GRAPES
Introduction

• The grape is one of the most delicious, refreshing and nourishing fruits.
• Grapes owing to their taste, nutrient content, composition and low calorific value are refreshing fruits.
• It is probably and obviously the largest produced fruit of the world.
• It is considered to be the fruit of the temperate region but it has been successfully acclimatized to several sub-tropical countries.
• Area under grapes in India: 1,16,000 ha
• Production : 22,21,000 (2.21 mt)
• Origin: Central Asia (regions between black sea and caucasian sea)
• Major grape producing states: Maharashtra, Karnataka, Tamil Nadu, Andhra Pradesh
• Botanical Name: *Vitis vinifera*
• *Family*: *Vitaceae*
Uses

• In India, all most all our produce is consumed as table fruit, while in European countries 99% of their produce is used for preparation of wines.
• Grapes are also used for preparation of other products like raisins, fresh juice and Jams etc.
• The grape fruits are rich in sugar and particularly in hexose and are easily digestible.
• It is fairly a good source of minerals like Calcium, Phosphorous and Iron and vitamins B1 and B2.
• The juice is mild laxative and acts as a stimulant to kidneys.
Climate

• Grape is a semi arid subtropical crop.
• It requires warm and dry summer and cool winter.
• Humid weather is not congenial for sweetness of the fruit, causes cracking of fruits and encourages fungal diseases.
• Parts of India having more than 100cm of rainfall are not suitable.
• A rain free period of 90 days from the time of pruning is most desirable.
• Frost does great damage if it occurs during its growing period.
• It thrives well in regions with a temperature range of 4.5°C and 45°C.
Soils

- Light soils are ideal but they can grow on any well-drained soil which is the most important requisite for grape vine.
- Water table should be deeper than 2 meters. Soils at least 1 meter depth with no hard pan up to 2 meters is suitable whether they are rich or poor.
- Compared to other horticultural crops, grape vines are relatively tolerant to salinity and alkalinity but excessive lime is harmful.
Varieties

- The commercial varieties of grapes grown in India belong to *vitis vinifera* (European grapes), which is indigenous to Mediterranean region.
- American grapes belong to *vitis labrusca* and *vitis rotundifolia*, where the skin separates easily from pulp when ripe.
- The important commercially grown varieties are- Bangalore blue, Gulabi, Anab-e-Shahi, Dilkush, Patcha Draksha, Pusa seedless, Thompson seedless, Beauty seedless and Perlette.
Varieties for H.P.

• **Dry zone**
  – Raisin varieties: Thompson Seedless and Kali Sahibi
  – Table varieties: Thompson seedless, Beauty Seedless, Katta, Kali Sahibi, Anab-e-Shahi and Kandhari.
  – Juice making varieties: Beauty Seedless, Katta and Black Prince

• Promising wine making varieties: Chholtu White, Chholtu Red, Isabel Rangspray

• **Low hills and Valley areas**: Perlette, Beauty Seedless, Delight and Himrod
Propagation

- Grape can be propagated both by sexual and asexual methods.
- Sexual propagation is encountered with a no. of hazards like poor germination and long period for germination etc.
- Asexual or vegetative propagation on the other hand has high percentage of success and it ensures genetical purity.
- Vegetative propagation in grape is practiced through cuttings, grafting, layering and budding depending on the varieties used and the growing conditions.
- Propagation through hardwood cuttings is the most popular method of propagation in grape.
- Cuttings made from well matured one season canes from productive vines which are of medium in thickness (0.7 to 0.8 cm), with an internodal length of 8-10cm and 25-30cm in length with at least 3-4 buds and dormant should be selected preferably from the October prunings. They are planted in well prepared flat beds, leaving two nodes above the soil surface.
- In North India these cuttings are planted in the nursery after allowing them to form callus by burying them in moist soil or sand for 4-5 weeks. The rooted cuttings will be ready for planting in the main field only after one year.
• In India grape is planted on its own roots.
• However, use of resistant rootstocks is necessary under infestation by nematodes and other pests and diseases and also for saline soils.
• The scion variety can be chip budded on suitable root stocks.
• **Phylloxera (Aphid) resistant root stocks**—St. George and Riparia.

**Nematode and soil salinity**—Salt creek

**Resistant to nematode**—Harmony and Dog ridge
Spacing

• The spacing that is given between the vines will depend on soil, climate, and vigour of the variety, method of training, pruning and cultivation practices.
Planting

• Preparation of the land before planting grape vine is essential.
• The land is prepare thoroughly by deep ploughing and follow up by tillage and the land should be leveled.
• Pits of 1m³ are dug at required spacing.
• October is the ideal time for planting unrooted cuttings directly in the filed.
• Rooted cuttings are planted in January or February.
• When rootstocks are planted, budding or grafting is done in July-August. Either chip or wedge grafting is followed.
Training and Pruning

- Proper methods of pruning and training contribute towards higher production of better quality fruits in grape.
- Training mainly concerns with giving the form and the direction of the trunk and arms and the position of the shoots.
- Training determines the form while pruning effects the functioning of the vine.
- It is done to concentrate the activity of the vine to the parts left after pruning.
- Pruning is the most important operation for the maintenance of fruitfulness and quality along with vigour of the vine.
- Before actually discussing the subject of training and pruning it is necessary to understand the various terms commonly used in these operations to make the subject more intelligible.
Trunk -- The main stem of the vine which is vertical
Arms/Cordons (Primary) -- The main branches arising from the trunk or extensions of the trunk usually grow vertically
Arms/Cordons (Secondary) -- The branches arising from primary arms or extensions of the primary arms or cordons.

Head -- The region of the trunk from which the arms or canes arise
Shoot -- The young growth (herbaceous) of the current season developing from a bud situated on the arm or trunk
Cane -- The matured shoot of the past season
Spur -- The shortened cane or part of the cane left after pruning
Fruiting spur -- The spurs having a few buds some of which (usually the apical ones) sprout and grow into fruiting shoots.
Training

• In the natural habitat, a grape vine is robust climber but it can be trained on any fashion.

• Although a no. of training systems are known only four namely bower, kniffin, telephone trellis, and head system are followed in India.
Pruning

• In grape pruning is done only once in North India during the month of January to make the fruitful buds to sprout but in south India, pruning is done twice in a year, once in summer and again in winter.

• Grape vines in these regions grow continuously without any dormancy (due to tropical climate). Hence by pruning in April (summer) the vines are forced to have a rest period, which helps in fruit bud differentiation.

• Pruning time mainly depends on rainfall and temperature.

• Pruning is adjusted so that there is no coincidence of rainfall with fresh growth and flowering and also winter doesn‘t set in with in 8-10 days after pruning.
• Pruning refers to the judicious removal of any plant part
• To establish and maintain desired vine shape
• To increase productivity
• To facilitate various cultural operations
• To distribute proper amount of bearing wood over the vein
• For consistent productivity
Summer pruning

• It is done during March-April in the states of A.P. and Karnataka, but in July in Tamil Nadu.
• In this pruning the canes are cut back to one or two bud level for building up the fresh vegetative growth.
• Hence it is called **back pruning** or **growth pruning**.
Winter pruning

- This is done during the last week of November in A.P. and Maharastra, during the second and third weeks of October around Bangalore, but at any time of the month of October in the interior northern districts of Karnataka and in December in Tamilnadu.
- The mature canes (about 6 months old) are pruned.
- Entire foliage and immature shoots are removed. Levels of pruning differs with varieties. Anab-e-shahi and Bhokri are pruned to 5 bud level, Thompson seedless to 10 buds, Bangalore Blue to 4 buds and Gulabi to 9 buds.
- This pruning is also called as forward pruning.
• Some of the varieties like Perlette, Beauty seedless, Bangalore blue, Bhokri etc. produce fruits on the shoots arising from the basal buds on the cane. In such varieties the canes are headed back to 4-5 buds. Such varieties are called **Spur pruned** varieties.

• On the other hand the Pusa seedless, Thompson seedless varieties in which the fruits are produced on the shoots arising from terminal buds, the canes are headed back to 8-12 buds. Such varieties are called **Cane pruned** varieties.
Manuring

- Grape is a heavy feeder of fertilizers.
- Keeping in view the nutrient requirements of grape and the experienced gained so far, the following fertilizers are recommended.
- At the time of filling of pits and planting add 50kg FYM, 2kg superphosphate and 10 litres of solution of chlorpyriphos (10ML/10 L water)/pit while filling the pits.
- After filling the pits, a light irrigation should be given to allow the soil to settle down.
- To the newly planted young vine, apply 250g each of CAN and muriate of potash in April and again in June.
## Manures and Fertilizer Schedule for low hills and valley areas

<table>
<thead>
<tr>
<th>Vine age (Yrs)</th>
<th>FYM (kg)</th>
<th>N (g)</th>
<th>CAN (g)</th>
<th>P$_2$O$_5$ (g)</th>
<th>SP (g)</th>
<th>k$_2$O (g)</th>
<th>MOP (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>25</td>
<td>100</td>
<td>400</td>
<td>80</td>
<td>500</td>
<td>150</td>
<td>250</td>
</tr>
<tr>
<td>2</td>
<td>40</td>
<td>200</td>
<td>800</td>
<td>240</td>
<td>1500</td>
<td>240</td>
<td>400</td>
</tr>
<tr>
<td>3</td>
<td>50</td>
<td>300</td>
<td>1200</td>
<td>320</td>
<td>2000</td>
<td>300</td>
<td>500</td>
</tr>
<tr>
<td>4</td>
<td>60</td>
<td>350</td>
<td>1400</td>
<td>480</td>
<td>3000</td>
<td>360</td>
<td>600</td>
</tr>
<tr>
<td>5 and above</td>
<td>75</td>
<td>400</td>
<td>1600</td>
<td>640</td>
<td>4000</td>
<td>480</td>
<td>800</td>
</tr>
</tbody>
</table>
• In dry temperate areas, an application of 1200 g CAN, 1500g super phosphate and 500 g muriate of potash may be given to full grown vines.
Irrigation

• Vine yard irrigation is chiefly governed by the nature of soil, its drainage, the rainfall and its distribution and temperature in the locality.
• Grape vine requires judicious irrigation for optimum growth and yield.
• During initial year of planting, vine may be irrigated frequently.
• While stagnation of water around the root zone leads to mortality of the vine.
• The excess water from frequent irrigations is conducive to excess and rapid vegetative growth at the cost of the fruiting of the vine.
• Grape requires 6-8 irrigations after April pruning till the south West monsoon begins.
• Vines are not irrigated from June-October.
- 8-10 irrigations may be given at 7-10 days interval after October pruning till March.
- Each adult vine needs 200 liters of water in winter and 300 liters of water in summer per per irrigation.
- Watering the vine just before pruning may increase the flow of plant sap.
- Hence, the vines are not irrigated after harvest and allowed rest for 15 days in April before pruning is taken up.
- This practice of withholding water for a fort night helps in controlling the flow of plant sap.
- The flow of plant sap inside the tissue at the time of pruning should be at the minimum, as otherwise, the plant may be get drained off the plant sap through the cut surface after pruning.
- This draining of plant sap through cut surface is called **Bleeding**.
- Hence, vines should not be pruned when the plant shows bleeding.
- Again while the berries are ripening, the irrigation of the crop may make the berries less sweet.
- Hence, withholding of water before pruning and also while the fruits are ripening is a sound practice.
Inter-culture

- It is not feasible to grow any inter crop and frequent shallow tillage is desirable.
- The vineyard should be kept free from weeds by shallow digging of 8-10cm depth in 15-20 days interval with spade by manual labour and weeds hand picked.
- Owing to shade the crop is susceptible to two mildews and anthracnose disease against which a schedule of three prophylactic sprays of bordeaux mixture sprayed after pruning, at flowering and when fruits are developing.
Fruit thinning

- Thinning of berries at pea stage increases the berry size by 20%, fruit quality with high sugar content in Anab-e-shahi and lowered the acidity in sub-acid varieties like Bhokri.

- Improvement in colour of berries and earlier maturity are the other advantages due to thinning. It also means to remove diseased, misshapen and shot berries.
Use of Plant growth regulators

- Encouraging responses were observed both in seeded and seedless varieties of grape by the use of growth regulators.

- **Effect on fruit set:** A good fruit set was obtained by spraying the flower cluster thoroughly 4-6 days after full bloom with **100ppm Gibberellic acid** or **20ppm Parachloro phenoxy acetic acid**. This increased set in current grapes, Thompson seedless and black Corinth.

- **Effect on berry size:** Increase in berry size in Anab-e shahi, Kishmis and Bhokri varieties was reported when **GA** was applied at **40ppm** at bud and flower stages. Higher concentrations resulted in the increase in the length of berries.

- **Effect on cluster size:** Use of **GA**, **TIBA** and **PCPA** resulted in lengthening the cluster parts especially the pedicles.

- **Effect on maturity:** with the application of **Benzothiazol A-Oxyacetic acid (BOA)** maturity can be regulated. Maturity can be delayed by 15 days with the application of this **Benzothiazol A-Oxyacetic acid**.
Harvesting

• Grapes should be harvested when they are fully ripe as they don’t ripen any further after harvest from the vine.
• The criteria for maturity are:
  – The bunches should be fully developed and every berry should attain a uniform size, shape and colour.
  – The bunch is ready for harvest when the lower most berry of the bunch is soft and sweet.
  – The berries should develop translucent look of colour peculiar to the variety. Anab-e-Shahi develop amber or light honey colour.
  – The seeds of the ripened berries becomes dark brown
  – Total soluble solids also give the indication of ripening. Anab-e-shahi is harvested when it records a brix of 15⁰-16⁰ and Thompson seedless 21⁰-22⁰
  – The bunches should be harvested when they are ripen on the vine as they are not subjected to post-harvest ripening process.
• The bunches are harvested with secature or scissors. Then the immature and rotten berries are removed with the help of scissors. Then they are packed in wooden or card board boxes or bamboo staked baskets. The paper strips are used to avoid damage to the berries.
Yield

• Bangalore blue and Patcha draksha--5000 kg/ha, Bhokri - 4500 – 9,000kg/ha, Anab-e-shahi-1000--15000kg/ha and Bangalore blue -30,000kg/ha.
• Grapes are long lived and may yield up to a century with a good care.
• But on a commercial scale they may be replaced after about 30 years with advantage.