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PEAR

- *Pyrus communis*, known as the European pear or common pear, is a species of pear native to central and eastern Europe and southwest Asia.
- Pear is next only to apple in importance, acreage, production and varieties diversity among temperate fruits in India.
- It is grown under temperate and subtropical conditions because of its wider climatic and soil adaptability.
- It is primarily grown in hills at 1,700-2,400 m above mean sea-level in the states of Himachal Pradesh, Jammu and Kashmir and Uttar Pradesh. Low-chilling pears have adapted very well in the subtropical regions.



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Climate :

- Pear can be grown in a wide range of climatic conditions, as it can tolerate as low as $-26\text{ }^{\circ}\text{C}$ temperature when dormant and as high as $45\text{ }^{\circ}\text{C}$ during growing period.
- However, Bartlett needs about 1,500 hr compared with other temperature pears.
- Pear variety Patharnakh needs only 150 hr of chilling and can also withstand high temperature and hot winds during summer.
- Spring frosts are detrimental to pear production and temperature at $-3.3\text{ }^{\circ}\text{C}$ or below kills the open blossom. Therefore, lowlands should be avoided for its planting. The hail-prone areas are also unsuitable as hailstorms affect both plants and fruits.

Soil:

Pear grows best in deep, well-drained, fertile, and medium-textured and relatively more clay soil.

- It is more tolerant to wet soils but less tolerant to drought than apple. Pears even to well on poorly aerated heavy soil with high water table which is heavy in texture for most of deciduous fruits.
- A soil depth of about 180 cm is ideal for proper root growth and fruit production.
- A neutral pH range of 6.0-7.5 is desirable because iron deficiency appears on highly alkaline soils.
- The highly fertile soils rich in N are not very suitable for pear growing as the incidence of pear psylla and fire blight is more in these soils.



Cultivars:

Pear varieties belong to three groups – European, Asian and hybrids. The varieties recommended for different states are listed below.

Himachal Pradesh

High hills: The pears are classified as early, mid-season and late – ripening. They are:

Early	Mid-season	Late
Early China, Laxton's Superb, Fertility(P), Seckel	Barlett, Starking Delicious, Max-Red Barlett, Dr Jule's Guyot	Conference (P), Comice, Hardy, Winter Nellis, Clapp's Favourite, Flemish Beauty (P)

J & K: Pear varieties for temperate areas

Early	Mid-season	Late
China pear, Beurre-de-Amanlis	Citron-do-Carme, Clapp's, Favourite, Doyenne Bussoch China Sand Pear, William Bartlett	Hardy, Vear of Winkfield

UP: The varieties grown are:

- High hills: Max-Red Bartlett, William Bartlett, Conference, Hardy, Winter Nelis, Clapp's Favourite, Flemish Beauty and Comice.
- Lower hills and plains: Patharnakh, Gola and LeConte.



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Propagation

- ❑ Pear is extensively propagated by whip grafting or shield budding on wild Himalaya root stocks like *Pyrus pashia*, *P. scrotina* and *P. khasiana*.
- ❑ Quince is also used as a root stock of pears to produce dwarf trees.
- ❑ The quince root stocks are multiplied by means of hard wood cuttings. One year old pear seedlings that are whip grafted, either indoors or in the nursery during late winter preceding the second growing season, usually make strong and stocky trees during the following season, either in their original location or after having been dug and lined out in a new place.
- ❑ Shield budding is generally done in early spring on seedling rootstocks.

Planting

- ❑ Individual pits one cubic metre in size, located 6m x 6m apart in hill slopes are prepared by halfmoon system before the onset of the moon.
- ❑ After proper sterilization, these pits are filled with rich soil along with sufficient amounts of farm yard manure (35-40 kg), and also with wood ash (5-6 kg) and bone meal (2-25 kg), so that it can be mixed properly and set in the pits.
- ❑ One year old vigorous grafted or budded plants with a height of more than one metre and free from diseases and pests should be selected for planting.
- ❑ While planting, care should be taken that buds or graft union remains 20-25 cm above the ground level.
- ❑ Most of the pear varieties are self-infertile and do not set fruits by themselves. As such it is advisable to plant more than one variety in an orchard. Fertility and conference are good pollinizing varieties.
- ❑ Pear flowers do not attract bees because of the poor quality of their nectar. Keeping bee-hives in pear orchards is more beneficial, because of this fact.



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Training and Pruning

- ❑ During early stages of plantation, pear trees are trained usually to the modified leader system.
- ❑ Training consists of heading back, to promote the development of lateral branches and low headed trees. 3-4 well shaped lateral branches are selected to form the framework while the others are removed.
- ❑ Removal of buds is also done to get desired spacing of lateral scaffold limbs.
- ❑ During transitory period the plants are pruned lightly.
- ❑ Pruning during this stage is continued to remove undesirable water sprouts, dead or diseased branches, with a light thinning of top.
- ❑ In early stages of bearing, corrective pruning is given, which consists of the removal dead or damaged branches, and cross or parallel branches for regulating growth so as to permit the development of strong crotches. In mature, bearing trees, thinner branches and unproductive branches which are found inside should be removed.
- ❑ Spurs should not be removed as is done in apple, because they bear fruits.
- ❑ Thinning is not generally practiced in pear, especially in the early season.
- ❑ Some spot picking of larger fruits may be done, as the remaining smaller fruits then increase in size.



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Nutrient Management:

- In hills, the recommended dose for 10-year-old plants is 60-100kg farmyard manure, 700g N, 350g P₂O₅ and 700 g K₂O.
- The farmyard manure, P and K are applied before snowfall in December. Half of N is added three weeks before flowering and the rest half just after fruit set.
- The deficiency of Zn and Fe on young foliage can easily be controlled by spraying 0.4 -0.5 % zinc sulphate and ferrous sulphate respectively during April.

After care:

- Immediately after planting, the basins should be prepared around the plants. The level of the soil near the trunk should be kept slightly higher than the level of the basin to avoid direct contact of water with the trunk.
- Irrigation should be given immediately after planting. Second irrigation is applied after 2-3 days. Subsequent irrigations should be given as and when required. The young plants are staked after planting to keep their stem straight.
- Green Gram, mash, toria and sunflower can be grown in summer, while wheat, peas, and gram in winter season may be intercropped in young orchards. Additional dose of fertilizers should be given to intercrops. Peach can also be planted as fillers in pear plantations.
- Weeds can be controlled either mechanically by weeding and hoeing or with the use of herbicides



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Irrigation:

- In heavier soils, moisture supply representing 50% or more of maximum available moisture in upper 1m is essential for maximum growth of fruit, shoot and trunk.
- A loam soil should be wet 1.5-1.8 m deep. In hills, pear cultivation is mostly done under rain fed conditions but at many places irrigation facility may be available which is an additional advantage. Besides rain fall, 75-100cm irrigation may be applied annually in some regions.
- Both excessive and scanty moisture affects color, composition and keeping quality of fruits. After harvesting in July-August, the trees should be irrigated at 20days intervals or so up to the end of October. Afterwards no irrigation is required up to January except when the manures and fertilizers are added in December.

Harvesting:

- Fully mature fruits are harvested for fresh consumption, while still firm and green for canning and distant markets.
- For local consumption, fruits are picked at slightly later stage, because fruits hanging on trees make a considerable gain in size, weight and overall quality. However, delayed picking reduces storage life and on canning such fruits develop unattractive color, turbid syrup and insipid flavour.
- Pear fruits are picked individually by giving a gentle twist rather than direct pull. Harvesting should be done in 2-3 pickings at 3-4 days intervals rather than single picking.
- A well-managed orchard of pear Bartlett yields 30-35 tons/ha.



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Diseases and Pests

Pear is less affected by diseases and pests in comparison to apple. However, it is susceptible to root rot, collar rot, powdery mildew, pear scab, sanjose scale, blossom thrips, stem and root borers, etc.

Physiological disorders

- Premature ripening begins with pink coloration near the blossom end. Consequently brown heart and softening occur in affected fruits which do not ripen properly. This disorder is caused by abnormally cool growing season preceding harvest.
- Night temperature lower than 7.1°C and day temperature lower than 21°C for a few days are sufficient to cause premature ripening. As soon as the initial symptoms appear, the fruits should be harvested and handled normally.



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PEACH

- Scientific name: *Prunus persica*
- Family: Rosaceae
- Origin: China or Persia
- Chromosome No. : $2n=16$
- 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.

Climate

- In India, peach is mainly grown in mid hills at a height ranging from 1000-1600 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.



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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.



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(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.

Propagation:

- **Raising of root stock:** For raising root stock, wild peach is propagated through seeds. Seeds are kept in moist sand for about 10-12 weeks for stratification. The germination and vigour of the seedling can be improved by pre-sowing treatment of seeds with thiourea (5g/l water), GA3 (200mg/l water) or IBA (100 mg/l water). The seeds are sown in beds about 5 cm deep and 15 cm apart at a row to row spacing of 20 cm in the month of October-November. Beds are mulched with dry grass followed by light irrigation.
- **Grafting:** Tongue grafting in the month of November is commercial method of multiplication. A smooth slanting cut of 4-5 cm is made on the one year old rootstock at about 15-20 cm above the ground level and another downward cut is given starting approximately 2/3rd from the top of the slanting cut and about 2 cm in length. This formed a tongue like structure on the stock. Similar cut is also made on the lower side of the scion exactly matching the cut given on the rootstock. The scion of 20-25 cm length having 2-3 buds of previous season growth is then fitted lightly with the rootstock and tied with polythene strips. The union completed within 30-45 days and after that polythene strip is also removed to avoid girdling.



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- **Intercropping**
- Additional income can be obtained by growing intercrops such as ginger, chilli, French bean, rice bean, urd bean and vegetable crops in the under storey of peach during pre-bearing stage.
- **Preparation of land and pits**
- Contour lines are marked and half moon terraces (1m.dia.) are prepared. Pits (size 0.75 x 0.75 x 0.75 m) are dug at 5 x 5 m apart on half moon terraces and refilled about 10 cm above the ground level with upper 30 cm soil along with 15-20 kg FYM, 100g Urea, 100g MOP, 300g SSP and 30g chlorpyriphos.

Planting

- The best time for peach planting is June to August. If there is no rain after transplanting, light irrigation is given. Peach can also be planted during Dec.-Jan., if irrigation facility is available.

Training and pruning

- Peaches are usually trained to an open-centre system. Cut back newly planted trees to about 30 inches high, just above a lateral branch; select 3-4 laterals with wide-angle crotches spaced evenly.
- Peach require heavy and regular pruning because fruiting occurs laterally only on previous season's growth. During early bearing, 20-30% linear growth of the shoots should be removed. The best time of pruning is last week of October. Water sprouts that come below the graft union is removed periodically.



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- **Manure and fertilizer**

Tree age (year)	Quantity			
	FYM (kg)	Urea (g)	SSP (g)	MOP (g)
1	5	200	250	150
2	10	400	500	250
3	15	650	750	300
4	20	1000	1000	400
5 and more	25	1200	1250	500

Diseases and Pests:

- Powdery Mildew
- Shot hole
- Peach leaf curling aphid
- Stem borer

Harvesting and yield

- The peak harvesting period of peach is last week of April to May.
- On an average, 20-30 kg fruit/tree can be harvested from 3 years old tree



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Strawberry

- Strawberry (*Fragaria vesca*)
- Family Rosaceae
- Day neutral ,monoecious plant
- Pollination – both self and cross

CLIMATE

- Grown in temperate and sub-tropical countries.
- Maximum growth rate 22-25⁰C day and 7-13⁰C night temperature
- Sensitive to frost and injury
- Flowering and fruiting at 16-27⁰C gives better yield

SOIL

- Shallow, well drained ,loamy soil rich in humus
- Optimum PH(5-6.5)



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Cultivars

- Royal Sovereign
- Srinagar
- Dilpasand
- Torrey
- Toiga
- Solana
- Pusa Early Dwarf

Propagation

- Runners- Most common Method
- Use those after blooming
- But runners hard to find semi-Arid region
- Seeds and stem cuttings

PLANTING

- Soil preparation start 1 month before Planting
- Use much organic matter as possible
- Creates beds-hill or matted rows or raised for better drainage.
- Hills-transplanting is done in march-april, Plains-jan-feb
- Spacing depends on variety and type of cultivar.
- A Spacing of 30 X 60cm is usually followed



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MANURE AND FERTILIZER

- For annual cropping 70-80 ton FYM/ha, 40 kg P and 80 kg K/ha
- For pre-planting 20 tons/ha, 20:40:40 npk/ha as basal dressing
- Urea (2%), zinc sulphate (0.5%), calcium sulphate (0.5%) is beneficial for higher yield.

IRRIGATION

- Strawberry being shallow rooted plant requires frequent irrigation should be preferred rather than heavy ones
- First 2 months-twice per week
- Third month-weekly, fourth and fifth months-every 2 weeks

WEEDING

Manual weeding, Herbicides Use

MULCHING

- Minimize freezing injury, suppress weed growth, reduce soil erosion
- Organic mulch (clean straw, saw dust), or inorganic mulch (black Plastic, transparent coloured polythene) can be used



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TRAINING AND PRUNING

- **Bud & shoot thinning /deshooting/debudding**

removal of 1-2 buds improves the fruit yield and quality

- **Deblossoming:** Removal of the flower truss to prevent fruiting and increase the yield

- **Control of runners:** Excess runners should be removed

USE OF RGR

- Application of GA (50PPM)&20PPM NAA induces flower and fruiting

HARVESTING

- Harvested when half to three quarter of the skin develops colour

- Harvested daily, early morning, dry conditions

- Average yield 8-12tons/ha



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PEST

- **Strawberry Root weevil**

- Feed on the rootlets and make the deep tunnels in crown

CONTROL

- Apply Carbofuran (6-7kg/ha) and parathion (0.017%) around the plant

- **Hairy Caterpillar**

- Defoliate leaves during June- July

CONTROL

- Spraying of Endosulphon 0.05% or malathion 0.05%

- **White grubs and cut worms**

- **Red spider mites**

DISEASE

- **Verticillium wilt**

- Older leaves turn into brown

- shriveled and plant die

CONTROL

- Proper crop rotation and soil fumigation with formalin (5000L/ha)

- **Black Root Rot**

- Caused by water-logged ,

- draining soil , freezing or nematode

CONTROL

- Avoiding poor draining clayish soil

- Adding organic matters to soil would also be effective