



**FACULTY OF AGRICULTURAL SCIENCES & ALLIED INDUSTRIES**

Grape vines, like many other fruit types, are self-pollinated where the female and male parts needed for pollination are present on the same plant. If you can recall your biology lessons from school, you will remember that there are certain things that need to be present for a flower to be a perfect flower.

## ***Female part (pistillate)***

- This is the central part of the flower and consist of basically 3 things
- The stigma – the soft tissue at the end of the pistillate, where pollen is accumulated
- The style – a tube where through the pollen will move to reach the ovary
- The ovary – the place where the fertilisation takes place

When you look at the a grape flower, you will notice the pollen-carriers (stamina), these are the male parts of the flower.

## ***Male part (stamen)***

- This is the outer part of the flower, just underneath the petal and consist of basically 2 things
- The anther – the place where pollen is produced
- The filament – a long stem that supports the anther at it's tip

For your grape vine to pollinate, all of these parts must be present in a grape flower. Certain wild grape varieties, do not have male or female parts on their flowers and is called dioecian plants. Cross pollination needs to take place for these grape vines to bear fruit. Most of the commercial grape varieties used these day are self-pollinated and do not need cross-pollination in order to bear fruit.

During pollination, the pollen from the anther of the male part of the flower, falls on the stigma of the female part, and grows down the style until it reaches the ovary, where it will penetrate the wall of the ovary so fertilisation can take place.

Dramatic climate conditions (wind, rain, and extreme cold and extreme heat) can have a negative influence on how well pollination will take place. Mild, sunny weather is ideal. During poor pollination weather, you will notice that grape clusters will be straggly and very loose, with not many berries on the clusters and the opposite happens with too good pollination weather – the grape clusters is too compact, deforming and damaging nearby berries. This is often the starting point for secondary infection (botrytis or grey rot).

There isn't much you can do about to straggling grape clusters, but in the case of compact bunches, you can thin out the bunches by removing berries by hand or blunt scissors. DO NOT work with scissors in a bunch after the berries softened – you will damage the surrounding berries and this will be were infection can start. Try to thin out the bunches when berries are still green (the size of small peas)

## **Harvesting and yield**

Grape is a non climacteric fruit and has to be harvested at correct stage of maturity. Degree days from full bloom gives a correct indication of maturity. Early cultivars require about 1600-2000 degree days and late cultivars about 3000 or more. A cluster having underdeveloped seedless brries known as “shot barriers” or mummies. These will be very sweet in taste.

- Treating clusters with AVG (2 Aminoethyl Vinyl Glycine) 50-300 ppm 1-3 weeks before anthesis improves berry set. Cluster thinning also helps in improving the quality. 60-70 clusters/ vine spaced 3mX3m is best.

- Girdling the shoot one week after bloom, improves berry set, after berry set improves berry size and before veraison advances ripening and uniform coloration.
- GA (40ppm) Ethrel also can be used for improving yield and quality. Ethrel (250ppm) can be used for uniform colour development (5 weeks after anthesis, 4 weeks after berry set for colour). Balancing the canopy also plays an important role in improving quality and yield.
- Grape starts yielding from 2-3 years and continues for more than 20-25 years. Average yield will be about 25-30 tonnes/ha but higher yields of 60-75 ton/ha also possible with good management.
- Grapes are packed in corrugated fibre board boxes having grape guard (craft paper coated within layer of mixture of sodium bisulphate and a plastic polymer) improve their storage life.
- Grapes can be stored grape guard or for 7-12 weeks under controlled atmosphere with 15-25% Co2 and at 0-10C.

#### Fruiting areas of Varieties

<u>Cultivars</u>	<i>Development of Buds</i>
Bangalore Blue	3 - 5 buds
Bhokri	3 - 4 buds
Anab-e-Shahi	6-8 buds
Cheemasabebi	5 - 8 buds
Pusa Seedless, Kishmish Charni, Gulabi	10 - 12 buds

#### Pests and Diseases

##### *Pests*

1. **Flea beetles**- Spraying Malathion or carbaryl.
2. **Thrips**- spray Malathion or 0.5ml Phosphomidon or 1ml monocrotophos per litre of water.
3. **Chaffer beetle**- dusting any insectide in evenings.
4. **Mealy bugs**- Spraying Dich lorovas.
5. **Scales**
6. **Nematodes**- Use nematode resistant root stocks.

##### *Diseases*

1. Anthracnose removing & burning, spraying BM, Benlate or Bavistin regularly or Ziram
2. Downy mildew spray BM, or Mancozeb (2.5 gm/1 litre.)
3. Powdery mildew spraying or dusting sulphur or Neem products.

#### Physiological disorders

1. Blossom a black suskan spot develops at the blossom end of the berry which later on spreads + water suncans and due to rot Calcium deficiency.
2. Interveinal chlorosis: Mn, Zn or Fe deficiency-0.2%.
3. Stalk necrosis : Calcium deficiency.
4. Bud, flower and berry drop: girdling 10 days before full bloom, 500PPM ethrel at ripening NAA 100PPM at 10 days before ripening, Reducing irrigation during bloom, Benzyl adenine 200ppm, 4-CPA 20ppm-for thinning.
5. Bud killing: Excessive nitrogen.

6. Hen & Chicken- Due to boron deficiency.

**Bud Analysis**

<b>Characteristics</b>	<b><i>Muscadinia</i></b>	<b><i>Eu vitis</i></b>	
1	Chromosome No(2n)	40	38
2	Nature of tendril	Unforked	Forked
3	Bark	Tight	Loose
4	Presence of lenticels	Present	Absent
5	Seed shape	Break absent	Broken
6	Presence of diaphragm at the node of shoot	Absent	Present

Sampling is an important pre-requisite. A minimum of 20 buds is necessary for each bud position for estimating the cropping potential with a reasonably high degree of precision. In varieties like Muscat prediction of fruitfulness is not necessary because most of the buds are fruit full in these varieties. The number of bud position for which buds have to be collected should therefore be fixed according to the variety. In general, it is better to collect buds at least for the first ten bud positions. Thus a total of 200 buds have to be collected. The collection may be done at least from five randomly selected vines in each variety. In each vine, at least ten canes should be done roughly about 100 days after pruning i.e. a month or two prior to next pruning. Immature, green, disease infected and unhealthy canes have to be rejected. The buds in the axils are scooped out with a piece of wood of the stem and placed in glass vials containing FAA (Formalin Acetic Acid, Alcohol= 5:5:50).

The grape bud is a compound bud with two or three secondary buds, covered by a lignified protective scale. Under a stereo microscope, the protective scale and secondary buds are removed one by one. The scale & thick packed inter-woven tormentor's hairs are next removed carefully with a needle. The shoot primordial (differentiated bud unexpanded) can be seen in the centre of the bud. The bud that shows the inflorescence primordial as a closely packed miniature branch besides the leaf primordia is recorded as a "reproductive bud while the one locking this inflorescence (cluster) primordium is noted as vegetative unproductive bud. The number of productive buds at each bud position is thus recorded from the first upwards on the cane. The bud fertility is expressed as a percentage on the number of buds examined and the percentage noted down for every bud position will reveal the most productive position of the cane. Pruning can be in the next season above the bud which records the highest percentage of fertility to obtain good crop.