MANUAL ON

GOOD AGRICULTURAL MARKETING

PRACTICES FOR GRAPES

सत्यमेव जयते

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GOVERNMENT OF INDIA

MINISTRY OF AGRICULTURE
(DEPARTMENT OF AGRICULTURE & COOPERATION)
DIRECTORATE OF MARKETING & INSPECTION
BRANCH HEAD OFFICE
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PREFACE

Grape is an important fruit crop in our country and world. Grape is the third most widely cultivated fruit after citrus and banana. Grapes are widely consumed as fresh fruit in India. It is also used for producing raisins, wine, juice, juice concentrate, squash, beverages, jams and marmalades. Maharashtra is the largest producer of grapes in the country. Karnataka, Tamil Nadu, Andhra Pradesh and Punjab are other major grapes growing states.

The Inter-Ministerial Task Force on Agricultural Marketing Reforms in their report in May,2002, suggested several measures for undertaking various reforms in the Agricultural Marketing System in the country. In view of the keen competition in the domestic as well as international markets, it has become imperative to launch awareness programmes vigorously to up-date the technical know-how of various stakeholders involved in the marketing of farm produce in multi dimensional aspects of agricultural marketing system.

In view of the above, “Manual on Good Agricultural Marketing Practices for Grapes” has been prepared. This manual covers various aspects of post harvest management and marketing of Grapes.

This **“Manual on Good Agricultural Marketing Practices for Grapes”** has been prepared by **Shri MANOJ KUMAR**, Assistant Agrilcultural Marketing Adviser under the guidance of **Shri RAKESH SAXENA**, Dy Agricultural Marketing Adviser, D.M.I. B.H.O., Nagpur.

The Directorate of Marketing & Inspection acknowledges the assistance and co-operation extended by various institutions/organisations in supplying the relevant data/information required for compilation of this manual.

The Govt. of India should not be regarded as assuming responsibility for any of the statements contained in this manual.

-Sd-
(Rajendra Kumar Tiwari)
Agricultural Marketing Adviser
to the Government of India

Faridabad
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MANUAL ON
GOOD AGRICULTURAL MARKETING PRACTICES FOR GRAPES

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GRAPES

Botanical Name: *Vitis vinifera*

Family: *Vitaceae*

1.0 INTRODUCTION

Grape is one of the important fruit crop grown in our country. Grape is the third most widely cultivated fruit after citrus and banana. Italy is the largest producer of grapes in the world with 11.48% followed by China with 10.73% and USA with 9.93%. India produced about 2.77 per cent (1878.00 thousand tonnes) of the total world production (67909.28 thousand tonnes) during 2008. Maharashtra (75.33 percent) is largest producer of grapes in the country. Maharashtra and Karnataka together contributes about 89.65 percent of India's grapes production.

Grape is one of the most delicious fruits. Grapes are widely consumed as fresh fruit in India. It is also used for producing raisins, wine and other products. The peel of grapes is the source of essential oil and pectin. It can also serve as a raw material for the production of cattle feed and in preparation of candies. Raisins are rich source of sugar most of which is fructose and antioxidants.

2.0 IMPORTANT VARIETIES GROWN IN INDIA

State	Varieties
Andhra Pradesh	Thomson seedless, Anab-e-shahi, Sharad seedless, Dilkhush,Sonaka, madhu Angoor, Italia, Crimson seedless
Haryana	Perlette, Flame seedless, Anab-e-shahi, Cardinal, Angur Early,Beauty Seedless
Karnataka	Bangalore Blue, Thomson Seedless, Red Globe, Sharad Seedless, Flame seedless, Sonaka, Fantasy Seedless, Dilkhush, Anab-e-shahi
Madhya Pradesh	Thomson seedless, Sharad seedless, Sonaka
Maharashtra	Thomson seedless, Tas-A-Ganesh, Sonaka, 2A clone, Sharad seedless, Red Globe, Fantasy seedless, Flame seedless, Crimson seedless, Manjari Naveen, Jumbo nath, Nana Purple

Punjab	Perlette, Flame Seedless, Beauty Seedless, Punjab Purple, Pusa Navrang, Fosta Seedless, Cardinal, Black Hamburg, Delight, Arkavati
Rajasthan	Anab-e-shahi, Sharad seedless, Perlette, Flame Seedless
Tamil Nadu	Muscat Hamburg (Panneer), Thomson seedless, Red Globe, Bangalore Blue, Sonaka,

However, following varieties have become more commercial in Maharashtra in view of their adaptability, cost of production and market demand.

- Nana Purple
- Jumbo nath
- Red Globe
- Fantasy seedless
- Manjri Naveen

Some new table grape varieties from USA have been introduced such as Autumn Royal (Black Seedless), Autumn Seedless (White), Blush Seedless (Red) and Merquise (White Labrusca Seedless) they are under field evaluations.

3.0 PRE-HARVEST, HARVESTING AND POST-HARVEST CARE:

A) PRE-HARVEST CARE

Quality improvement in grapes is aimed at the production of loose bunches, increasing berry size, its sugar content and firmness.

A) Foundation pruning:

Sr. No.	Growth Stage	Chemical	Concentration (ppm)
1	After pruning	Hydrogen cyanamide @	1.5%

B) Forward pruning:

Sr. No.		Growth Stage	Chemical	Concentration (ppm)
1	1	After pruning	Hydrogen cyanamide	1.5-3.0 %
2	21-24	Prebloom spray	Gibberelic acid	10
3	23-27	2nd prebloom spray	Gibberelic acid	15
			Urea phosphate	1000
4	35-40	Early bloom dip	Gibberelic acid	20
5	48-50	After berry set 3-4 mm	Gibberelic acid	40
		for white seedless	CPPU	2
		for color seedless		0.5
6	60-62	After berry set 5-6 mm	Gibberelic acid	30
7	50-70	Pre harvest stage 2 times in white seedless	Calcium nitrate	10000

Practices to produce loose bunches:

Do's

i. Spray GA_3 @ 10 ppm at parrot green stage of cluster and 15 ppm GA_3 after a 4-5 days of 1st spray.

ii. GA_3 spray solution should be acidic (pH 5.5 - 6.5). Use citric *or* phosphoric acid *or* urea phosphate as a adjuvant to lower down the pH of spray solution

iii. Dip the clusters with 40 ppm GA_3 at 50% flowering if necessary. Treat individual cluster selectively.

iv. Cut the tips of clusters immediately after set by retaining 8-10 apical branches depending on the number of leaves available for a bunch.

v. Thin the berries manually after 3-4 mm berry size stage.

vi. If thinning is inadequate remove the alternate branch of the rachis to retain 5-6 branches and clip the tip of the bunch 8 days after set.

vii. Use sufficient spray solution to have optimum coverage of foliage as well as clusters.

Don’ts

i. Do not use the solvent (acetone / methanol) more than 30 ml per g of GA_3.

ii. Do not spray pre-bloom GA_3 without fungicide if the weather is cloudy and humid, particularly if it is likely to rain to avoid excessive flower drop.

iii. Do not spray GA_3 at full bloom *or* immediately after berry set to avoid berry shatter and formation of shot berries.

iv. Do not girdle the vines before 3-4 mm berry size stage and at higher bunch load.

v. Avoid injury to the berries while thinning mechanically by scissors.

vi. Do not use IAA along with GA_3 for cluster elongation.

Regulation of bunch size:

Do’s

i. Thin out the excess shoots to retain only one per two square feet of ground area occupied by the vine, to build strong canes.

ii. Restrict the growth of shoots to 15-18 leaves after back pruning by shoot topping after 75 days of back pruning.

Don’ts

i. Do not induce more bud break than required per cane. Three buds on canes thicker than 10 mm, two on canes with thickness of 8-10 mm and one on the canes with thickness ranging between 6-8 mm.

ii. Do not retain the canes that are thinner than 6 mm on the vines.

iii. Do not allow more than 15 leaves on a bearing shoot.

iv. Do not allow the clusters to develop on a shoot having less than 8 leaves.

Berry thinning:

Do’s

i. Thin the berries and tip the cluster by 1/4 or 1/3 rd to retain 8 berries per leaf.

ii. 1-2 ppm CPPU to 30-40 ppm GA_3 and dip the clusters in the mixed solution once at 3-4 mm stage and again at 6-7 mm berry size stage. Selection of growth regulators for dipping should depend on the number of leaves available per bunch.

Don’ts

i. Do not allow the bearing shoots to have more than 15 leaves.

ii. Do not treat the clusters with CPPU when the vine has inadequate leaf area, and the shoots are less vigorous.

iii. Do not girdle the vines before the berries attain 3-4 mm berry size stage.

iv. Do not reduce the quantity of irrigation water during 60-105 days after forward pruning with a notion to increase the quality.

v. Do not delay berry thinning beyond 7-8 mm stage of berries.

Uniform size of berries in a bunch:

Do’s

i. Clip off the tip of the cluster by 1/3rd or 1/4th of its length, since the under developed berries are mostly formed in the lower half of the bunch.

ii. Ensure that all berries in a cluster receive all GA_3 treatments uniformly.

iii. Ensure adequate leaf/fruit ratio for a developing bunch (6-8 berries / leaf).

Don’ts

i. Do not treat the berries with GA3 nor girdle the vines from berry set to shatter stage. Since this may lead to more shot berries in a bunch

Achieving uniform colour of berries in a bunch:

Do’s

i. Orient the rows in North-South direction when trained to flat roof gable system

ii. Irrespective of the size of the leaf, retain minimum 10 leaves above the cluster

iii. Orient the bearing shoots horizontally or diagonally on a slanting curtain

iv. Angle of the curtain should be 40°-45° to the vertical plane

v. Curtain height should be atleast 4 ft above the cordons

vi. Position the side shoots to cover the bunches borne on short shoots

Don’ts

i. Avoid training less vigorous vines to vertical trellises (T, V or Y).

ii. Do not orient the vine rows in East-West direction when trained to vertical trellises.

iii. Do not reduce the angle and the height of the curtain to less than 45° and 4 ft. respectively.

Increasing sugar content of berries:

Do’s

i. Train the shoot in such a way that all leaves are exposed to sunlight and the vine canopy is well illuminated and ventilated.

ii. Remove the weak canes of < 6 mm diameter at forward pruning.

iii. Girdle the vines at 3-4 mm size of berries.

iv. Ensure adequate leaf area per bunch.

v. Encourage the shoot growth up to berry setting to acieve proper leaf fruit ratio.

vi. Remove the basal yellow leaves.

Don’ts

i. A void over-crowding of shoots and natural shading of leaves.

ii. Avoid excessive irrigation after berry softening.

iii. Do not allow the clusters on weak shoots.

iv. Do not use CPPU for increasing the berry size in clusters borne on shoots with inadequate leaf area.

Bio-regulators are used in grape for quality improvement viz. increasing fruitfulness, inducing bud break apart from increasing rachis elongation for production of well filled bunch, berry setting and also for increase in berry size besides quality improvement and increase in shelf life. Bioregulators with their nomenclature, doses, stage of application, care to be taken during application have been elaborated pointwise and given below:

Fruitfulness

The fruitful buds are formed during 40-60 days after April pruning. To increase fruitfulness in buds, the moisture stress is to be imposed as well as N fertigation has to be stopped to reduce the excess vigour of the vine.

Budbreak

After Forward pruning, hydrogen cyanamide @ 1.5-3.0 per cent a.i. (30-60ml/L active ingredient is 50%) can be used within 2 days of pruning as per thickness of the cane to increase the budbreak and also the uniformity in the budbreak. For achieving more uniformity in budbreak, only selected buds has to be treated with hydrogen cyanamide.

Cluster elongation

Clusters are treated with Gibberellic acid (GA_3) for cluster elongation, thinning and to increase berry size. GA_3 @ 10 ppm is used as foliar spray when the cluster is at parrot green stage. After 4-5 days, GA_3 @ 15 ppm can be sprayed for rachis elongation and cluster growth.

Berry thinning

For thinning, if required GA_3 is sprayed @ 40 ppm when 50 percent of the flowers are opened in a cluster. This reduces the berry set and result in berry thinning. To enhance the efficacy of GA_3, the pH of the spray solution should be acidic (5 to 6.5). Treatment of GA_3 for thinning should not be taken if the rachis is well elongated and also when the weather is cloudy and is likely to rain. Otherwise, the entire flowers will drop.

Berry elongation

Treatment of GA_3 after berry set will increase their size by elongation. Care should be taken not to dip clusters where berries are yet to reach 3-4 mm size. If the berries are treated immediately after the set, thinning will be inadequate and more number of shot berries will form. Hence it is recommended to treat the clusters with GA_3 for berry elongation only after 3-4 mm size of berries.

Increasing berry diameter

For the export, berry diameter is more important than the berry length or the overall size of the berries. GA_3 along with CPPU (forechlorofenuron) @1-2 ppm can be used for increasing the berry diameter in seedless grapes. These bio-regulators must be used along with GA_3 @ 30- 40 ppm depending on the cluster and berry size. Therefore CPPU has to be used with the utmost care and only in vines having vigorous shoots.

With respect to use of bio-regulators, the stage of application and concentration plays very important role to achieve desired quantity and quality. To increase berry size (diameter) bio-regulators should be used at 3-4 mm berry size stage once and again at 6-7 mm berry size stage.

At berry size of 3-4 mm diameter

GA_3 @ 40 ppm + CPPU @ 1-2 ppm *or*

GA_3 @ 40 ppm

At berry size of 6-7 mm diameter

GA_3 @ 30 ppm + CPPU @ 1 -2 ppm *or*

GA_3 @ 30 ppm

The above schedule has to be followed according to leaf / fruit ratio.

Retaining green colour of berries

The use of CPPU at 3-4 mm and 6-7 mm berry size stage may also be helpful to retain the green colour of berries at harvest. Shade net are used and also the bunches are covered with paper bags to retain the uniform colour of the berries.

Improving shelf life

Generally, post harvest berry drop in Thompson Seedless and its clones is very negligible. If in any case, the berry drop is more than permissible limits, this can be avoided either by increasing the pedicel thickness which can be achieved with the application of bio-regulators which are used at 3-4 and 6-7 mm berry size stage or dipping the clusters with calcium nitrate @ 1 % aqueous solution from 75 to 105 days after forward pruning or by treating the clusters with NAA @ 100 ppm in 2 split doses ten days prior to harvest.

Source: National Research Centre for Grapes, Pune

B) HARVESTING CARE

The following harvesting care should be taken:

- Grape is a non-climacteric fruit, so it should be harvested only when the berries are fully ripened on the vine itself. Maturity standards of grapes fixed under the AGMARK states that the minimum TSS of 16^0B and sugar acid ratio of 20:1 and this has to be complied for export and domestic market.

- The optimum stage for harvesting is indicated by the characteristic colour development in coloured varieties.
- Ratio of sugar/acid is the correct index of ripening.
- Peduncle should be fresh and green.

- The grapes should be harvested early cool hours in the morning or cool late afternoon.
- Harvest the bunches in early morning hours before the berry temperature rises above 20°C.
- It is advisable to close the harvesting by 10 a.m.
- A day prior to picking, the broken, along with decayed, deformed, undersized, and discoloured berries should be removed by cutting their pedicel from the selected bunches, using a long nosed scissors.
- In case of heavy dew in the night, harvesting should be delayed till the dew has dried.
- If rainfall has occurred just prior to harvest, the fruit should not be picked for at least 3-4 days.
- Long nose scissors should be used in harvesting.
- The selected bunches are harvested by giving a cut above the knot present on the stalk of the bunch.
- Care should be taken not to injure other berries by the scissors.
- Care should be taken to avoid erasing the bloom (waxy coating) of berries by holding the stem of the bunch by hand.
- Wear rubber gloves during harvesting to reduce erasing the bloom from the berry surface.
- Bunches should be trimmed by removing the decayed or defective berries before packing.
- Picker should be trained for harvesting. Harvesting should be done by skilled workers wearing soft rubber gloves and using sharp secatures / scissors for cutting.

C) POST-HARVEST CARE

To minimise post-harvest losses, the following measures should be followed:

- Harvested bunches should be placed gently in clean perforated plastic trays in not more than two layers and shifted to the packing shed without loss of time.
- The crates should be lined with clean bubble sheets for cushioning and kept over newspapers spread on the ground to avoid contamination with vineyard dust.
- While cleaning, harvesting or trimming bunches should be held by their stalk.
- Immature, diseased, shrivelled, undersized, off-colour or under developed berries or side branches of the rachis should be trimmed.
- The berries should never be pulled out by hand as the portion of the pedicle along with pulp from the berry that remains attached to the bunch (wet brush) is a hot spot for development of decay causing organisms.
- Bunches with sun scorching or damage due to mealy bugs, powdery mildew, chemicals etc. or excessive water berries, etc. should be removed before packing.

- Immature, diseased, shriveled, undersized, off-colour or under developed berries should be removed from bunch.
- Grapes should be cleaned and graded after harvesting.
- Use hygienic packaging material for storage and transport to avoid infestation.
- Before storage grapes should be pre-cooled.
- Pre-cooling is essential to minimize water loss, avoid decay and reduce metabolic activities of grape by lowering the temperature.

- By precooling berry temperature is brought down to 4°C within six hours.
- In pre-cooling, temperature is maintained at 0-4 ^{o}C and Relative Humidity at 90% and above.
- Grapes should be stored in cold storage (Temp.: 0 -2 ^{o}C and Relative Humidity: 90-95%).
- The harvested produce should be treated with sulphur dioxide to sterilize the fruits to prevent attack of bacteria and fungus.
- Use proper techniques while handling (loading and unloading).
- Grape guard should be used during storage and transportation to retain freshness of fruits and checks fungal infection.

4.0 GRADING

Grading means the sorting of the homogenous lots of the produce according to the fixed grade standards. Produce is graded in accordance with the various quality factors.

Grading is one of the most important procedures to be followed in post-harvest handling as it determines the quality, shelf life and price of the fruits. Bunches are graded based on the size and colour of berries and not on the shape of the bunch. Grading is done manually. While grading, the bunch should be held by the peduncle and care should be taken to avoid touching the berries/bunch by the naked palm of the hand.

The Agricultural Produce (Grading and Marking) Act, 1937 was enacted to maintain the quality of agricultural produce in India. The Act authorizes the Central Government to frame rules related to the fixing of grade standards and the procedure to be adopted to grade the agricultural commodities included in the schedules. In accordance with this Act, specifications have been drawn up for grapes considering various quality factors. As per AGMARK, Extra, Class I and Class II grades are available based on bench weight.

Benefits:

1. Grading is beneficial to the farmers, traders as well as to the consumers.
2. Grading of the grapes before sale enables farmers to get better price for their produce.

3. Grading helps the consumers to get standard quality produce at fair price.
4. After grading, it is easier for the consumer to compare the prices of different qualities of a produce in the market.
5. Grading also reduces the cost of marketing.
6. Grading helps in segregation of grapes for raisin making, juice making, wine making etc.

5.0 PACKAGING

Packaging is very important as good packaging protect the produce from any damage during storage, transportation and other marketing operations.

The grapes are packed in ventilated corrugated fibre boxes, pouches and punnets. These boxes are lined with bubble sheet. Punnet packing is highly appreciated in retail stores/malls.

Fine paper shred or fine hay is spread at the bottom and top of the box for cushioning. For export before placing the grapes in the carton, the bubbled polythene cushion is placed at the bottom of the carton. A white and soft polythene liner is spread over the top of the bubble sheet. These pouches are arranged in a single layer in a slanting fashion in the carton. The open flaps of the box are secured firmly by an adhesive tape before pre-cooling. After pre-cooling, dual purpose SO_2 releasing pads are placed over the pouches. A few opening points are also provided in the cartons for free circulation of air. The cartons are printed with information such as name of the variety, date of packing, weight, name of the consignee and consignor, destination for domestic markets. Punnet packing is highly appreciated in retail stores/mall.

The shelf life could be enhanced by modified atmospheric packaging (MAP) of grapes in polymeric films. Polymeric films like low-density polyethylene (LDPE) and polypropylene (PP) could be used for storing the grapes in small pouches.

GRAPEGUARD:

It is a paper, chemically treated with Sodium metabisulphate or Potassium metabisulphate, which when it comes in contact with moisture releases Sulphur dioxide which helps in retaining freshness of fruits and checks fungal infection in transit and storage.

Qualities of good packaging material :

Packaging material should;

- Be food grade.
- Protect the quality and quantity of the produce.
- Prevent spoilage during transportation and storage.
- Maintain the freshness of grapes.
- Convenient and suit the need of the consumer.
- Attractive for display.
- Gives information about quality, variety, growing region, date of packing, weight and price.
- Be convenient in handling operations.
- Be environment friendly and biodegradable.
- Be free from contaminating chemicals.

6.0 TRANSPORATION

The following points should be considered during transportation of grapes:-

1. Transportation should be quick.
2. Rough handling of boxes/cartons during loading/unloading should be avoided.
3. Over loading should be avoided.
4. To reduce bruising, good shock absorbers should be used.
5. No mixing of grapes packs with the packs of other commodities.
6. Appropriate temperature should be maintained during transportation.
7. Containers used for transporting must be capable of maintaining grapes at appropriate temperatures.
8. Container should be designed in such a way to monitor the temperature at regular interval.
9. Use of reefer containers should be encouraged.
10. Rail reefer container should be preferred over road transport.
11. Containers used for transporting grapes should be kept clean and maintained in good conditions in order to protect from contamination.
12. Containers should be designed and constructed to permit adequate cleaning and disinfection.

Cool chain:

Cool chain is essential during the movement of quality grapes all the way from the farm to the fork (consumer).

The various stages of the cool chain are:

1. Pre-cooling and cold store at the farm.
2. Maintaining suitable temperature during grading and packing in pack house.
3. Maintaining temperature in containers during transportation.
4. Off loading direct into a cold store in the receiving country.
5. Refrigerated truck to the temperature controlled departmental store.

7.0 STORAGE

Pre-cooling:

Grapes should be pre-cooled before cold storage.

Pre-cooling is done to remove field heat of grapes.

The grapes should be transported to pre-cooling units within 4-6 hours of harvest.

The temperature of harvested grapes should be brought down to less than 4°C within six to eight hours in the pre-cooling chambers.

In pre-cooling, temperature is maintained at 0-4 ^{o}C and relative humidity at 90% and above.

If the pre-cooling units are away from the production farm and packinghouses, mobile pre-cooling units are to be used.

The filled boxes without closing the polyethylene liner are placed in the pre-cooling chambers.

The temperature in the pack house should be maintained at 18-20°C.

Cold storage:

Grapes are stored in cold storage. After pre-cooling, the dual releasing sulphur dioxide pads (Grape guard) are placed with their coated surfaces facing downwards on the filled plastic pouches and covered with the polythene sheet lining.

The boxes are closed and shifted to cold storage rooms where the temperature and humidity are maintained at 0-2° C and 90% to 95% respectively.

Temperature of 0°C and humidity of 95% are the best for maintaining freshness and preventing decay.

The export process followed by MAHAGRAPES:

1. **Harvesting:** Harvesting is done in the early hours of the morning when ambient temperatures are low. Bunches of grapes are carefully placed in a single layer in crates and are kept in the shade.

2. **Grading:** Removal of unwanted berries, watered, small berries and grading bunches as per size and colour is undertaken. The grape bunches are graded as per AGMARK standards.

3. **Packing:** The grapes are packed in corrugated boxes under supervised and hygienic conditions at the farm itself and are then transported to societies.

4. **Transportation to societies:** Packed boxes are transported to the Member societies in Covered vehicles (Refridgerated / Ordinary) for pre-cooling treatment.

5. **Pre-cooling:** Grapes are pre-cooled to 2 ºC to prolong it's shelf life from 60 days to 90 days. Each of our member societies are provided with a pre-cooling unit.

6. **Cold storage:** Pre-cooled grapes are then packed in corrugated boxes in 4.5/5/9 kgs and kept in cold storage. Boxes are specially designed with perforations to allow cool air to pass through. The boxes are palletized to facilitate easy handling.

7. **Container filling:** The 40ft. reefer containers are pre-cooled to 2 º C and then are filled with the packed produce under supervision of an Central Excise & Customs supervisor.

8. **Sealing of container:** Containers are then sealed at site by the Central Excise
   Inspector / Superintendent.

9. **Export:** Thereafter, the boxes containing the grapes are stuffed in the container. Prior to stuffing the conditions of the grapes are checked by surveyors appointed by the shipping companies. The container is then sealed by Central Excise and Customs Inspector.

10. **Dispatch to destinations:** The filled containers are then transported and shipped to various destinations as per the directives of Mahagrapes.

Source: www.mahagrapes.com

MAJOR DISEASES AND THEIR CONTROL MEASURES:

Diseases	**Characteristics of diseases**	**Control measures**
Black Rot (*Aspergillus niger*)	High storage temperatures and humid conditions favour the development of the disease.  The fungus enters the berries through the injuries caused due to poor post harvest handling operations. The pulp of infected berries is reduced to watery consistency.	Careful handling and prompt refrigeration to 1-2^{0} C or below prevents the disease in storage. Inclusion of SO_2 releasing pads in the boxes while packing helps to control the disease.

Rhizopus Rot (*Rhizopus sp*.)	The fungus grows rapidly under warm and moist conditions producing a  coarse grey mat of mycelium. Injury caused to the berries by tight packing and storage temperature help the fungus grown during storage. Under ideal storage conditions it does not occur if the infected berries are trimmed at harvest.	Pre-harvest fungicidal sprays of Captan or Benomyl reduce the disease inoculum on berries. Inclusion of SO_2 releasing pads in the boxes while packing, removing of diseased berries during grading, avoiding injury to the berries while packing and handling helps to restrict the growth of fungi. Maintaining cold storage temperature between 0-1^0 C prevents fungal growth.

Crop growth stage wise cultural measures:

i) After foundation pruning,

ii) Pre-prunning period
-Mealy bugs

-Mites

-Stem borer

iii) At bud swelling stage

- Flee beetle

iv) During active shoot growth

v) During April- May or 15-50 days of back pruning

-Mealy bugs

-Sucking insects

-Jassids

-Stem borer

vi) After the onset of monsoon during June-July:

-Chaffer beetle

-Mealy bugs

-Caterillar

vii) Aug. to Oct.:

-Mealy bugs

-Stem borer

viii) Oct. to March:

-After fruit pruning

ix) Weather forecast helps in scheduling spray

x) Important risk period for downy mildew :

After foundation pruning

List of chemicals with Central Insecticide Board(CIB) and Registration Committee(RC) label claim for use in grapes is given in Annexure – 5

List of chemicals to be monitored for the grape season is given in Annexure – 9

8.0 IMPORTANT ASSEMBLING MARKETS

States	Important markets
1.Andhra Pradesh	Gaddiannaram, Medak, Anantpur, Rangareddy, Mehboobnagar, Kurnool
2. Haryana	Fatehabad, Jakhal, Ratia, Tohna
3. Karnataka	Bangalore, Malur, Mulbhagilu, Hubli, Mysore, Tumkur, Kolar, Bijapur , Gulbarga,Raichur, Bellary,Gadag, Kappal, Belgaon
4.Madhya Pradesh	Jabalpur, Katni, Chhindwara, Indore, Bhind, Morena, Shivpuri, Guna
5. Maharashtra	Nashik, Nagpur, Pune , Sangli, Solapur, Satara, Ahmednagar, Latur,Beed, Aurangabad

6.Punjab	Amritsar, Bhatinda, Faridkot,Ferozpur, Gurudaspur, Hoshiarpur, Jalandhar, Kapurthala, Ludhiana, Moga, Muktsar, Narashahar, Patiala, Ropar, Sangrur, Fatehgarhsahib
7.Rajasthan	Jaipur,Jodhpur,Ajmer, Bikaner, Sri Gangapur, Udaipur
8. Tamil Nadu	Coimbatore, Madampatti, Dindigul, Kodai Road, Semapatti, Madurai, Oodaipatti, Surulipatti, Kadayanallur
9.Uttar Pradesh	Lucknow, Jhansi, Sultanpur, Kanpur, Meerut, Moradabad, Muzaffarnagar, Bareilly, Allahabad, Agra

9.0 MARKETING CHANNELS

The following are the main marketing channels through which grapes are marketed

in India:

i) Producer – Pre harvest contractor – Wholesaler – Retailer –Consumer

ii) Producer – Commission agent/ Wholesaler – Retailer –Consumer

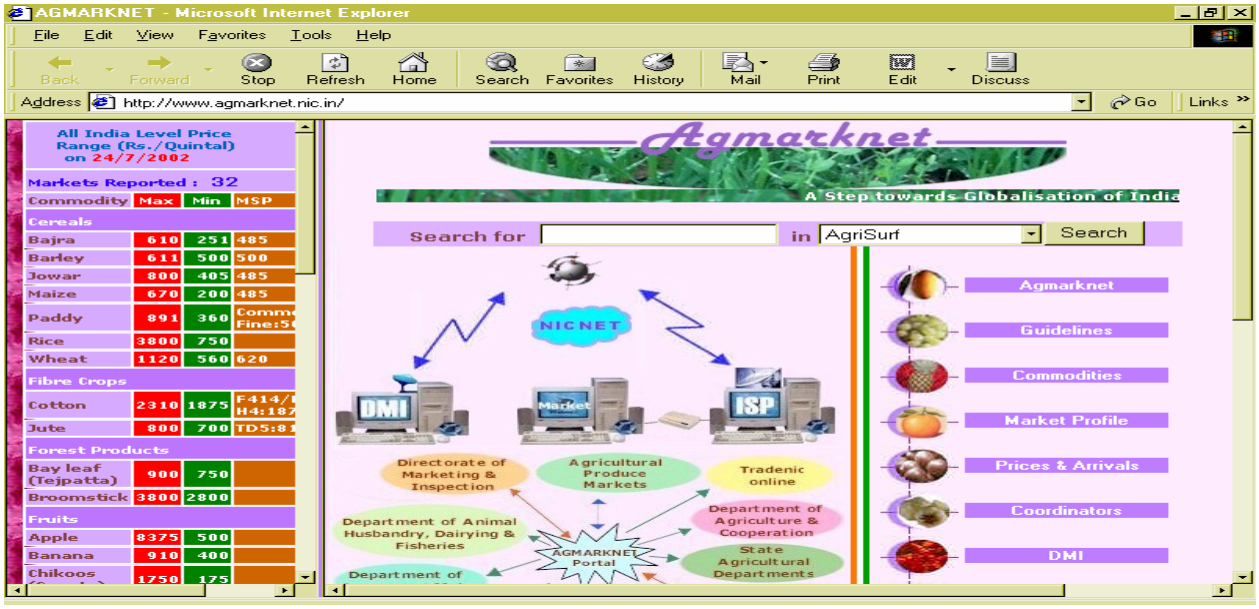
iii) Producer – Commission agent – Retailer –Consumer

10.0 MARKETING INFORMATION AND EXTENSION

Marketing information:

Marketing Information is essential for producers in planning production and market led production. It is equally important for other market participants for trading.

Government of India has launched Marketing Research and Information Network Scheme through Directorate of Marketing & Inspection (DMI) to bring out improvement in the present market information scenario by linking all agricultural produce markets in the States and Union Territories. The data received from markets is being displayed on the website www.agmarknet.nic.in



Marketing extension:

Market extension is a vital service to enlighten the farmers about proper marketing and improving their awareness in various aspects of post-harvest management for efficient and cost effective marketing.

Benefits : It;

- Provides the up-to-date information on the arrivals and prices of agricultural commodities of different markets.
- Helps the producers to take right decision, when, where and how much to produce and market the same efficiently.
- Educates the producers/traders about the post-harvest management i.e.
  - Harvesting care
  - Techniques to minimize losses during post-harvest period.
  - Value addition to the produce by proper cleaning, processing, packaging, storage and transportation.
- Orients the producers/traders/consumers about price trends, demand and supply situation etc.
- Orients the producer regarding the importance of grading, proper storage, co-operative/group marketing, direct marketing, contract farming, futures trading etc.
- Provides the information about the sources of credit availability, various Govt. schemes, policies, rules and regulations etc.

Kisan Call Centre :

The Department of Agriculture and Cooperation (DAC), Ministry of Agriculture, Government of India launched Kisan Call Centres on January 21st,2004 throughout the country. It has the objective of affording instant solution to the problems faced by the farmers during cultivation under diverse challenging situations by using local language. Dial toll free No. 1551 to contact Kisan Call Centre.

11.0 ALTERNATIVE SYSTEM OF MARKETING

1.) Direct marketing:

Direct marketing is an innovative concept, which involves marketing of produce i.e. grapes by the farmer directly to the consumers/processors without any middlemen. Direct marketing enables producers and processors and other bulk buyers to economize on transportation cost and improve price realization. It also provides incentive to large scale marketing companies i.e. processors and exporters to purchase directly from producing areas.

Benefits:

- It increases profit of the producer.
- It helps in market oriented production.
- It helps in better marketing of grapes.
- It minimizes marketing cost.
- It encourages distribution efficiency.
- It promotes employment to the producer.
- Direct marketing enhances the consumer satisfaction-since the farmer bring the produce in a manner acceptable to consumer.
- It provides better marketing techniques to producers.
- It encourages direct contact between producers and consumers.
- It encourages the farmers for retail sale of their produce.

2.) Contract Farming:

Contract farming is a system of farming, where selected crop is grown for marketing by farmers under a ‘buy-back’ agreement with an agency (entrepreneur or trader or processor or manufacturer). Contract farming is beneficial to both the parties i.e. farmers and the contracting agencies.

Benefits	To Producer	To Contracting agency
Risk	It minimises the price risk.	It minimises risk of raw material supply.
Price	Price stability, ensuring fair price.	Price stability as per pre-agreed contract.
Quality	Use of quality seed and inputs.	Get good quality produce and control on quality.
Payment	Assured and regular payments through bank tie up.	Easy handling and better control on payment.
Post-harvest handling	Minimises risk and cost of handling.	Control and efficient handling.
New technology	Facilitates in farm management and practices.	For better and desired produce to meet consumer needs.
Fair trade practices	Minimises malpractices and no involvement of middle man.	Better control on trade practices.
Crop insurance	Reduces risk.	Reduces risk.
Mutual relationship	Strengthens.	Strengthens.
Profit	Increases.	Increases.

3.) Co-operative Marketing:

"Co-operative marketing" is the system of marketing in which a group of producers join together and register them under respective State Co-operative Societies Act to market their produce jointly. The members also deal in a number of co-operative marketing activities i.e. purchasing of produce, grading, packing, processing, storage, transport, finance, etc. Co-operative societies market the member's produce collectively and secure advantages of economy of scale to its members.

The cooperative marketing structure in the different states consists of;

1. **PMS** (Primary Marketing Society) at the Mandi level
2. **SCMF** (State Cooperative Marketing Federation) at the State level
3. **NAFED** (National Agricultural Cooperative Marketing Federation of India Ltd.) at the National Level.

Benefits:

- Remunerative price to producers.
- Reduction in cost of marketing.
- Reduction in commission charges.
- Effective use of infrastructure.
- Credit facilities.
- Provide facilities of cold storage.
- Marketing information.

- Help in export to other countries.
- Supply of agricultural inputs.
- Collective processing.
- Timely and easy transportation service.

12.0 INSTITUTIONAL CREDIT FACILITIES

The institutional credit to agriculture is offered in the form of short term, medium term and long term credit facilities:

Short term and medium term loans:

1. Crop Loan

2. Produce Marketing Loan (PML)

3. Kisan Credit Card Scheme

4. Modified National Agricultural Insurance Scheme

Long term loans:

1. Agricultural Term Loan

13.0 ORGANISATIONS PROVIDING MARKETING SERVICES

Name and address of the organisation
1.Directorate of Marketing and Inspection (DMI) NH-IV, CGO Complex Faridabad   Website: www.agmarknet.nic.in
2.Agricultural and Processed Food Products Export Development Authority (APEDA)   NCUI Building, 3, Siri Institutional Area, August Kranti Marg, New Delhi-110016

Website: www.apeda.com

3.National Horticultural Board (NHB)

Ministry of Agriculture,Govt of India,

85, Institutional Area, Sector – 18

Gurgoan - 122015 (Haryana)

Website : www.nhb.gov.in

4.National Co-operative Development Corporation (NCDC),

4, Siri Institutional Area, New Delhi-110016

Website: www.ncdc.nic.in

5.Director General of Foreign Trade (DGFT),
Udyog Bhavan, New Delhi.

Website:www.nic.in/eximpol

6.State Agricultural Marketing Board (SAMBs),

14.0 DOS AND DON'TS

DO'S	DON'TS
√ Harvest the grapes at right maturity stage.	X Delay in harvesting causes shattering of berries.
√ Grapes should be harvested at low temperature (early in the morning or evening).	X Harvest during noon (high temperature).
√ Grapes are harvested by cutting selected bunches with long nose sharp scissors.	X Damage the bunches and individual berries.
√ While harvesting, care should be taken to avoid erasing the waxy coating by holding the stem of the bunch by hand.	X Erase waxy coating on grapes.
√ Market the grapes after AGMARK grading to get remunerative prices in the market.	X Market grapes without grading.
√ Before marketing the produce, get the market information regularly from www.agmarknet.nic.in website, newspapers, T.V., radio, MAHAGRAPES, concerned APMC offices etc.	X Market produce without collecting / verifying marketing information.
√ Grapes should be pre cooled before transportation or storage.	
√ Store grapes in cold storage.	
√ Package properly to protect the quality and quantity of grapes during transit.	X Transport or store grapes without pre cooing.

√ Grapeguard should be used in package during transport.	X Store in godown at high temperature.
√ Grapes should be transported in refrigerated (reefer) van.	X Use conventional method of package, which causes higher transit losses.
√ Adopt the procedure of Sanitary and Phyto-Sanitary measures during export.	X Package without grapeguard during export.
√ To assure better marketing of the produce, avail benefit of contract farming.	X Transport in open trucks.
√ Get MRLs certificate to control pesticide residues in excess before exporting grapes.	X Export without any Sanitary and Phyto-Sanitary measures.
	X Produce grapes without assessing and assuring its market demand for that year.
	X Export without getting MRLs certificate.

Annexure-5

Revision date: 27 October, 2010

List of chemicals with CIB&RC label claim for use in grapes

NATIONAL RESEARCH CENTRE FOR GRAPES
(Indian Council of Agricultural Research)
P.B. No. 3, Manjri Farm P.O. Solapur Road Pune - 412 307, India
Tel.: 020-26914245, 25169101 Fax: 020-26914246
E-mail: nrcgrapes@gmail.com, Website: http://nrcgrapes.mah.nic.in

Sr. No.	Chemical recommended for major disease & pest	Nature of chemical	Dose on formulation basis	EU MRL (mg/kg) updated as on 11/10/2010	Pre-harvest Interval (PHI in days)
I	**Downy Mildew**				
1.	Mancozeb 75 WP	NS	1.5-2.0 g/L	5.0	35 (avoid using after fruit set)
2.	Propineb 70 WP	NS	3.0 g/L	1.0	40 (avoid using after fruit set)
3.	COC 50 WP	NS	2.5 g/L, 2.4 g/L	50.0	42 (avoid using after fruit set)
4.	Chlorothalonil 75 WP	NS	2.0 g/L	1.0	60
5.	Fosetyl Al 80 WP	S	1.4-2.0 g/L	100.0	7
6.	Metalaxyl + Mancozeb 8+64 WP	S+NS	2.5 g/L	2.0 + 5.0	66
6a.	Metalaxyl-M + Mancozeb 4+64 WP	S+NS	2.5 g/L	2.0 + 5.0	66
7.	Cymoxanil + Mancozeb 8+64 WP	S+NS	2.0 g/L	0.2 + 5.0	66
8.	Dimethomorph 50 WP + Mancozeb 75WP as tank mixture	S+NS	0.5 to 0.75 g/L + 2.0 g/L	3.0 + 5.0	66
9.	Fenamidone + Mancozeb 10+50 WG	S+NS	2.5 to 3 g/L	0.5 + 5.0	66
10.	Azoxystrobin 23 SC	S	200 mL/Acre	2.0	7
11.	Iprovalicarb + Propineb 5.5+61.25WP	S+NS	2.25 g/L	2.0 + 1.0	55
12.	Famoxadone 16.6 % + Cymoxanil 22.1 % SC	S+NS	500 mL/ha	2.0 + 0.2	27

Sr. No.	Chemical recommended for major disease & pest	Nature of chemical	Dose on formulation basis	EU MRL (mg/kg) updated as on 11/10/2010	Pre-harvest Interval (PHI in days)
13.	Kresoxim methyl 44.3 SC	S	600-700 mL/ha	1.0	30
14.	Fenamidone 4.44% + Fosetyl-Al 66.66% WDG	S	2 to 2.5 kg/ha	0.5 + 100	27
II	**Powdery Mildew**				
15.	Penconazole 10 EC	S	0.50 mL/L	0.2	50
16.	Triadimefon 25 WP	S	0.50-1.0 g/L	2.0	45
17.	Hexaconazole 5EC	S	1.0 mL/L	0.1	38
18.	Myclobutanil 10 WP	S	0.40 g/L	1.0	30
19.	Flusilazole 40 EC	S	25 mL / 200 L	0.05	50
20.	Fenarimol 10 EC	S	0.40 mL / L	0.3	30
21.	Difenoconazole 25EC	S	0.50 mL / L	0.5	45
10a.	Azoxystrobin 23 SC	S	200 mL / Acre	2.0	7
13a.	Kresoxim methyl 44.3 SC	S	600-700 mL/ha	1.0	30
22.	Dinocap 48 EC	NS	0.30 - 0.35 mL/L	0.05	50 (avoid application when tender shoots are present in canopy)
23.	Sulfur 40 SC, 55.16 SC, 80 WP, 80 WDG, 85 WP	NS	3.0 mL, 3.0 mL, 2.50 g, 1.87-2.50 g, 1.50-2.0 g/L, respectively	MRL not applicable	--
III	**Anthracnose**				
2a	Propineb 70 WP	NS	3.0 g/L	1.0	40
3a.	COC 50 WP	NS	2.5 g/L, 2.40 g/L	50.0	42 (avoid using after fruit set)
24.	Carbendazim 50 WP, 46.27 SC	S	1.0 g/L, 1.0 mL/L	0.30	50
IV	**Flea beetles**				
25.	Imidacloprid 17.8 SL*	S	0.30 mL/L	1.0	60
26.	Clothianidin 50 WDG*	S	0.12 g/L	0.60	40
27.	Lambda-cyhalothrin 05 EC*	NS	0.50 mL/L	0.20	30
28.	Thiamethoxam 25 WG*	S	0.25 g/L	0.50	40

Sr. No.	Chemical recommended for major disease & pest	Nature of chemical	Dose on formulation basis	EU MRL (mg/kg) updated as on 11/10/2010	Pre-harvest Interval (PHI in days)
V	**Thrips**				
26a.	Clothianidin 50 WDG*	S	0.12 g/L	0.60	40
29.	Emamectin benzoate 05 SG*	NS	0.22 g/mL/L	0.05	25
30.	Fipronil 80 WG*	S	0.05 g/L	0.005	60
27a.	Lambda-cyhalothrin 05 EC*	NS	0.50 mL/L	0.20	30
31.	Spinosad 45 SC*	NS	0.25 mL/L	0.50	28
28a.	Thiamethoxam 25 WG*	S	0.25 g/L	0.50	40
VI	**Jassids**				
26b.	Clothianidin 50 % WDG*	S	0.12 g/L	0.60	40
27b.	Lambda-cyhalothrin 05 EC*	NS	0.50 mL/L	0.20	30
28b.	Thiamethoxam 25 WG*	S	0.25 g/L	0.50	40
VII	**Mealy bugs**				
32.	Buprofezin 25 SC	NS	1.25 mL/L	1.0	40
25a.	Imidacloprid 70 WG*	S	0.45 g/L/vine as soil drench	1.0	60
33.	Methomyl 40 SP	NS	1.0 g/L	0.02	61 (one application only at pre-flowering stage)
VIII	**Caterpillars (*Helicoverpa armigera* and *Spodoptera litura*)**				
31a.	Spinosad 45 SC*	NS	0.25 mL/L	0.50	28
27c.	Lambda-cyhalothrin 05 EC*	NS	0.50 mL/L	0.20	30
IX	**Mites**				
34.	Fenpyroximate 5 SC*	NS	1.5 mL/L	0.30	60
X	**Plant Growth Regulators**				
35.	Hydrogen cyanamide 50 SL	S	30-40 mL/L	0.05	90-120
36.	Forchlorfenuron (CPPU) 0.1% L	S	1-2 ppm	0.05	45 (for 1 ppm dose) 60 (for 2 ppm dose)
37.	Gibberellic acid (GA3) Technical	S	100 ppm (Cumulative Usage)	5.00	PHI data not available

Sr. No.	Chemical recommended for major disease & pest	Nature of chemical	Dose on formulation basis	EU MRL (mg/kg) updated as on 11/10/2010	Pre-harvest Interval (PHI in days)
38.	1-Naphthyl acetic acid 4.5% L	S	100 ppm	0.05	PHI data not available
39.	Chlormequat chloride 50 SL	S	250 ppm	0.05	PHI data not available
XI	**Herbicides**				
40.	Paraquat dichloride 24 SL	NS	5 mL/L	0.02	PHI data not available

NS = Non-systemic, S = Systemic

Note

- All the doses mentioned above are for high volume sprayers, where normal spray volume is 1000 L/ha. Spray volume can however be changed as per the efficiency of sprayers used. However, the amount of each pesticide based on its active ingredient recommended for 1 ha area on the basis of 1000 L spray solution should be strictly maintained to minimize pesticide residues.
- Recommended PHI will be valid only if two applications of an agrochemical are given per fruiting season at the interval of 7-15 days at recommended dose except in case of Flusilazole.

  The PHI of the fungicide Flusilazole pertains to one application by foliar spray only.
- Imidacloprid (17.8 SL or 70 WG) application (spraying or drenching) should not exceed more than two times per fruiting season.
- For the chemicals (Sl. No. 37, 38, 39 and 40) having label claim for grapes with CIB&RC, no PHI data is available for EU MRL. The farmers need to be cautious about the dose and stage of application as per the need.
- * As per the Office Memorandum F. No. 13035/18/2010-PP.I dated 21.10.2010 (copy enclosed) of the Govt. of India, Ministry of Agriculture, Department of Agriculture and Cooperation regarding the label expansion of insecticides for control of insects-pests of grapes.
- The responsibility of usage of chemicals for the management of pests and diseases will rest with the growers in compliance with the requirements of the importers/EU and, in the minimum; all chemicals listed in Annexure 9 should be tested.

Annexure – 9
Date: 22nd February, 2011

List of Agrochemicals to be monitored for the grape season 2010-2011

Sr. No.	Chemicals	Harmonized EU-MRL (mg/kg) updated on 11th October 2010	Status in EU under Directive 91/414/EEC
I)	**Organochlorine**		
1.	Aldrin (Aldrin and dieldrin combined expressed as dieldrin)	0.01*	Out/Banned
2.	Chlordane (cis & trans)	0.01*	Out/Banned
3.	**Chlorothalonil****	**1.00**	**In**
4.	DDT (all isomers, sum of p,p´-DDT, o,p´-DDT, p,p´-DDE and p,p´-TDE (DDD) expressed as DDT)	0.05*	Out/Banned
5.	**Dicofol** (sum of p, p´ and o,p´ isomers)**	**2.00**	**Out/Substance fulfilling criteria Annex VI Reg 1490/2002**
6.	Dieldrin (see Aldrin)	0.01*	Out/Banned
7.	Endosulphan (All isomers, sum of *alpha*- and *beta*-isomers and endosulphan sulphate expressed as endosulphan)	0.50	Out
8.	Endrin	0.01*	Out/Banned
9.	HCH (sum of isomers, except the *gamma* isomer)	0.01*	Out/Banned
10.	Heptachlor (sum of heptachlor and heptachlor epoxide expressed as heptachlor)	0.01*	Out/Banned
11.	Lindane (*gamma*-HCH)	0.01*	Out
II)	**Organophosphorus**		
12.	4-bromo-2-chlorophenol (metabolite of Profenophos)	0.01	Out
13.	Acephate	0.02*	Out
14.	Chlorfenvinphos	0.02*	Out/Essential use 835/2004
15.	**Chlorpyrifos****	**0.50**	**In**
16.	Chlorpyrifos methyl	0.20	In
17.	Diazinon	0.01*	Out
18.	Dichlorvos	0.01*	Out
19.	Dimethoate (Including Omethoate)	0.02*	In
20.	Edifenphos	0.01	Out/ Never notified and authorized in the EU
21.	Ethion	0.01*	Out/Essential Use
22.	Etrimfos	0.01	Out
23.	Fenitrothion	0.01*	Out
24.	Fenthion (fenthion and its oxygen analogue, their sulfoxides and sulfone expressed as parent)	0.01*	Out
25.	Glufosinate-ammonium (sum of glufosinate, its salts, MPP and NAG expressed as glufosinate equivalents)	0.10*	In
26.	Glyphosate (and the metabolite aminomethylphosphonic acid)	0.50	In/ Extension of the expiry date for inclusion

Sr. No.	Chemicals	Harmonized EU-MRL (mg/kg) updated on 11th October 2010	Status in EU under Directive 91/414/EEC
			(2010/77)
27.	**Iprobenphos****	**0.01**	**Out/ Never notified and authorized in the EU**
28.	**Malathion** (sum of malathion and malaoxon expressed as malathion)**	**0.02***	**In**
29.	Methamidophos	0.01*	Out
30.	Monocrotophos	0.01	Out
31.	Omethoate (refer to Dimethoate)	0.02*	Out
32.	Oxydemeton- methyl (sum of oxydemeton methyl and demeton-S-methylsulfone expressed as oxydemeton methyl)	0.01*	Out
33.	Parathion ethyl	0.05*	Out
34.	Parathion methyl (sum of Parathion methyl and paraoxon methyl expressed as Parathion methyl)	0.02*	Out
35.	Phenthoate	0.01	Out
36.	Phorate (sum of phorate, its oxygen analogue and their sulfones expressed as phorate)	0.05*	Out
37.	**Phosalone****	**0.05***	**Out**
38.	Phosphamidon	0.01*	Out
39.	Pirimiphos-methyl	0.05*	In
40.	Profenophos	0.05*	Out
41.	Propetamphos	0.01	Out
42.	Quinalphos	0.05*	Out
43.	Temephos	0.01	Out
44.	Thiometon	0.01	Out
45.	Triazophos	0.01*	Out/Essential use
III)	**Synthetic Pyrethroids**		
46.	Allethrin and Bioallethrin	0.01	Out
47.	Bifenthrin	0.20	Out/Application resubmitted for inclusion (Reg 33/2008)
48.	Cyfluthrin (including other mixtures of constituent isomers sum of isomers)	0.30	In
49.	Cypermethrin (including other mixtures of constituent isomers sum of isomers)	0.50	In (except beta isomer)
50.	Deltamethrin	0.20	In
51.	Ethofenprox (Etofenprox)	5.00	In
52.	Fenpropathrin	0.01*	Out
53.	Fenvalerate & Esfenvalerate (sum of RR & SS isomers)	0.10	Fenvalerate-Out Esfenvalerate-In/ Extension of the expiry date for inclusion (2010/77)

Sr. No.	Chemicals	Harmonized EU-MRL (mg/kg) updated on 11th October 2010	Status in EU under Directive 91/414/EEC
54.	Fenvalerate & Esfenvalerate (sum of RS & SR isomers)	0.02*	Fenvalerate-Out Esfenvalerate-In/ Extension of the expiry date for inclusion (2010/77)
55.	**Lambda-cyhalothrin****	**0.20**	**In**/ Extension of the expiry date for inclusion (2010/77)
56.	Permethrin (sum of isomers)	0.05*	Out
57.	*tau*- Fluvalinate	0.10	In/Initially not included by decision 2008/934. Inclusion voted in Jan 2011 following resubmission for inclusion according to Reg. 33/2008
58.	Transfluthrin	0.01	Not Included
IV)	**Triazines**		
59.	Atrazine	0.05*	Out
60.	Flufenzine	0.10	Out
61.	Simazine	0.20	Out/ Essential use 835/2004
V)	**Acylamino acid fungicides**		
62.	Benalaxyl including other mixtures of constituent isomers including Benalaxyl-M (sum of isomers)	0.20	Benalaxyl-In Benalaxyl-M-Pending
63.	**Metalaxyl ** & Metalaxyl-M**	**2.00**	Metalaxyl - In Metalaxyl –M-In/ Extension of the expiry date for inclusion (2010/77)
64.	Oxycarboxin	0.05*	Out
65.	Propanil	0.10*	Out/Application resubmitted for inclusion (Reg 33/2008)
VI)	**Carbamates**		
66.	Bendiocarb	0.01	Out
67.	Benfuracarb	0.05*	Out
68.	**Benomyl (see carbendazim)****	**0.30**	**Out/ Essential use 835/2004**
69.	**Carbaryl****	**0.05***	**Out**
70.	Carbofuran (sum of carbofuran and 3-hydroxy-carbofuran expressed as carbofuran)	0.02*	Out
71.	Carbosulfan	0.05*	Out
72.	Dazomet (Methylisothiocyanate resulting from the use of	0.02*	Out/ Application

Sr. No.	Chemicals	Harmonized EU-MRL (mg/kg) updated on 11th October 2010	Status in EU under Directive 91/414/EEC
	dazomet and metam)		resubmitted for inclusion (Reg 33/2008)
73.	Fenobucarb	0.01	Out/ Never notified and authorized in the EU
74.	Indoxacarb (sum of R and S isomers)	2.00	In
75.	Iprovalicarb	2.00	In/ Extension of the expiry date for inclusion (2010/77)
76.	**Methomyl** and Thiodicarb (sum of methomyl and thiodicarb expressed as methomyl)**	**0.02***	**Methomyl-In Thiodicarb-Out**
77.	Propoxur	0.05*	Out
78.	Thiobencarb (Benthiocarb)	0.10*	Out
79.	Thiodicarb (see Methomyl)	0.02*	Methomyl-In Thiodicarb-Out
VII)	**Pyrimidines**		
80.	Fenarimol	0.30	Out
VIII)	**Triazoles**		
81.	Bitertanol	0.05*	Out/ Application resubmitted for inclusion (Reg 33/2008)
82.	Difenoconazole	0.50	In
83.	**Flusilazole****	**0.05**	**In**
84.	**Hexaconazole****	**0.10**	**Out**
85.	**Myclobutanil****	**1.00**	**In/Initially non included by decision 2008/934. Inclusion voted in Nov 2010 following resubmission for inclusion according to Reg. 33/2008**
86.	Paclobutrazol	0.05	Out/ Application resubmitted for inclusion (Reg 33/2008)
87.	**Penconazole****	**0.20**	**In**
88.	Propiconazole	0.05*	In
89.	Tebuconazole	2.00	In
90.	**Triadimefon **(sum of triadimefon and triadimenol)**	**2.00**	**Triadimefon-Out Triadimenol-In**
IX)	**Imidazole**		
91.	**Fenamidone****	**0.50**	**In**
92.	**Iprodione****	**10.00**	**In**
X)	**Oxazole**		
93.	Famoxadone	2.00	In/ Extension of the

Sr. No.	Chemicals	Harmonized EU-MRL (mg/kg) updated on 11th October 2010	Status in EU under Directive 91/414/EEC
			expiry date for inclusion (2010/77)
XI)	Phthalimide		
94.	Captafol	0.02*	Out/Banned
95.	Captan**	0.02*	In
XII)	Benzimidazole		
96.	Carbendazim (including Benomyl)**	0.30	Carbendazim – In/ Approved with restrictions to crops and application rates Benomyl-Out/Essential use 835/2004
97.	Thiophanate-methyl	0.10*	In
XIII)	Dithiocarbamates		
98.	Dithiocarbamates (Mancozeb**, Maneb, Propineb**, Metiram, Thiram, Zineb** and Ziram** collectively estimated as CS2)	5.00	All In except Zineb
XIV)	Nicotinoids		
99.	Acetamiprid	0.01*	In
100.	Clothianidin (see thiamethoxam)**	0.60	In/Additional provisions to protect honey bees introduced by Directive 2010/21/EU
101.	Imidacloprid**	1.00	In/Additional provisions to protect honey bees introduced by Directive 2010/21/EU
102.	Thiacloprid	0.02*	In
103.	Thiamethoxam (sum of thiamethoxam and clothianidin expressed as thiamethoxam)**	0.50	In/Additional provisions to protect honey bees introduced by Directive 2010/21/EU
XV)	Dinitrophenol		
104.	Dinocap** (sum of dinocap isomers and their corresponding phenols expressed as dinocap) and Meptyldinocap	0.05*	Dinocap-Out/Inclusion expired on 31/12/2009 Meptyldinocap-Decision Pending
XVI)	Aliphatic Nitrogen fungicides		
105.	Cymoxanil**	0.20	In
XVII)	Morpholine		
106.	Dimethomorph**	3.00	In

Sr. No.	Chemicals	Harmonized EU-MRL (mg/kg) updated on 11th October 2010	Status in EU under Directive 91/414/EEC
107.	Tridemorph	0.05*	Out
XVIII)	**Substituted Thiourea**		
108.	Diafenthiuron	0.01	Out
109.	**Diuron** (Diuron including all components containing 3,4- dichloroaniline moiety expressed as 3,4-dichloroaniline)**	**0.05***	**In**
110.	Iodosulfuron-methyl (iodosulfuron-methyl including salts, expressed as iodosulfuron-methyl)	0.02*	In
111.	Isoproturon	0.05*	In/ Extension of the expiry date for inclusion (2010/77)
112.	Linuron	0.05*	In
113.	Lufenuron	1.00	In
114.	Pencycuron	0.05*	Out/ Application resubmitted for inclusion (Reg 33/2008)
XIX)	**Benzoylphenyl urea**		
115.	Flufenoxuron	1.00	Out/ Application resubmitted for inclusion (Reg 33/2008)
XX)	**Strobilurin**		
116.	**Azoxystrobin****	**2.00**	**In**
117.	Kresoxim methyl	1.00	In
118.	Pyraclostrobin	1.00	In
119.	Trifloxystrobin	5.00	In
XXI)	**Phenyl pyrazole**		
120.	**Fipronil** (sum of fipronil + sulfone metabolite (MB46136) expressed as fipronil)**	**0.005***	**In/Additional provisions to protect honey bees introduced by Directive 2010/21/EU**
XXII)	**Pyrazole**		
121.	**Fenpyroximate****	**0.30**	**In**
XXIII)	**Nitrophenyl ether**		
122.	Oxyfluorfen	0.10	Out/ Application resubmitted for inclusion (Reg 33/2008)
XXIV)	**Dinitroaniline**		
123.	Pendimethalin	0.05*	In
124.	Trifluralin	0.10*	Out
XXV)	**Anilide/acetanilide and chloroacetanilide**		
125.	Alachlor	0.05*	Out
126.	Butachlor	0.01	Out
127.	Carboxin	0.05*	Out/ Application

Sr. No.	Chemicals	Harmonized EU-MRL (mg/kg) updated on 11th October 2010	Status in EU under Directive 91/414/EEC
			resubmitted for inclusion (Reg 33/2008)
128.	Flufenacet (sum of all compounds containing the N fluorophenyl-N-isopropyl moiety expressed as flufenacet equivalent)	0.05*	In
129.	Metolachlor (with S-Metolachlor)	0.05*	Metolachlor-Out S-Metolachlor-In
130.	Novaluron	0.01*	Pending/Extension provisional authorization (2009/579)
XXVI)	**Miscellaneous group of chemicals**		
131.	**1-Naphthylacetic acid (alphanapthyl acetic acid)****	**0.05***	**Out**/ Application resubmitted for inclusion (Reg 33/2008)
132.	**2,4-D (sum of 2,4-D and its esters expressed as 2,4-D)****	**0.05***	**In**/ Extension of the expiry date for inclusion (2010/77)
133.	6-Benzyl adenine	0.01	In/ Initially non included by decision 2008/941. Inclusion voted in November 2010 following resubmission for inclusion according to Reg. 33/2008
134.	Abamectin (sum of avermectin B1a, avermectinB1b and delta-8,9 isomer of avermectin B1a)	0.01*	In
135.	Azadirachtin	1.00	Out/ Application resubmitted for inclusion (Reg 33/2008)
136.	Bifenazate	0.01*	In
137.	**Buprofezin****	**1.00**	In/ Initially non included by decision 2008/771. Included as from 1 Feb. 2011 following resubmission for inclusion according to Reg. 33/2008
138.	Cartap hydrochloride	0.01	Out
139.	**Chlormequat (CCC)****	**0.05***	**In**
140.	Diflubenzuron	1.00	In
141.	**Homobrassinolide**	**0.01†**	**Not mentioned**
142.	Diquat	0.05*	In/ Extension of the expiry date for inclusion (2010/77)

Sr. No.	Chemicals	Harmonized EU-MRL (mg/kg) updated on 11th October 2010	Status in EU under Directive 91/414/EEC
143.	Dithianon	3.00	Out/ Application resubmitted for inclusion (Reg 33/2008)
144.	Dodine	0.20*	In/ Initially non included by decision 2008/934. Included as from 1 June 2011 following resubmission for inclusion according to Reg. 33/2008
145.	**Emamectin Benzoate****	**0.05**	**Decision Pending**
146.	Ethephon	0.70	In
147.	Fenazaquin	0.20	Out/ Application resubmitted for inclusion (Reg 33/2008)
148.	Flubendiamide	0.01*	Decision Pending
149.	**Forchlorfenuron (CPPU)****	**0.05***	**In**
150.	**Fosetyl-Al (sum fosetyl + phosphorous acid and their salts, expressed as fosetyl)**	**100.00**	**In**
151.	**Gibberellic acid****	**5.00**	**In**
152.	Hexythiazox	1.00	Out/ Application resubmitted for inclusion (Reg 33/2008)
153.	**Hydrogen cyanamide (Cyanamide including salts expressed as cyanamide)**	**0.05***	**Out**/ Application resubmitted for inclusion (Reg 33/2008)
154.	Isoprothiolane	0.01	Out
155.	Mandipropamid	2.00	Pending/Extension provisional authorization (2009/579)
156.	Mepiquat	0.30	In
157.	Metribuzin	0.10*	In
158.	Milbemectin (sum of MA4+8,9Z-MA4, expressed as milbemectin)	0.05*	In
159.	Oxadiazon	0.05*	In
160.	**Paraquat****	**0.02***	**Out**
161.	Propargite	7.00	Out/ Application resubmitted for inclusion (Reg 33/2008)
162.	Pyriproxyfen	0.05*	In
163.	**Spinosad (sum of Spinosyn A+D)****	**0.50**	**In**
164.	Spiromesifen	0.02*	Pending/Extension provisional authorization (2009/579)

Sr. No.	Chemicals	Harmonized EU-MRL (mg/kg) updated on 11th October 2010	Status in EU under Directive 91/414/EEC
165.	Trichlorfon	0.50	Out
166.	Tricyclazole	0.05*	Out
167.	**Uracil**	**1.00†**	**Not mentioned**
XXVII)	**Inorganic**		
168.	Cadmium	0.05#	Heavy metal contaminant
169.	**Copper compounds** (all copper fungicides as elemental Cu; **Bordeaux Mixture, Copper oxychloride, Copper hydroxide)****	**50.0**	**In**
170.	Lead	0.20#	Heavy metal contaminant
171.	**Sulphur**	**0.00**	**Sulphur-In Lime sulphur-Out Listed in Annex 4 of EU‡**

* EU-MRL set at LOQ (mg/kg) as per
http://ec.europa.eu/sanco_pesticides/public/index.cfm?event=substance.selection

† These are natural products. EU-MRL does not exist for these chemicals. Hence, their MRL is set at the LOQ of the method developed and validated at the National Referral Laboratory of the NRC for Grapes.

** Pesticides registered for use in grapes for control of insect pests, diseases and weeds approved by the CIB of Ministry of Agriculture, Government of India, New Delhi under the Insecticides Act 1968

#Reference: Commission Regulation (EC) No 1881/2006 of 19th December 2006

‡ Annex IV: Active substances of plant protection products evaluated under Directive 91/414/EEC for which no MRLs are required because residues arising from use of the active substance are indistinguishable from natural background levels or other sources.

In = Chemicals authorized in EU
Out = Authorization of these chemicals in EU is withdrawn
Out/Banned = Chemicals are Banned in EU