

Major training and pruning methods practised for canopy management in Indian grape vineyards

Dr. Madhumita Mallick^{1,*} and Dr. Tanushree Sahoo²

¹Assistant Horticulture Officer, G.B. Nagar block, Mayurbhanj District, Odisha

²Assistant Professor, Sri Sri University, Bidyadharpur, Cuttack District, Odisha

ARTICLE ID: 019

Introduction: Grape (*Vitis vinifera*) is a commercially important table fruit crop of India owing to its delicious taste and nutrient content. Despite of having temperate origin, it has acclimatized well to tropical and subtropical regions of India. Maharashtra, Karnataka, Tamil Nadu and Andhra Pradesh are the major grape growing states of India.

Canopy management: It is one of the principal cultivation practices, which concentrates on manipulation of tree canopy to obtain high yield with good quality fruits. Training and pruning are two key tools for canopy management, which have to be judiciously followed, keeping in mind, the crop's growth as well as fruiting pattern. Compared to other fruit crops, in grapevine, characteristic training and pruning techniques have been evolved owing to its weaker stem, indeterminate growth, apical dominance and, bearing pattern.

Training: Training is chiefly, giving a definite shape to the vine canopy, with the following objectives:

- It should allow maximum sunlight and good ventilation throughout the canopy.
- It should maximize no. of fruiting canes per unit canopy area.
- It should allow even distribution of vigour throughout the canopy and support heavy crop load.
- It should restrict build-up of microclimate congenial for disease, pest attack.
- It should result in maximum productivity keeping the quality intact.
- It should be convenient for different cultural practices and mechanization as well.
- It should be simple, durable and economically viable.



Popular grapevine training systems in India: Mainly six training methods *viz.*, bower, telephone, head, 'Y', Kniffin and flat roof gable are followed on a large scale.

Bower: Also known as **pergola/overhead/arbour/pandal**. Though highly expensive, it is the most popular training system in India, owing to its high productivity *i.e.*, 1 fruiting cane/sq. feet. It is highly suited for vigorous varieties like Anab-e-Sahi, Bangalore Blue and Gulabi. However, in Thompson Seedless and Tas-e-Ganesh, as vine vigour hampers yield, bower system is not preferable. Vines are trained onto a pandal fixed at 2-2.5 m above ground on concrete/iron poles. Due to overlapping of shoots, bunches are protected from sunburn injury. However, it leads to more disease and pest attack, poor spraying and mechanization. Higher height of the pandal also reduces the work efficiency.

Telephone: Also known as '**T**' **trellis**, is suitable for moderately vigorous varieties with more apical dominance like Thompson Seedless. Vine is grown on 'T' shaped support, with shoots hanging from three top wires stretched from the horizontal bar. The name comes from its resemblance to a telephone pole with wires. It is little advantageous over the bower system in terms of light penetration and airflow in the canopy, convenience in spraying and mechanization. However, it gives lower yield due to less canes/unit area and bunches too get sunburn injuries.

Head: Also known as **spur pruned** training system, is suitable for low to moderately vigorous varieties with poor apical dominance, *e.g.*, Perlette, Delight and Beauty Seedless. This is the least expensive training system, accomodating greater population, *i.e.*, 4000-5000 vines/Ha, at a spacing of 1.8 x 1.2-1.5 m. Vines are usually trained onto wooden poles at a height of 3-4 feet above the ground. This gives lower yield than other systems but with larger berries and good quality.

Kniffin: Also known as **Espalier**, this system is generally practised in moderately vigorous varieties with low apical dominance *e.g.*, wine varieties. Vines are trained on a two-wire vertical trellis, where the top wire or foliage wire is placed at 5' above the ground at the top of a line post, while the bottom wire to support canes are placed 16" below the top wire. Though it has advantages over bower system with regard to vine population, light

penetration, ventilation, spraying and mechanization, but it is less preferred by the growers due to 50% less yield than bower.

‘Y’ trellis: The trellis consists of a vertical pole mounted at a height of 1.2-1.3 m above the ground with two arms of 90-120 cm length placed at an angle of 90-110°. The main stem is headed back at a height of 1.2 m above the ground, from which two primary arms on each direction are allowed to grow at 90° to the row. The secondaries climb on wires spaced at a distance of 10-15 cm on the inclined surface of ‘Y’. This system is suitable for Perlette and Flame Seedless. This system facilitates better light penetration and spray coverage, prevents sunburn injury to the clusters and brings high yield with good quality.

Flat roof gable: This is mostly suitable for vigorous varieties. This consists of interconnected ‘Y’ trellis resembling to an angular bower between two adjacent rows. It encompasses benefits of both bower and ‘Y’ trellis systems, and hence is gaining popularity rapidly over bower. The clusters harvest maximum sunlight and are protected from sunburn, as they hang below the canopy. It also facilitates better aeration, spraying operation and mechanization.

Pruning: It is basically judicious removal of vine parts, in order to achieve the following objectives:

- To increase number of fruiting canes/unit area and promote their even distribution.
- To balance between vine vigour and fruitfulness
- To regulate stature of the vine to obtain higher yield with good quality.
- To reduce diseased, dry or dead wood and to facilitate cultural operations throughout the canopy.

Different pruning methods: In tropical parts of India such as peninsular and central India, grapevine displays evergreen nature, while in temperate region like north India, it shows deciduous nature as it slumbers into dormancy during winter. Hence, based on prevailing climate and subsequent growth habit of the vine, three common pruning practices are followed in India.

Single pruning-single cropping: It is mainly followed in subtropical north India, where the vine gets only one growing season to complete its physiological process due to onset of severe winter. Pruning is done late winter or at the onset of spring (January-February), and single harvest is obtained during June-July. Here, floral bud differentiation and fruiting occurs simultaneously. Therefore, half of the pruning is done to get fruiting while, half is for renewing the spurs.

Double pruning- single cropping: In hot tropical India like Maharashtra, A.P. and some parts of Karnataka, pruning is done twice and single crop is harvested. After harvest in March-April, canes are pruned back to spurs retaining one or two basal buds, to get fresh vegetative growth. It is also known as back/foundation/summer pruning. In October-November, these fruiting canes (six month old) are pruned to get shoots that will bear fruits, also known as forward/fruit/winter pruning. Intensity of fruit pruning depends upon variety and cane thickness, *e.g.*, in spur pruned varieties like Anab-e-Sahi, Bangalore Blue and Bhokri, pruning is done to 4-5 bud level, while in cane pruned varieties like Thompson Seedless, it is done to 10 bud level.

Double pruning- double cropping: In mild tropical regions, forward pruning is done twice a year, one during summer instead of back pruning and the other during winter, yielding two crops/year. This is commonly followed in Bangalore Blue in Karnataka, Anab-e- Shahi Bhokri and Gulabi in Tamil Nadu. In Karnataka, pruning done during October-November, gives first crop during February-March, while pruning during April-May after harvest, gives second crop during July-August. In Bangalore Blue, canes are pruned to 3-4 nodes at every pruning and harvesting is done about 5 months after pruning. As a result, five crops are harvested in two years. These varieties are not much prone to rain damage regarding bud differentiation, hence facilitate pruning throughout the year.

Sub cane pruning: Shoots grown to 9-leaf stage after back pruning are cut back to 7th leaf position, from where laterals arise forming a knot. The bud present on this knot is often ignored by the grower, which actually gives rise to a strong and healthy bunch. To facilitate this, pruning on the sub cane close to the knot is must.

Straight cane pruning: After attaining 12 or 13 leaf stage, growing shoots are pinched to halt growth. Now, these shoots will grow slowly, so that 16-17 leaves/shoot can be obtained.

It has advantage over sub cane pruning in terms of thicker canes, stronger and better quality grape bunches. This is normally practiced in areas with low irrigation facility during vine vegetative growth.

Conclusion: To enhance productive lifespan of grape vine with better quality clusters, proper canopy management through correct training and pruning methods is mandatory. A faulty technique may deplete the vine of its food reserve, subsequently reducing its vigour, productivity and quality. Unlike other fruit crops, training and pruning in grapevine are more scientific, expensive, require greater skill, hence need to be properly planned from the very beginning, focussing on vine vigour, soil type, weather condition and economy of the method.

