

should match with each other for successful union.  
vi. A plastic strip of 200-micron thickness should be used around the union so that no air or water passes in.

Besides the *in situ* method of grafting, some times pre-grafted plants are planted. However, these plants take more time to get established in the field. Where as in case of *in situ* grafting roots of rootstocks proliferate well before grafting and this benefits growth of scion after grafting.

vii. The sprouting starts 7-10 days after grafting and healing of graft joint completes in 45 days. Care should be taken that the plastic used to wrap the graft joint should be loosened after 21 days to avoid stem-girdling effect.

viii. Urea @ 0.5kg and 19:19:19 @ 1.0 kg per acre should be applied from 15<sup>th</sup> day of grafting through fertigation at every alternate day up to 3 months.

ix. To achieve the maturity of the stem, Sulphate of potash 1kg/ac/day should be applied through fertigation 1 month before re-cut.

x. Spray of Carbaryl @ 3 g/lit to control Flea beetle at 4 days after grafting.

xi. To control the diseases like Anthracnose, Downey mildew and Powdery recommended spraying should be taken up.

xii. To achieve maximum graft success in the vineyards, frequent removal of suckers should be given priority. This operation is called as 'De-suckering.'

After grafting plants may not grow uniformly due to uneven sprouting of scion and variation in the temperature. To overcome this a re-cut should be taken up during February.

## VII. Framework development

- a. Re-cut is taken by retaining 2-3 buds above the graft joint.
- b. The swabbing of Hydrogen cyanamide @ 30 ml/lit. is done on the retained buds.
- c. Sprouting will start after 7-8 days of application.
- d. To train the shoots on the training system, select only one shoot preferably the lower one to avoid the entry of the disease organism.
- e. Protect the emerging shoots from Flea beetle infestation by spraying Carbaryl 2g/l.
- f. Apply 19:19:19- 1kg + Urea- 0.5kg/ ac/ day through fertigation to promote the growth of main stem.
- g. For primary cordon development, pinch the shoot 3" below the first wire when it grows 3" above.
- h. Apply 19:19:19-0.5 kg + 12:61:0- 1.0 kg/ac/day for bud differentiation and shoot growth.
- i. In case of single cordon shoot are trained in N-S direction directly. To develop double cordon system the primary arms trained in 'V' shape in E-W direction is pinched 2" before cordon wire. The secondary arms are trained on cordon wire in N-S direction to develop 'H' shaped double cordon system.
- j. Develop the cordon by stop and go method i.e. by pinching half way or at least at 1'3" of cordon length. The last shoot on this cordon is then extended as next part of the cordon. This cordon is to be stopped by pinching at its total length.
- k. Apply 19:19:19- 0.5 kg + 13:0:45- 1.0 kg/ac/day for cane maturity after final pinching of cordon.
- l. Spraying of CCC 250 ppm at 3-leaf stage of shoots on cordons in both the steps helps in development of side shoots and fruitfulness. The shoots on first half of the cordon are pinched to 7-leaf at 9-leaf stage to develop sub-canes.

Formation of good number of fruitful cane units and ample food storage in vine is an aim of framework development. Canopy management has to play an important role in this process, with judicious nutrient and water management.

- m. Spraying of 6,BA @10ppm during cane development helps in increasing photosynthetic activity of leaves and fruitfulness.
- n. The shoots on the main stem are removed once the canes on the cordons are developed.
- o. Apply 0:0:50 - 1.0 kg/ac/day to enhance cane maturity.

### Technical Folder No. 5

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## Vineyard Establishment

- A guide to cultural practices



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Vineyard once established can remain productive for more than 15 years. To retain its economic value for longer period, it is necessary to establish a vineyard with an industrialist's vision. Following parameters should be considered while establishing new vineyard.

- I. Selection of Site
- I. Land preparation and Layout Designing
- II. Erection of Trellises
- III. Installation of Irrigation System
- IV. Selection of Variety and Rootstock
- V. Planting and Grafting
- VI. Framework Development

#### I. Selection of Site

a. Basically grape is a temperate fruit crop, however, with the modifications in cultural practices it had been very well adopted in sub-tropical parts of the country. Mild climate is more suitable for grape cultivation as humidity invites diseases.

b. Light to medium soil is preferable. However, the use of rootstock can overcome abiotic stress conditions related to soil and water.

- c. Assured source of irrigation water is an important criteria in site selection. For planning 1.0-acre vineyard, 18,000 to 20,000 liter water per day is required during summer.
- d. Low-lying area with poor drainage should be avoided.

## II. Land Preparation and Layout Designing

- a. Perennial weeds like doob grass and nut grass should be controlled by post-emergence sprays of Glyphosate @ 10ml/lit,



Fig 1: Layout Designing & Trench preparation

- b. Design the layout as per the location of the plot and approach roads. In general rows should be in north-south direction in case of 'Y' or 'T' trellises so as to maintain N-S direction of arms. However, east-west direction is preferred in 'Bower' training system for easy spray convenience, but in any case the direction of arms should be N-S

For maximum utilization of sunlight the cordons should be trained in north south direction. The cordons of east west direction, leads to canopy shading.

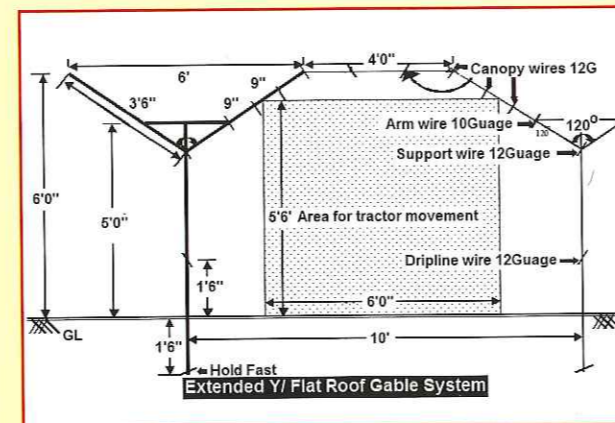
- c. Planting distance in the vineyard should be based on variety, soil type and climatic conditions.

Soil Type	Humid Climate		Dry Climate	
	Table	Wine	Table	Wine
Heavy	10'x6'	8'x5'	8'x5'	8'x4'
Medium	9'x6'	8'x4'	8'x5'	8'x3'
Light	9'x5'	6'x4'	8'x4'	6'x3'

- d. For easy intercultural operations either the row is broken at 200 feet length or the field can be divided into smaller plots.
- e. Trenching up to 2' or ripping up to 4' is required where soil depth is not adequate for root growth or there is hardpan in the upper layer of the soil.
- f. Trenches should be filled with farm wastes, loose soil and farmyard manure along with fertilizers like Single super phosphate (500kg/ac) and Urea (100kg/ac).

## III. Erection of Trellises

- a. Type of trellises depends on variety, climatic conditions and degree of mechanization proposed. 'Y' and 'T' trellises are suitable for humid areas and for higher degree of mechanization. Though bower system is suitable for dry areas, performing the major important cultural operations like thinning and dipping is difficult. The system also helps in building up the microclimate helpful for the multiplication of the disease like Downey mildew. 'Extended Y' or 'Flat Roof Gable' system of training can serve the benefits of both 'Y' and 'Bower'.



- b. Wine varieties being less vigorous 'Mini-Y' or 'T' trellises and 'Kniffin' system of training can be useful as it has the ability to support the canopy architecture, scope for mechanization, higher production potential and cost effectiveness.

## IV. Installation of Irrigation System

- a. Uniform distribution of water (horizontally

- and also vertically) should be the important criteria while designing irrigation system. Use of low discharge emitters for long duration helps in easy and uniform distribution of irrigation water.
- b. For optimum discharge, pressure should be maintained to 1 kg/cm<sup>3</sup> at the end of the lateral. The discharge at any point should not differ more than 10% in case of non-pressure compensatory drippers and 5% in case of pressure compensatory drippers.
- c. Laterals should be clipped with wire neatly to avoid any sagging in between.
- d. The system should have provision for attachment of ventury and suction tank for application of fertilizers through fertigation.
- e. Timely flushing and acid treatment should be done to avoid blockages due to salt deposition and algal growth.

## V. Selection of Variety and Rootstock

- a. The variety selection should be based on purpose, market demand and climatic conditions in that area. Some of the varieties recommended are as below.

**Table Grape-** Thompson seedless and its clones (Tas-A-Ganesh, Manik Chaman, Sonaka, H5, 2A, etc), Sharad seedless, Flame seedless, Superior Seedless and Red Globe.

**Raisin Grape-** Thompson seedless and its clones, Monuka, etc.

**Wine Grape-** Chenin Blanc, Sauvignon Blanc, Ugni Blanc, Chardonnay (White wine) and Shiraz, Cabernet Sauvignon (Red wine).

- b. Use of rootstocks is becoming mandatory for sustaining grape under adverse situation of drought and salinity. Following are some of the rootstocks considered for vineyard establishment based on their performance and compatibility with scion.

**Dog Ridge-** Salinity and Drought

**110 R -** Salinity, Drought & General purpose

**Ramsey-** Salinity

Other rootstocks like 1103-P, SO4, 140 RU and Freedom are under trial at the Centre.

## VI. Planting and Grafting

- a. Planting of rootstock should be done in February after cold period is over. Furrow irrigation should be given 2-3 days before planting. Small pits of 1'x1'x1' are then made after wapsa condition of the soil. The plants of rootstock are then placed in the center of the pit with well-decomposed FYM for initial nourishment, sand for easy root spread and Chloropyriphos dust to control termites.
- b. February March planted rootstock is allowed to grow as it is till June month to promote root development.
- c. After 50 days of planting once the roots are established, three uniform and healthy shoots are trained to bamboo and excess and unwanted shoots are removed.
- d. Removing side shoots step by step till the time for grafting should be done to clear lower 1'6" portion of the rootstock.



Fig 2: Rootstock in Main Field & In situ Grafting

- e. Grafting is carried out during September-October month on two shoots of rootstock. Proper care should be taken up at the time of wedge grafting as listed below.
- The scion selected for grafting should be from healthy, high yielding and disease free vines.
  - The cuttings selected should be well matured and of same thickness to that of stock.
  - The selected scion cutting should be dipped in 0.1% Carbendazim solution for an hour to prevent diseases.
  - A slanting cut of at least 2" should be taken at the basal end of the scion so as to expose the pith.
  - At least one side of the scion and rootstock