Mountains in Europe and Asia.  It is a shrub/tree which grows to 10 feet in height.  It is native to India and is cultivated in many tropical countries.  The plant has a reputation for toxicity and is used as a pest control.  It is used in traditional medicine and is also a popular ornamental plant.

- Family Euphorbiaceae
- Chromosome No. 2n = 28 (Parry 1943)
- Chromosome No. 2n = 98 - 104 (Janaki Amal & Raghavan 1957)
- Genus comprises about 350-500 species, mostly shrubs, few herbs or trees
- Other species used for pickles
  - *Phyllanthus acidus*, Skeeb
  - *Emblica fischeri* Gamble
  - *Phyllanthus acidus*, Heyne
  - *Emblica logiflorus*
ORIGIN

- Indigenous to tropical South Eastern Asia (Firminger, 1947)
- Particularly Central and Southern India
- Native to India, Srilanka, Malaysia, China
- Thrives well throughout tropical India (Base of Himalaya to Sri Lanka)
IMPORTANCE

- Hardy, prolific bearer
- Highly remunerative
- Requires less care and maintenance
- Adaptable in various agro-climatic and soil conditions
- Highly nutritive fruits, richest in Vit. C
- Fruits are also rich in pectin, minerals like iron, calcium, phosphorus
- Astringent food recommended by the Ayurvedic system of medicine
- Fruits are acidic, cooling, refrigerent, diuretic and laxative
- Used in the treatment of headache, constipation and enlarged liver
## COMPOSITION OF AONLA FRUIT

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>81.2 %</td>
</tr>
<tr>
<td>Protein</td>
<td>0.5 %</td>
</tr>
<tr>
<td>Fats</td>
<td>0.1 %</td>
</tr>
<tr>
<td>Mineral matter</td>
<td>0.7 %</td>
</tr>
<tr>
<td>CHO</td>
<td>14.0 %</td>
</tr>
<tr>
<td>Calcium</td>
<td>0.05 %</td>
</tr>
<tr>
<td>Phosphorous</td>
<td>0.02 %</td>
</tr>
<tr>
<td>Iron</td>
<td>1.2 %</td>
</tr>
<tr>
<td>Vit. B&lt;sub&gt;1&lt;/sub&gt;</td>
<td>30/100 g</td>
</tr>
<tr>
<td>Vit. C</td>
<td>600-800 mg/100 g</td>
</tr>
<tr>
<td>Nocotinic acid</td>
<td>0.2 mg/100 g</td>
</tr>
<tr>
<td>Calorific value</td>
<td>59/100 g</td>
</tr>
</tbody>
</table>
SOIL

- Wide adaptability (Light - heavy soils)
- Well drained fertile soils are best suited
- Rocky, marginal and waste lands
- Tolerate salts to certain level
- Successfully grown in sodic (up to 35 ESP)
- Saline soils (10 ECe/ dsm⁻¹)
- Maximum 9.5 soil pH
- Young seedlings are susceptible to salt injury (Deshmukh, 1996)
CLIMATE

- Aonla - subtropical fruit, but quite successful in tropical belt.

- Responds well to the dry weather, moderately cool temp., high temp. during summer up to 46°C (Shankar, 1969)

- Tree prefer warm and dry climate especially at flowering

- Fruit remain dormant during summer for 100 days

- Congenial temperature for growth and development of fruits - 25-35°C

- Rains received during Jan-Feb. encourage twice flush

- Rains received during June encourage the swelling of ovary
Early maturing group

Krishna (NA - 5)

- Chance seedling of Banarasi
- Semi-spreading
- Fruits are medium to large
- Average wt. 45 g
- Conical at apex
- Apricot yellow colour
- Sex ratio 56 : 1
- Yield 100-125 kg/tree
- Chance seedling of Banarasi
- Plant spreading and dwarf
- Fruits are medium to large
- Average wt. 42 g
- Heavy bearer
- Fruits are flattened, round
- Skin rough
- Yellowish green with pink tinge
- Sex ratio 67 : 1
- Yield 125-150 kg/tree
Mid season group

Neelam (NA - 7)

- Selection from Francis
- Semi-erect growth
- Fruits medium to large
- Average wt. 44g
- Fruits flattened, oblong with conical apex
- Fruits greenish yellow in colour
- Sex ratio 61 : 1
- Free from necrosis
- Yield 75 kg/tree
Late season

Francis (Hathi Zool)

- Erect drooping growth habit
- Shy bearer
- Fruits are large in size
- Average wt. 60-70 g
- Fruits flattened, oblong
- Fruits greenish white in colour
- Segments distinct and thick
- Yield 75 kg/tree
Chakaiya

- Upright growth habit
- Fruits are medium sized
- Average wt. 35 g
- Fruits round, green colour
- Segment 6 and not distinct
- Highest fibre content (8.8 %)
- Fruits have strong attachment
- Useful for high density plantation
- Susceptible to necrosis
- Yield 100-125 kg/tree
Kanchan (NA - 4)

- Selection from Chakaiya
- Spreading growth habit
- Profuse bearer
- Fruits are medium sized
- Average wt. 30 g
- Fruits greenish yellow
- Fruits round, soft, attractive
- Sex ratio 67 : 1
- Yield 200-250 kg/tree
PROPAGATION

Seed
- Wide propagation in the forest area
- Variability in plant vigour and fruit size
- High gestation period, inferior fruit quality etc.
- Soaking seeds in 500 ppm GA for 24 hrs (92%)
- Seeds of fully mature fruits should be extracted

Budding
- Patch budding in Feb.

Grafting
- Soft wood grafting (dormant period)
- Period - June-August and February
Patch Budding
Planting

- **Planting distance:** 7-8 m
- **Planting time:** July- August. Early planting is desirable
- Irrigate newly planted trees to get high survival rate
- While planting, earth wall should not be disturbed.
- Tree should not be planted deeper than their natural position in the nursery
- **Graft/ bud union should be 8-10” above ground level.**
Training and Pruning

• Aonla tree should be trained to develop low-headed one and the main branches constituting the foundation framework should be made to arise on the trunk within 0.75m from ground.

• The framework should be developed by encouraging the growth 4-6 well-spaced branches with fairly wide angle.

• Pruning of bearing plants can be done after the termination of crop in each year.

• While pruning, dead, diseased, weak, crossing branches and suckers appearing from rootstock should be removed.
## Manure and Fertilizers

<table>
<thead>
<tr>
<th>Age of tree (year)</th>
<th>FYM (Kg)</th>
<th>N (g)</th>
<th>$P_2O_5$ (g)</th>
<th>$K_2O$ (g)</th>
<th>CAN (g)</th>
<th>SP (g)</th>
<th>MOP (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Per year age of tree</td>
<td>10</td>
<td>80</td>
<td>50</td>
<td>60</td>
<td>320</td>
<td>310</td>
<td>100</td>
</tr>
<tr>
<td>10 years &amp; above</td>
<td>100</td>
<td>800</td>
<td>500</td>
<td>600</td>
<td>3200</td>
<td>3100</td>
<td>1000</td>
</tr>
</tbody>
</table>
Time of Fertilizer Application

• FYM along with super phosphate and muriate of potash should be applied into the soil around the tree basins during December.

• Split N in two doses: first dose in March- April and other in August- September
Irrigation

- Aonla plants hardly require any irrigation except during the spells of dry period.
- The young plants require water in summer at fortnightly intervals till they are firmly established.
- Watering of mature bearing plants is also necessary for better fruit development and to arrest fruit drop.
Harvesting

• The budded plants used in commercial cultivation start bearing from 6-8 years after planting.
• Generally, aonla fruits are ready for harvest in November /December.
• Maturity can be judged either by the change of seed colour from creamy white to black.
• The economic life is considered to be about 60-75 years under good management.
Yield

- Vegetatively propagated plant attain full bearing within 10-12 years and may continue to bear up to 60-75 years of age under well-managed conditions.
- A full-grown aonla plant can yield up to 100-300 kg fruits per year.
Grading and packing

- Aonla fruits are graded according to their size, weight, colour and maturity into 3 grades i.e. large, medium and small size.
- Immature, damaged and diseased fruits should be discarded.
- Gunny bags and baskets are used for packing.
- Approximately 40-45 kg capacity baskets are used with newspaper as lining and aonla leaves as cushioning material.
Storage

• Aonla fruits could be stored upto 2 months at low temperature (5-7°C).
• Mature fruits can be kept at room temperature for about 6-9 days depending upon the variety.
Packing
Fruit Necrosis

- Symptoms starts with the browning of the innermost part of mesocarpic tissue at the time of endocarp hardening in the 2nd or 3rd week of September which later on extends towards epicarp resulting into brownish black appearance of the flesh.
- In case of severe incidence, these black spots become corky and gummy pockets developed.
- Cultivar francis is highly prone to fruit necrosis, whereas chakaiya is resistant.

Control:
- Combined spray of zinc sulphate (0.4%) + copper sulphate (0.4%) + Borax (0.4%) during September-October has been effective