

## PRODUCTION TECHNOLOGY OF GRAPES

Vishal Tiwari, Chahak Tandon, Nainsi, Vivek Kumar Yadav, Durga Kumari

### Scientific classification:-

**Botanical Name** - VITIS VINIFERA

**Kingdom:** Plantae

**Division:** Magnoliophyta

**Class:** Magnoliopsida

**Order:** Vitales

**Family:** Vitaceae

**Genus:** Vitis L.



### INTRODUCTION:-

1. It is a deciduous crop. Its natural habitat is temperate climate.
2. It was introduced in to north India from Iran and Afghanistan in 1300 AD by the Muslim invaders; and into south India in 1832 by the Christian missionaries from France.
3. However, grape was known in ancient India though it was not commercially cultivated until the 14th century.
4. Wild grapes grown in Himachal Pradesh were used to prepare local wine.
5. Presently grape cultivation is concentrated in the peninsular India (surrounded Arabian Sea, Bay of Bangal & Indian Ocean), accounting for 90% of the total area.
6. Major grape-growing states are Maharashtra, Karnataka, Andhra Pradesh, Tamil Nadu, and the north-western region covering Punjab, Haryana, Delhi, western Uttar Pradesh, Rajasthan and Madhya Pradesh.

### VARIETIES:-

#### 1. Anab-e-Shahi:-

1. This variety is grown in the states of Andhra Pradesh, Punjab, Haryana and Karnataka.
2. Juice is clear and sweet with TSS 14-16%.
3. It is highly susceptible to downy mildew.
4. Average yield is 35t/ha

*Vishal Tiwari, Chahak Tandon, Nainsi, Vivek Kumar Yadav, Durga Kumari*

<sup>1,2</sup>*M.Sc.(Ag) Horticulture From Dr. Ram Manohar Lohia Avadh University.*

<sup>3</sup>*M.Sc. (Ag) Horticulture From Institute Of Agriculture Science, University Of Calcutta.*

<sup>4</sup>*M.Sc. (Ag) Horticulture From Chandra Bhanu Agriculture PG College, Lucknow University.*

<sup>5</sup>*M.Sc. (Horticulture) PostHarvest Technology Banda University Of Agriculture And Technology*

## 2. Bangalore Blue:-

1. This variety is grown in Karnataka
2. Berries are small sized, dark purple, ovoid, seeded with thick skin.
3. Juice is purple coloured, clear and pleasantly flavoured with 16-18% TSS. It is resistant to anthracnose

## 3. Thompson Seedless:-

1. This variety is grown in Maharashtra, Andhra Pradesh, Tamil Nadu and Karnataka.
2. The juice is straw coloured, sweet with a TSS of 20-22%.
3. Variety has a good keeping quality and is used for table purpose and raisin making.
4. Average yield is 20-25 t/ha.

## 4. Sharad Seedless:

1. It is a variety local to Russia called as Kishmish Chorne
2. The berries are seedless, black, crisp and very O sweet.
3. The TSS is up to 24 Brix.
4. It has a good shelf life.
5. It is grown mainly as table purpose variety.

## 5. Black Seedless Grapes:-

These grapes are seedless, Black and make very good Table and Wine Grapes.

## 6. Red Flame Seedless Grapes:-

Are the result of across between Thompson, Cardinal and other grape varieties.

Flame grapes are one of the most popular varieties along with Thompson grapes. These grapes are seedless, sweet-tart, and crunchy.

## AREA AND PRODUCTION:-

In terms of production, grape occupies the 7<sup>th</sup> position (only 0.02% of total fruit production) among all fruits, but it has the highest productivity among all fruits.

Variety	Area (ha)	Production (t)
Anab-e-Shahi (white, seeded)	3,000	135,000
Bangalore Blue Syn. Isabella (black, seeded)	4,500	180,000
Bhokri (white, seeded)	500	15,000
Flame Seedless (red, seedless)	500	10,000
Gulabi Syn. Muscat Hamburg (purple, seeded)	1,000	30,000
Perlette (white, seedless)	1,500	60,000
Thomson Seedless and its mutants (white, seedless)	22,000	550,000
<b>TOTAL</b>	<b>33,000</b>	<b>980,000</b>

## CLIMATE:-

1. Grapes generally require a hot and dry climate during its growth and fruiting periods.
2. It is successfully grown in areas where the temperature range is from 15-40 0C.
3. High temperatures above 400C during the fruit growth and development reduce fruit set and consequently the berry size.
4. The fruitfulness of buds is influenced by light.
5. Light intensity of 2,400-ft. candle is essential for optimum growth.

6. It is most successfully grown at elevations ranging from 200-250m above mean sea level
  7. Area with annual rainfall not exceeding 900mm well distributed throughout the year is ideal.
  8. However, rainfall during flowering and fruit ripening is not favourable as it leads to the spread of downy mildew disease.
2. Grape is mostly propagated by hard wood stem cuttings.
  3. The diameter of cuttings should be 8–10mm. Cuttings are mostly obtained from October pruning in the peninsula.
  4. Quickdip method is preferred. Cuttings after treating with IBA should be planted in the nursery or directly in the field.

### SOIL:-

1. Grapes can be cultivated in variety of soils including sandy loams, sandy clay loams, red sandy soils, shallow to medium black soils and red loams.
2. The soil should be well drained, having good water holding capacity and devoid of any hard pan or impervious layer in the top 90-cm, with water table at least 6.5m below.
3. Soils having pH range of 6.5-8.0 are considered ideal.

Major Grape Growing Regions	Soil Types
Uttar Pradesh & Haryana	Sandy loams sandy clay loams.
Andhra Pradesh	Red sandy soils.
North interior Karnataka & Maharashtra	Shallow-medium deep black.
South interior Karnataka & Tamil Nadu	Red loams

### PROPAGATION:-

1. Grape vines are propagated by seeds, cuttings, layering, budding, or grafting.

### Spacing:-

Spacing varies with variety and soil fertility. Generally under organic cultivation, spacing of 2.5m x 1.5m, 2.75 m x 1.50 m and 3.0 mx 1.5 m are followed

### Planting:-

Pits of 90cm x 90 cm x 90 cm are dug and filled with soil and well decomposed FYM/Compost @ 55t/ha. The pits are then irrigated in order to allow the soil to settle.

Rectangular system of planting is adopted for growing grape. (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)

### LAND PREPARATION AND VINE ESTABLISHMENT:-

The land is tilled and laid into plots of 120 m x 180 m separated by 3 m wide roads. Land within a plot is levelled perfectly to have a gradient of less than 1 percent in any direction to ensure uniform discharge of water through the emitters of drip irrigation systems.

Trenches of 75cm width, 75cm depth and 118m length in a north-south direction with a gap of 3 m between trenches are opened with heavy machinery. They are closed with top soil, up to a height of 45cm after 15 days exposure to sun. The remaining gap is filled with a mixture of soil, cattle manure, single super phosphate, sulphate of potash and micro-nutrients. Usually, 50kg of cattle manure, 2.5kg of super phosphate, 0.5 kg of sulphate

### IRRIGATION:-

Grape requires less water during fruit bud formation and more water during berry growth. Reduced irrigations during ripening improve the quality. Drip irrigation is becoming more popular. Water requirements under drip are:

1. 1-40 days after summer pruning -48000 - 60,000 liters/day/ha
2. 41-100- days after summer pruning- 24000 - 32,000/litres/day
3. 101- winer pruning days after summer pruning-15000 - 20,000 liters/day
4. 1 - 45 days after winter pruning 20,000 - 24,000 liters/day
5. 46 – 75 days after winter pruning- 20,000 - 24,000 liters/day
6. 76 – 100 days winter pruning 48,000 - 60,000 liters/day
7. 101 - harvest summer pruning 36000 – 48000 liters/day

### 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.

#### **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. This system is followed for moderately vigorous varieties like Thompson Seedless and other seedless cultivars in about 25-30 percent of the vineyard area in Maharashtra.

#### **3. KNIFFIN SYSTEM:**

Here, 2 trellies of wires are strung supported by vertical posts. The vine is trained so that it bears 4 canes one along each wire and bearing shoots can hang freely. In this system, 2 wires are stretched horizontally at the height of 0.90m and 0.60m. height. Vines are planted at 2-4m. distance between 2 poles supported by sticks to allow single stem to grow with one arm horizontally to either side

so that each arm having with the results into 4 arms.

### **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 unfavourable 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.

### **THINNING OF FRUITS**

The removal of flower clusters before flowering or parts of such clusters after fruit set is called thinning.

Types of thinning methods:

1. **Flower cluster thinning**
2. **Flower thinning**
3. **Cluster thinning**
4. **Berry thinning** **Thinning of fruits**

### **Shoot pinching:**

Shoot pinching is done when the main shoot attains 7-8 leaf stage. During pinching the tip of the mature shoot is pinched by retaining only five nodes. As a result the terminal bud along with 1-2 laterals resumes growth. These laterals are called as sub-canecanes. Buds up to third node from the base on the sub-cane were found to be invariably fruitful resulting in 2-3 clusters/cane

### **Girdling:**

Girdling is removing a narrowing of 4-5mm width of bark entirely around some member of vine like arm or cane. It is done to improve fruit set increase berry size & advance maturation.

### **MANURING:-**

Manuring is done by applying FYM at the rate of 55 t/ha. Biofertilizers like Azatobacter, Phosphate Solubilizing Bacteria (PSB), Effective Microorganism (EM), Neem cake and vermiwash are being used to supplement the nutrient requirement of crop. Trichoderma, Azatobacter and PSB are applied at the rate of 25 g/plant. Neem cake is applied at the rate of 1.25 t/ha. Jeevamrut is prepared by adding 10 kg cow dung, 5 l cow urine, 2 kg

black jaggery, 2 kg ground pulses powder, handful of bund soil in 200l of water. The solution is kept for 2 to 7 days in shade for fermentation. During the fermentation, the solution is stirred daily. To improve the quality of grapes, a solution of sugar, humic acid and coconut water is sprayed at bud development stage.

### WEEDING:-

In the vineyards, weeding is generally done mechanically. Frequent weeding is required to allow feeder roots to absorb the nutrients and moisture without any competition. Bullock drawn or tractor drawn implements can be used for inter-cultivation and weed control. Weeding is done 3-4 times in a year.

### PEST AND DISEASES

The major pests affecting the grape crop are flea beetles, thrips, mealybug and leafhoppers. The major diseases are downy mildew, powdery mildew and anthracnose. The schedule of plant protection measures are given below:

PEST AND DISEASES	PLANT PROTECTION MEASURES (SPRAYING OF)
Downy mildew or powdery mildew	Trichoderma, 1% Bordeaux mixture + Dasparmi arka + Gomutra
Mealy bug	Cowdung urine
Thrips	Dasparmi arka
Anthracnose	Solution of acacia leaves

### HARVESTING

1. Grapes should be harvested only after ripening. The heat requirement of most of varieties ranges from 2900 to 3600 units.
2. The grape berries can be kept without spoilage for 7 days at room temperature.
3. Grapes can economically be stored up to 40-45 days in cold storage. The optimum storage temperature recommended is -2 to -1.5°C.
4. Raisins from grapes form an important by product industry in several grape growing countries in the world.

### YIELD

1. Seedless: 15t / ha / year
2. Muscat: 30t / ha / year
3. Pachadraksha: 40t/ha /year
4. Anab-e-Shahi and Arka hybrids: 20t/ha /year

### **Post harvest management:**

#### **1. Grading:**

It is mainly done based on the size and colour of the grapes to maintain uniformly berries in a package.

#### **2. Pre-cooling:**

Pre-cooling is done to reduce the field heat, moisture loss and subsequently increase the storability of grapes. Fruit needs to be pre-cooled to a temperature below 4.400 C within

six hours after harvesting in cold rooms, forced air coolers, refrigerator cars and tunnels.

### **STORAGE:-**

1. The shelf life of grapes is only one week at room temperature
2. The storage life of grapes can be increased by employing suitable means to reduce desiccation, decay due to growth of fungi .
3. Pre-cooled grapes are packed in corrugated boxes in 4.5/5/9 kgs and kept in cold storage Boxes that are specially designed with perforations to allow cool air to pass through
4. The boxes are palletized to facilitate easy handling.

### **PACKAGING:-**

1. Table grapes meant for local market are picked and packed directly in containers in the field
2. Raisin, juice and wine grapes are subjected to suitable treatments and processed
3. Different types of containers are used for packing grapes in India
4. For the European market, bunches of grapes of approx. 300 to 700gms are packed in food grade plastic pouches.

### **TRANSPORATION:-**

1. Table grapes are mostly transported through roadways for local, short distance or long distance markets.

2. About 5% of the produce is transported by rail and the quality of produce transported through air cargo is almost negligible.
3. The cold chain for grapes is maintain edmeticulously right from pre-cooling state to selling of the same.
4. The produce for international market is sent through refrigerated vans by road up to the seaport and then again by sea in refrigerated containers in the ships to their respective destination.

