 20-30% linear growth after corrective pruning of the tree. After 7-8 years of bearing, the corrective pruning should be followed by removal of linear extension growth to the extent of 70-80%.

- The remaining 50% of selected shoots should be headed back by removing 2030% linear growth.
- In general, fruiting shoots should be lightly pruned and alternate ones severely headed back to get sufficient yield and following year's growth respectively.
- In subsequent years, the pruning severities in these two branches are changed which maintains the trees in growing and fruiting condition.
- In July Elberta peach, pruning should be done to retain 40 fruiting shoots and each shoot is headed back to 15 nodes. Where heavy pruning is required three-fourths heading back + 40% thinning out is recommended.
- Mid-winter is best time of pruning.

# MANURING AND FERTILIZATION

- The peach has a relatively high requirement for N and K
- Whole quantity of farmyard manure along with P and K is given during December-January. Half of N should be given in spring before flowering and the remaining half a month later if irrigation facilities are available.
- Under rain fed conditions, N fertilizers should be applied in one lot 15 days before bud break.
- The manures and nitrogenous fertilizer should always be applied by broadcasting evenly in the tree basins which should be sufficiently large and should encompass the entire canopy of the tree.
- It should be thoroughly mixed in soil by gentle raking.
- Phosphatic and potassic fertilizers should be applied in trenches of 20-25 cm width and 10-15 cm deep made beneath the tree canopy at a distance of 1-2 m from the main trunk.
- The trees should be irrigated lightly immediately after the application of manures and fertilizers.
- Peach is very susceptible to Fe deficiency which can be controlled by foliar application of 0.5-1.0% ferrous sulphate or by soil application of 50-250 g chelated Fe (Fe-EDDTA) at 20-30 spots around the tree in small holes.
- Trunk injection of 1% ferrous sulphate or ferric citrate is also beneficial in extreme cases.

# After care

- Peach July Elberta in high hills, and Redhaven, Sunhaven, Kanto 5 and Shimizu Hakuto are prolific bearing.
- Their fruit size remains small as a result of excessive cropping.
- Simazine and Atrazine (2.9 kg/ha), Turbacil (0.8 kg/ ha) as pre-emergent and Paraquat (4.0 litres/ha) and Glyhosate (4.32 kg/ha) as post- emergent herbicides are quite effective to control weeds without any phytotoxic effect. In nursery, Oxyflurofen (0.5 kg/ha) and Diuron (2 kg/ha) are good to control weeds.

# Irrigation

- To get optimum-sized and quality peaches, irrigation is very much essential.
- There should be sufficient moisture in soil before the emergence of leaves and flowers.
- Frequent irrigations are needed during the fruit development. Lack of irrigation, particularly during dry and hot summer result in fruit drop, reduced fruit size and quality.
- In hills, at least two irrigations should be given during the fruit development period.
- Irrigation should be stopped a few days before harvesting and at the time of dormancy, when the plants should become sufficiently hardened to withstand cool weather. Due to scarcity of water in hills, drip irrigation is recommended.

# FLOWERING

- The peach flower is termed perigynous.
- The receptacle is cup-shaped and encloses the ovary.
- The air space between the receptacle and ovary is thought to provide some insulation during spring frosts.
- Following bloom, the cup-like receptacle dries and is called the shuck, which splits and falls off as the fruit grows.
- The flowers are produced in early spring.

# FRUIT THINNING

- To improve prospectus of developing peach industry, it is essential to improve the marketable size and quality of fruits.
- Thinning is more desirable on mature trees making small annual growth than on young vigorous plants. Trees growing on light soils, deficient in moisture and nutrients, would also need fruit thinning.
- The heavy bearing cultivars like Pratap, Flordasun, Shan-i-Punjab, Florda Red, Sunred, Sharbati, and Sufeda need fruit thinning to minimise danger of limb breakage.
- Thinning may also be resorted when good-sized uniform fruits are needed for canning and fancy trade.
- The distance from fruit to fruit after thinning on shoots should be 15 cm and the average number of leaves/ fruit should be 20 to 25.
- Application of Ethephon (300 ppm) with Tween 20 at petal fall in July Elberta is recommended for optimum fruit thinning. However, in Redhaven peach Ethephon (600 ppm) 20-30 days after fruit set when the fruitlets are 20-25 cm in diameter, should be used for thinning.

# MATURITY INDICES AND HARVESTING

- To get premium price and reduce the losses during packaging and transporting, peaches should be harvested at optimum stage of maturity. A large number of maturity indices-days to maturity, calendar date, fruit size, firmness, sense of touch, pit discoloration, freeness of pit, taste, ground colour, sugar, acidity, starch, sugar: acid ratio—have been assessed on different cultivars.
- The days from full bloom to maturity vary in different cultivars Alexander, 86 days; July Elberta, 101 days; Babcock, 122 days and Elbert, 127 days.
- All peach fruits do not mature simultaneously. Therefore, these may be harvested in 3-4 pickings at 4 days interval. For distance markets, they should be harvested when they attain good colour but are still hard and ripe, whereas for local consumption tree ripe peaches are harvested by twisting with hand.
- The peak harvesting period for different peach cultivars in hills is mid-May (Shan-e-Punjab) mid-July (July Elberta and Shimizu Hakuto).

# Yield

- The peach comes into bearing after two years of planting in the field.
- The plants bear for about 20 years.
- The yielding capacity increases with the age of the plant.
- The average yield of fully-grown trees of different varieties varies from 50 to125 kg in hills.
- In conventional plantations, 7-10 tonnes/ ha and in Tatura Trellis about 23 tonnes/ha yield can be obtained.

# PHT

## Ripening

- Peaches ripen very fast as the harvesting season coincides with the prevailing high seasonal temperature.
- Ripening process declines to half with each reduction of 5.6 ˚C from 21.1˚4.4 ˚C. The fruits ripen in three days at 21.1 ˚C, while in six days at 15.5 ˚C.
- Peaches ripen with good flavour and aroma at temperature above 15.0 ˚C, with undesirable flavour at 10 ˚C and breakdown internally instead of ripening at 4.4 ˚C.

## Grading

- The harvested fruits must be disposed off as expeditiously as possible.
- Peaches are graded to fetch better price in the market. Size grading is essential for uniformity and packing in standard cartons of boxes.

## Packaging

- Peaches are generally packed in wooden boxes. But nowadays universal CFB cartons are also used.
- These cartons are lighter in weight and consume about one third wood and are easy to handle.
- Fruits in these cartons fetch better price as there is lesser bruising damage.
- These cartons need protection from direct rains.

# Storage

- Peaches have a shorter storage life than most other temperate fruits.
- The recommended cold storage conditions are 0˚-0.3 ˚C and 85-90 % relative humidity. In these conditions, free stone peaches and nectarines can be kept for two weeks and clingstone for four weeks.
- Pre cooled peaches can be stored for 28-36 days.
- Peaches are frozen in cold storage at -0.9 ˚C.
- In controlled atmosphere storage containing 5% CO2 + 1-2% O2 at 0 ˚C, peaches can be stored up to 42 days.

# Diseases

## (1) Brown rot (*Monilinia fructicola*)

### Symptoms

- Typical disease symptoms induced by *M. f*ructicola include blossom and twig blight, cankers, and a fruit rot.
- The fungus often produces conidia profusely on sporodochia on infected areas.
- The first indication of the disease in the spring is the rapid death of blossoms which, as they turn brown, often become affixed to the twig in a gummy mass, later becoming covered with a greyish to tan spore mass.
- Frequently, following colonization of the blossom, the fungus enters the shoot where it causes a canker on which spores are also produced.
- Shoot blight symptoms will occur if the fungus girdles the shoot.
- Leaves on such shoots turn tan to brown and may remain attached for several weeks.

### Management

- Avoid fruit injury.
- Use sanitation.
- Improve orchard drying conditions.
- Apply fungicides to prevent brown rot.

# Bacterial spot (Xanthomonas pruni)

## (2) Symptoms

- Bacterial spot attacks the fruit, leaves, and current season's twigs.
- Fruit infections appear as tiny purple to black flecks on the fruit surface of peaches, and as water-soaked spots on nectarines and other smooth skinned Prunus spp. Later, the skin is "broken" and the flesh beneath the spot becomes sunken.
- Early season infections result in very deep lesions in the flesh, and infections within 30 days of harvest result in circular, yellowish spots on the fruit surface.
- The leaf spots are always angular as a result of being restricted by the veins of the leaf.

## Management

- Plant varieties that are resistant or tolerant to bacterial spot and avoid those that are highly susceptible.

# Physiological disorder

## (1) Internal breakdown or chilling injury

### Symptoms

- This physiological problem is characterized by flesh internal browning, flesh mealiness, flesh bleeding, failure to ripen and flavor loss.
- These symptoms develop during ripening after a cold storage period, thus, are usually detected by consumers

### Management

- Fruit stored within the 2.2-7.6 °C temperature range are more susceptible to this disorder.

## (2) Inking (Black staining) Symptoms

- It is a cosmetic problem affecting only the skin of peaches and nectarines.
- It is characterized by black or brown spots or stripes.
- These symptoms appear generally 24-48 hours after harvest.
- Inking occurs as a result of abrasion damage in combination with heavy metals (iron, copper and aluminum) contamination.
- This occurs usually during the harvesting and hauling operations, although it may occur in other steps during postharvest handling.
- Management
- Gentle fruit handling, short hauling, avoiding any foliar nutrient sprays within 15 days before harvest, and following the suggested preharvest fungicide spray interval guidelines are our recommendations to reduce inking in California.

## (3) Sunscald Symptoms

- Peach trees are affected with sunscald.
- It is a severe damage to the exposed trunk and main scaffold branches. Management
- Shading of branches considerably reduces the incidence.
- To overcome this problem, painting of exposed surface with lime paste and shading by wrapping straw or hay around the trunk and thicker branches is quite effective in mitigating the problem.

## (4) Splitting of fruits Symptoms

- The fruits are affected on dorsal and ventral sides mostly at the time of pit hardening stage.
- Sometimes gum exudes for the fruit making it unfit for consumption.
- Splitting and gumming are accentuated during heavy rains after a long dry spell.
- The exact cause of this problem is still unknown

THANKS