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GRAPE

Grape (*Vitis sp.*) belonging to Family Vitaceae is a commercially important fruit crop of India. It is a temperate crop which has got adapted to sub-tropical climate of peninsular India.

Origin

Grape cultivation is believed to have originated in Armenia near the Caspian Sea in Russia, from where it spread westward to Europe and eastward to Iran and Afghanistan. Grape was introduced in India in 1300 AD by invaders from Iran and Afghanistan.

Area & Production

India is among the first ten countries in the world in the production of grape. The major producers of grape are Italy, France, Spain, USA, Turkey, China and Argentina. This crop occupies fifth position amongst fruit crops in India with a production of 1.21 million tonnes (around 2% of world's production of 57.40 million tonnes) from an area of 0.05 million ha. in 2001-02. The area under grape is 1.2 % of the total area of fruit crops in the country. Production is 2.8% of total fruits produced in the country. About 80% of the production comes from Maharashtra followed by Karnataka and Tamil Nadu.



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Climate

- Temperature, humidity and light are important for grapes. Hot and dry climate is ideal. Areas with high humidity and high rainfall are not suitable.
- The climatic requirements of *vinifera* are different from those of *labrusca* grapes. Mild temperature, not exceeding 35°C in summers, impairs the fruiting of *vinifera* grapes, particularly, in Thompson Seedless.
- Higher night temperatures (above 25°C) during ripening hamper the colour development in coloured grapes. Cool nights and hot days even though congenial for coloured grapes, pink pigmentation develops in green grapes if the diurnal differences are more than 20°C during ripening.
- The total amount of rainfall is not the criterion, but the timing, frequency and duration of rainfall are important considerations for grape cultivation. Rains associated with cloudy weather and poor sunlight during 45–60 days after back pruning in the tropical India reduce the fruitful buds in a vine.

Soil

- Soil with good drainage and water-holding capacity in a pH range of 6.5–7.5 is ideally-suited for grapes.
- Presence of excess salts, particularly sodium and free calcium is detrimental for grapes. Vines become weak and their productive life span is reduced.
- When the soil contains more free calcium than 12%, vines suffer from iron deficiency and the soil gradually becomes sodic.
- High content of sodium in soil poses drainage problems and the root growth is impaired.
- Soils of Maharashtra, Haryana and Punjab are saline-alkali. Free calcium content is also high in soils of Maharashtra.



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Varieties cultivated in different region of India

Regions	States	Varieties cultivated
Region - I. (Northern India)	Haryana, Punjab, Delhi, Western Uttar Pradesh, Rajasthan	Thompson Seedless, Perlette, Beauty Seedless, Anab-e-Shahi, Black Hamburg, Black Prince, Dakh, Foster's seedling, Kandhari, Khalili, Pandhari Sahebi, Watham Cross, Pusa Seedless, Hur, Black Muscat, Early Muscat, Banquiabyad, Cardinal, Kairon
Region - II (Peninsular India)	Telangana & Rayalseema regions of Andhra Pradesh, Nasik, Pune, Sholapur, Satara, Sangli, Bhir, Aurangabad and Ahmednagar districts of Maharashtra Bijapur, Gulbarga, Raichur, Bellary districts of Karnataka	Anab-e-Shahi, Thompson Seedless, Cheema Sahebi, Pandari Sahebi, Gulabi, Bhokri, Kali Sahebi, Sonaka & Tas-A-Ganesh (clones of Thompson seedless).
Region - III (Peninsular India)	Madurai, Salem and Coimbatore districts of Tamil Nadu Bangalore, Kolar, Mysore & Tumkur districts of Karnataka	Bhokri, Anab-e-Shahi, Gulabi, Bangalore Blue, Black Champa, Convent Large Black, Angur Kalan, Taifi Rosovi, Coarna Resia, Queen of vineyard, Kandhari, Black Prince, Muscat, Pachadraksha

List of commercial varieties utilized for specific purposes is given in the following:

Category	Varieties
Table grapes	Anab-e-Shahi, Bangalore Blue, Beauty Seedless, Bhokri (Pachadrakshi), Cheema Sahebi, Delight, Gulabi (Panneer Drakshi, Muscat Hamburg), Himrod, Kali Sahebi, Kandhari, Khalili, Pandari Sahebi, Perlette, Selection 94, Pusa Seedless and Thompson Seedless.
Raisin Grapes	Thompson Seedless, Arkavati
Wine Grapes	Bangalore Blue, Thompson Seedless and Arka Kanchan



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Propagation methods

- Grapevines are propagated by seeds, cuttings, layering, budding, or grafting. Grape is mostly propagated by hardwood stem cuttings.
- Four-noded cuttings from well mature canes on proven vines are made. The diameter of cuttings should be 8–10mm. Cuttings are mostly obtained from October pruning in the peninsula.
- Rooting of cuttings is not a problem. However, Thompson Seedless roots are poorer than Anab-e-Shahi or Bangalore Blue.
- To increase the rooting of stem cuttings, they should either be soaked or dipped to cover the basal buds in IBA solution. For overnight soaking, 500ppm IBA solution is used, while 2000ppm solution is used for quick dipping for 10 sec. before planting the cuttings. Quick dip method is preferred. Cuttings after treating with IBA should be planted in the nursery or directly in the field.
- Cuttings are planted in nursery either in beds or polybags for rooting. The beds or polybags should be under partial shade. The rooting media should have 30–40% well-decomposed cattle manure to retain moisture and similar proportion of sand to provide drainage. The beds or rooting medium should be treated with Chloropyriphos or Furadan granules to prevent termite damage. Light frequent watering is to be given to the cuttings.
- For planting in field, 3–4 cuttings should be planted at each spot. Cuttings are covered with green twigs to provide shade. After rooting, one good cutting is retained at each spot. Gap filling should also be done at this stage.
- In nematode-prone soils, the rootstock 1613 can be used for Anab-e-Shahi or Thompson Seedless.
- In saline soils, Dogridge is better.



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Land Preparation

- Land is leveled by a tractor or bulldozer as per the requirement, soil type and gradient.
- In case of drip irrigation, leveling need not be perfect.
- The size of the plot will vary with the type of training system used.
- In case of bower and telephone or “T” trellis the ideal size could be 60 X 80 m. and 90 X 120 m. respectively.

Planting Season

The best season for planting the rooted cuttings of cultivated varieties in the main field is September-October whereas for rootstocks it is February-March

Spacing

Spacing generally varies with the varieties and soil fertility. For vigorous varieties it is 6 m x 3 m or 4 m x 3 m and 3 m x 3 m or 3 m x 2 m for less vigorous varieties.

CARE AND MANAGEMENT OF VINEYARDS

(A) Training of Vines: Many training systems are in vogue in India, but the most popular are Bower, Telephone and Flat Roof Gable systems

1. Bower System:

Owing to the high productive potential, bower was a very popular system of training in the past. It is highly suited for vigorous varieties like Anab-e-Shahi, Bangalore Blue and Gulabi. But in varieties like Thompson Seedless and Tas-A-Ganesh where vine vigour and excessive foliage density affects the productivity adversely, this system is not popular.



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2.Telephone System:

T-trellis is used in this system of training. With three top wires and 'T' shaped supports, the trellis looks like a telephone pole and wires and hence the name.

3.Flat Roof Gable System:

Combining the advantage of bower and the extended Y systems and eliminating their disadvantages, an inter-connected Y trellis forming a flat roof gable is being adopted. This system is particularly followed for vigorous vines (vines grafted on rootstocks). The bunches are protected from direct sunlight and well exposed to sprays of pesticides.

(B) Pruning of Vines :

Three distinct pruning practices are in vogue in relation to cropping in the three grape growing regions of the country.

In the sub-tropical region, vines are pruned only once in December and the crop is harvested once. Half of the canes are pruned to renewal spurs and the rest to fruiting canes (3-4 nodes for Perlette).

In hot tropical regions, vines are pruned twice but only one crop is harvested. All canes in a vine are pruned back to single node spurs in March-May to develop canes and the canes are forward pruned in October-November for fruiting. The number of nodes retained on a cane varies with the variety and cane thickness. There is no scope to prune earlier than October and later than November due to unfavorable weather conditions.

In the mild tropical region, vines are pruned twice and the crop is harvested twice. In varieties like Gulabi and Bangalore Blue, which are fairly resistant to rain damage and in which fruit bud differentiation is not impaired by cloudy weather and rains, pruning is done at any time of the year. As a result, five crops are harvested every two years.



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Application of Manure and Fertilizers:

At the time of planting about 75 tonnes of cattle manure 5 tonnes of caster cake and 2 1/2 tonnes of super phosphate per hectare are applied .After the vine has grown for 3-4 weeks it is given an application of 100 to 150 g of Ammonium sulphate and 250g of caster cake every month during the first six months after planting.

Variety	Region	N	P ₂ O ₅	K ₂ O
Anab-e-Shahi	North India	366-600	300-550	183-1200
	Telangana	435	305	784
	South interior Karnataka	500	500	1000
Beauty Seedless	North India	165	-	-
Cheema Sahebi	Maharashtra	600	240	120
Gulabi, Himrod, Perlette	North India	444-715	457-1332	460-1000
Thompson Seedless	North India	444-1100	1332	1332
	Maharashtra	666-1000	500-888	666-800

Weed Management :

Farmyard manure and compost are the major sources of weed seeds from outside. The problematic weeds in vineyards are bermuda grass (*Cynodon dactylon*) and nut grass (*Cyperus rotundus*). The weed intensity is less in bower trained vineyards. Mechanical control is most common means of weed control in India. Dhaincha and sunhemp are grown as intercrops to check the weeds in vineyards trained to T, V or Y trellises. Post-emergent weedicides- Paraquat (7.5 kg/ha) or Glyphosate (2.0kg/ha), is also recommended. Glyphosate offers a long time control of weeds as compared to Paraquat



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Supplementary Irrigation :

Since grapes are grown in areas where the evapotranspiration exceeds the precipitation, irrigation is essential. Less than 10 percent of the vineyard areas are surface irrigated, while the rest is irrigated by drip systems. Water requirement is calculated based on the pan evaporation using 0.8 as the crop factor. Water is applied at different rates at different stages of vine growth and berry development.

Improvement in fruit Quality

Pruning time, variations in climate during the growth period (temperature, humidity and frost), use of various chemicals to control diseases and pests are the main factors which determine the quality of the produce. Good variety bunches of Grapes for eating should be from medium to big sized, seedless grains. Varieties like Perlette tend to bear very compact bunches and require considerable thinning of berries for proper development of berry and bunch. Removal of distal end of the bunch helps in uniform ripening of berries. Application of growth regulators also helps in improving the fruit quality. Application of 20 ppm. of Gibberellic acid (GA) (2g./100 l. water) at full bloom followed by dipping of bunches in 75 ppm. of GA solution at fruit set stage increases the bunch and berry size of seedless varieties. Similar kind of treatment given to seeded varieties does not give the same kind of result. Pre-bloom application of SADH (1500 ppm.) and CCC (1200 ppm.) increases fruit set and yields in Thompson Seedless and Anab-e-Shahi cultivars of grapes.



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Plant Protection Measures

Insect Pests

Insect pests mostly observed are flea beetle, thrips & wasps. For controlling these spraying with Dichlorovas, Dimethoate & Endosulfan is recommended.

Diseases

The Crop is suspect to diseases like downy mildew, powdery mildew, black rot, wilt, leaf blight etc. Timely treatment and control measures are needed.

Disorders

Some of the disorders observed in case of grapes are post harvest berry drop, berry cracking, leaf chlorosis, dead arm & trunk splitting.

Harvesting and Yield

In North India, plants start fruiting after two years of planting. Berries start ripening from the end of May in early varieties. However, most of the varieties are harvested after they have changed colour near the tip and have become sweet. A day prior to picking, the broken, decayed, deformed, under-sized berries are removed. The clusters are usually harvested during the early hours of the day before the temperature rises above 20⁰ C. Yield varies according to variety and climatic conditions etc. The average yield of Anab-e-Shahi and Bangalore blue is 40-50 tonnes/ha while that of seedless varieties is 20 tonnes/ha. Average yield of 20-25 tonnes/ha. is considered good.