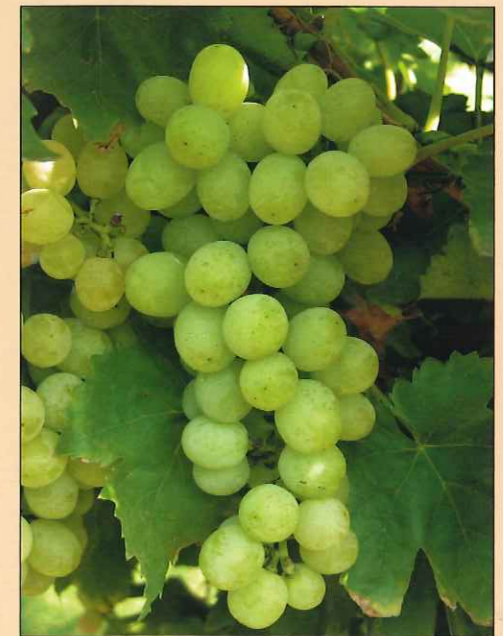




## Use of Bioregulators and Other Inputs for Quality Grape Production



**National Research Centre for Grapes**

P. B. No.3, Manjri Farm P. O., Solapur Road  
Pune - 412 307, Maharashtra, India

used at berry softening stage. The use of CPPU at 3-4 and 6-7 mm berry size stage is also useful to retain uniform green colour of the berries at harvest.

### Do's

1. Planting should be done in North-South direction for flat roof gable system
2. Keep at least 10 leaves after the bunch
3. The bearing shoot should have more than 4 ft. length and its angle should be around 45° from the arm so that bunches should not be exposed directly to sunlight.

### Don'ts

1. Planting should not be done in East-West direction in flat roof gable system.
2. The 'Y' system should not be followed whenever growths of the vines are very less.
3. The bearing shoot should not be smaller than 4 ft length angle less from 45° from the arm.

### Benefits of Shade Nets

1. Helps in retaining uniform green colour of the berries in a bunch.
2. Avoid berry scorching and sunburn.
3. Prevents damage from hail storm.
4. Saves water in limited extent.
5. Beneficial when vine canopy is a limiting factor
6. Retains bloom on a bunch.

### Berry scars

Blemishes / scars on berries are caused by certain pests and diseases viz. thrips, anthracnose, powdery mildew; injury to the skin by chemicals such as sulphur and Karathane or sunburn. The bunches should not be dipped with mixtures/solutions of many chemicals. The recommended combinations are only to be used. Two to three same compounds should not be used as they may cause injury to berry skin (Scars).

### TSS/acid ratio

Palatability of table grapes is determined by a proper blend of TSS and acids content. The optimum ratio of TSS/acids is 20/1. Harvesting may be hastened or delayed with the help of bioregulators. The bioregulators like CPPU delays the harvesting by 7-10 days. The sprays of seaweed extracts may hasten the harvest by 2-3 days.

### Berry adherence and shelf life

Berry attachment to the pedicel and the pedicel attachment to the rachis accounts for berry adherence. Shriveling and loss of freshness in grapes is due to loss of water from the berries during storage and transit. Grapes shrivel with 1 to 2% loss of water. The thick pedicels can be formed with the application of CPPU at 3-4 & 6-7 mm berry stage (see Table 2). The cluster dipping with calcium nitrate @ 0.5-1% at 75 to 105 days after October pruning increase the shelf life. Treating the bunches with NAA (naphthalene acetic acid) @ 50-100 ppm 8-10 days prior to harvest enhances the shelf life in grapes.

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#### Prepared by :

Dr. S. D. Ramteke, Dr. R. G. Somkuwar and Dr. P. G. Adsule  
National Research Centre for Grapes, Pune - 412 307

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For further details contact :

#### NATIONAL RESEARCH CENTRE FOR GRAPES

P.B. No.3, Manjri Farm P.O., Solapur Road  
Pune - 412 307, Maharashtra, India  
Tel. : 020-26914245 / 5573 / 5574  
Fax : 020-26914246  
Email : dirnrcg@gmail.com

Printed at : Flamingo Business Systems, Tel. : 24214636. Email : flaminbs@vsnl.com

Grape is export oriented crop and recent international market trends indicate that the export of grapes from India is increasing every year. However, the contribution of Indian grapes in terms of table grapes is only 2.24% in the international market. Around 15 lakh tons of grape production is taken from 60,000 ha. area and around 53000 tons of grapes are being exported mainly to EU (European Union) countries, which comprised of 1.46%. The export of grapes is being done mainly from Thompson Seedless and it clones like Tas-a-Ganesh. Among the coloured grape, Sharad Seedless variety is being exported to Arabic countries.

To increase the export, it is essential to maintain the quality and secondly grape production should be according to consumer choice. To achieve these qualities in grape production use of bioregulators becomes essential.

#### Quality of grapes depends on following factors :

1. Bunch shape and size
  - a) Berry thinning
  - b) Berry Size
2. Uniformity of berries in a bunch
3. Uniform colour
4. No scars on berries
5. TSS and Acidity
6. Shelf life

#### Bunch Shape and Size



Shape refers to the length/breadth ratio of berries. Shape of the berry is a varietal character, but it can be altered by the use of growth regulators. To produce 400 g bunch it becomes essential to have bunch shape of appropriate size. To achieve the appropriate size and loose bunch, use of GA<sub>3</sub> during pre-bloom stage becomes essential. The details of application of GA<sub>3</sub> for production of loose bunch is given in Table 1.

**Table 1 : Use of Bioregulators for rachis elongation**

Sr. No.	Stage	GA <sub>3</sub> and other chemicals	Purpose
1	Parrot Green Stage	10 ppm GA <sub>3</sub> + Urea Phosphate (to maintain pH = 6.0)	Rachis elongation
2	3-4 days after above application	15 ppm GA <sub>3</sub> + Citric Acid (to maintain pH = 6.0)	Rachis elongation
3	3-4 days after above application	20* ppm GA <sub>3</sub> + Citric Acid (to maintain pH = 6.0)	Rachis elongation

\*Based on need 20 ppm GA<sub>3</sub> should be applied. If elongated Rachis are formed this application may be avoided.

#### a. Berry Thinning

Around 500 berries may form in a bunch. It is not possible to keep all the berries in a bunch due to compactness problem. Around 100 berries may be ideal for bunch shape and its growth, hence, rest of the berries has to be removed. This is done by following means.



- a. Use of GA<sub>3</sub>
  - a) Use of GA<sub>3</sub> - At the time of 50% flowering use 40 ppm GA<sub>3</sub> to thin the unwanted berries.
  - b) Mechanical Thinning - With the help of seizers the rachis can be removed first and then the berries can be thin out.
- b. Mechanical operations

#### b. Berry Size

To increase berry size, use of GA<sub>3</sub> and CPPU is essential. The doses of bioregulators have been standardized for Sharad Seedless, Flame Seedless, and Thompson Seedless grape varieties. For Flame Seedless and Sharad Seedless, CPPU @ 0.5 ppm and GA<sub>3</sub> @ 40 ppm at 3-4 mm and 6-7 mm berry stage is sufficient to achieve the adequate quality of grapes. For Thomson Seedless the doses of GA<sub>3</sub> & CPPU has also been standardized and the details are given in table 2.

**Table 2 : Application of bioregulators and berry growth stages to increase berry size**

Sr. No.	Stage	GA <sub>3</sub> and other chemicals
1	3-4 mm berry size	GA <sub>3</sub> @40 ppm + CPPU @2 ppm (pH 6.0) GA <sub>3</sub> @50 ppm + CPPU @ 1 ppm (pH 6.0)
2	6-7 mm berry size	GA <sub>3</sub> @40 ppm + 1-2 ppm CPPU (pH 6.0)

#### To increase berry size

##### Do

1. Berries to be thinned and the bunch to be tipped before dipping in bioregulators solution.
2. Based on availability of leaves the use of bioregulators has to be fixed. If 15 leaves are available on bearing shoot, 2 ppm CPPU and 40 ppm GA<sub>3</sub> needs to be applied as dip.

##### Dont's

1. There should not be more than 18 leaves on bearing shoot.
2. If less than 10 leaves available, avoid use of CPPU.
3. Don't do girdling before 3 to 4 mm berry size.
4. Avoid water stress during berry growth stage.
5. Thinning has to be completed upto 6-7 mm berry stage.

#### Uniformity in berry size in a bunch

To maintain the uniform size of the berries within a bunch, the bunches should be dipped properly and fully in GA<sub>3</sub> and CPPU solutions. When the berry thinning is performed, the small and large size berries should be thinned out, also the deformed & scars berries should be thinned.



#### Uniformity of colour

Colour is attributed to the diurnal variation in temperature, particularly low night temperature at the time of berry ripening. To retain green colour of berries for export, 6 BA @ 10 ppm can be