PEARS
Botany

- Botanical Name: *Pyrus communis* (European pear)

*Pyrus pyrifolia* (Oriental pear): resistant to blight and drought.

*Pyrus ussuriensis*: winter hardy.

Family: Rosaceae
USES

A highly delicious fruit – helps in maintaining a desirable acid-base balance in human body.

Mostly used for table purpose.

For juice and wine making, canning, drying and cooking.

Jelly, sherbets and nectar.

Can also be candied and sweet pickled.

Browning of cut pear fruits is considered due to polyphenolase.
Origin & Distribution

• Submountainous regions of Western China.
• **Countries:** China, Italy, USA, Russia, Germany, Japan, Turkey, France & Spain.
• **States:** J & K, H.P., Uttrakhand. Low chilling cvs. are also cultivated in hot plains of North India and hills of South India.
• In India, pear occupies an area of 22640 ha with a production of 212510 tonnes.
• In H.P., area under pear is 7662 ha and production is 12039 MT.
<table>
<thead>
<tr>
<th>Characters</th>
<th><em>Pyrus communis</em></th>
<th><em>Pyrus pyrifolia</em></th>
<th><em>Pyrus pashia</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Trees</td>
<td>Pyramidical, medium tall &amp; spiny when young.</td>
<td>Tall, vigorous &amp; spreading.</td>
<td>Comparatively medium sized, open headed &amp; stem has stout spines.</td>
</tr>
<tr>
<td>Leaves</td>
<td>Orbicular-ovate to elliptic, crenate-serrate &amp; glabrous when old but new growth &amp; inflorescence are pubescent.</td>
<td>Ovate-oblong, dark green, pubescent, elliptic &amp; comparatively large.</td>
<td>Lanceolate, acuminate, crenate, wooly when young but glabrous &amp; shining above when old.</td>
</tr>
<tr>
<td>Flowers</td>
<td>White, mostly borne in corymbs</td>
<td>White</td>
<td>White &amp; fragrant</td>
</tr>
<tr>
<td>Fruits</td>
<td>Vary in shape, mostly pyriform, calyx persistent, fleshy pedicels &amp; pulp with gritty concretions, melting &amp; buttery texture.</td>
<td>Mostly round (apple shaped) with a depression at stem end, deciduous calyx, russeted &amp; full of grit cells, crisp texture, sweet taste but lack aroma.</td>
<td>Globose, small, dark brown in colour covered with raised white dots, gritty &amp; unacceptable for table purpose due to high tannin content.</td>
</tr>
</tbody>
</table>
Recommended varieties

- **High hills**
  
  **Early**: Early china, Laxton’s superb.
  
  **Mid season**: Bartlett, Red Bartlett, Max Red Bartlett, Clapp’s favorite, Flemish Beauty (P).
  
  **Late season**: Conference (P), Kashmir pear, Doyenne-Du-Comice.

- **Mid, Low hills and valley areas**:
  
  Patharnakh (Sand pear), Kieffer (P), China pear, Punjab Nectar, Punjab Beauty, Punjab Soft, Punjab Gold
Climate

• Can be grown from foot hill to high hills (600-2700m a.m.s.l.), experiencing 500-1500 chilling hours.
• Thrives best in areas which are located on north-eastern aspects at lower elevation and south-western aspect at higher elevation.
• Bartlett cultivar of pear needs 1500 chilling hours whereas Patharnakh require about 150 chilling hours.
• Spring frost are detrimental to pear production and temperature at –3.3°C or lower kill the open blossoms.
• Air circulation is, therefore, necessary in the vicinity of pear orchard.
• Hail prone localities must be avoided.
• Well distributed annual rainfall of about 100 cm is desirable, if irrigation facilities are not available.
• It is cultivated under both under rainfed and irrigated situations.
• Grows best in deep, medium textured and well drained soils.
• Can also do reasonably well where the soil has a high water table, poorly aerated or too heavy in texture for other deciduous fruits.
• There should be no hard rock or pan in at least two meter of soil depth.
• Compared with apple, pear is less tolerant to drought but more tolerant to wet soils.
• Neutral pH range of 6.0 – 7.5 is desirable.
Rootstocks

- **Seedling**: Kainth (*Pyrus pashia* Linn).
  Shiara (*Pyrus serotina*)
- **Clonal**: Quince A: semi-dwarf
  Quince B: semi-vigorous
  Quince C: very dwarfing
  OHxF: resistant to fire blight
  Oregon 211 & 249: *P. calleryana*
  Oregon 260, 261 & 264: *P. betulifolia*
Propagation method

- **Tongue grafting**: February – March
- **Cleft grafting**: February – March (Top working method)
Layout and Planting

- If terraces already exist, trees can be planted in the middle of terrace at appropriate spacing.
- In valley areas, systems like square or hexagonal can be adopted.
- High density planting should be taken up in areas where soils are fertile, irrigation facilities are available, soils are flat and free from high velocity winds.
- For trees on seedling rootstock spacing of 5 m is recommended but for clonal rootstocks 3 m should be kept.
- **Planting time:** December – March. Early planting is desirable.
Training and Pruning

- Modified central leader system: This is very common system for training of pear trees.
- Remove the crowding, dead, broken and diseases branches of tree.
- Head back all the shoots to ¼ during dormant season.
- Since pear trees are spur bearer, therefore renewal of spurs is required after 8-10 years.
Orchard Soil Management

- Weeds in tree basins should be kept under check by hand-weeding or by using herbicides and mulching
- Application of grass mulch (10cm thick) plus Glyphosate @ 800ml / 800L water/ha is recommended
- Green manure crops like sunflowers and beans can be used to improve texture and nutrient status of soil
- Growing of grasses and legume in the orchard can improve soil fertility, prevent soil erosion apart from controlling the weeds and other shrubs.
## Manure and Fertilizers

<table>
<thead>
<tr>
<th>Age (Yrs)</th>
<th>FYM (kg)</th>
<th>N (g)</th>
<th>CAN (g)</th>
<th>P$_2$O$_5$ (g)</th>
<th>SSP (g)</th>
<th>K$_2$O (g)</th>
<th>MOP (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>10</td>
<td>70</td>
<td>280</td>
<td>35</td>
<td>220</td>
<td>70</td>
<td>120</td>
</tr>
<tr>
<td>2</td>
<td>20</td>
<td>140</td>
<td>560</td>
<td>70</td>
<td>440</td>
<td>140</td>
<td>240</td>
</tr>
<tr>
<td>3</td>
<td>30</td>
<td>210</td>
<td>840</td>
<td>105</td>
<td>660</td>
<td>210</td>
<td>360</td>
</tr>
<tr>
<td>4</td>
<td>40</td>
<td>280</td>
<td>1120</td>
<td>140</td>
<td>880</td>
<td>280</td>
<td>480</td>
</tr>
<tr>
<td>5</td>
<td>50</td>
<td>650</td>
<td>1400</td>
<td>175</td>
<td>1100</td>
<td>350</td>
<td>600</td>
</tr>
<tr>
<td>6</td>
<td>60</td>
<td>420</td>
<td>1680</td>
<td>210</td>
<td>1320</td>
<td>420</td>
<td>720</td>
</tr>
<tr>
<td>7</td>
<td>70</td>
<td>490</td>
<td>1960</td>
<td>245</td>
<td>1540</td>
<td>490</td>
<td>840</td>
</tr>
<tr>
<td>8</td>
<td>80</td>
<td>560</td>
<td>2240</td>
<td>280</td>
<td>1760</td>
<td>560</td>
<td>960</td>
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<tr>
<td>9</td>
<td>90</td>
<td>630</td>
<td>2520</td>
<td>315</td>
<td>1980</td>
<td>630</td>
<td>1080</td>
</tr>
<tr>
<td>10 &amp; above</td>
<td>100</td>
<td>700</td>
<td>2800</td>
<td>350</td>
<td>2200</td>
<td>700</td>
<td>1200</td>
</tr>
</tbody>
</table>
Method of Fertilizer Application

- NPK fertilizer should be broadcasted on the soil surface under the spread of tree and slightly mixed with soil

- Fertilizer should be applied 30cm away from the trunk in old trees and should not be applied in too wet or too dry soils

- Apply FYM during December – January along with P and K.

- Apply half dose of nitrogen 2-3 weeks before flowering and remaining second half dose one month after 1st. application.

- Apply N in a single dose along with P and K. In case full dose of N is not applied then second dose of N can also be given 1-2 foliar sprays of urea @ of 0.5% (500 g/100 L water) after fruit set.
Harvesting

- Fully mature pear fruits are harvested while still firm and green for canning and distant markets but for local consumption, they are picked at a slightly later stage.
- The optimum time of harvest for Bartlett pears grown under Kullu valley conditions was computed to be 122 days from full bloom that is between August 6 to 12, for 60 days optimum storage at 0°C.
- Pear fruits are plucked individually by giving a gentle twist rather than direct pull.
- Two or three pickings at an interval of 3-4 days are better than single picking.
Yield

- Yield varies greatly with the cultivar, age of the plant, orchard management and the climatic conditions.
- A well managed orchard of Bartlett pear gives about 30-40 tones of fruits per hectare.
Grading and Packing

• To secure better price and goodwill, proper grading of fruits is desirable
• Bartlett pears are graded as extra large, large, medium and small with diameters of 8.0, 7.0, 6.5 and 5.0cm, respectively.
• All damaged and misshapen fruits should be excluded from grading.
• The fruits after wrapping need to be arranged in layers in the containers.
• Both bottom and top portions of the container should be cushioned with dry grass and paper.
• Label indicating the grade, cultivar and name of the orchard should be pasted, printed or stamped on the container.
Pears can be stored for 2-7 months at storage temperature of \(-1.1-0.0^\circ\text{C}\) with 85-90% relative humidity.