

### REJUVNATION OF PROGENY ORCHARD AND SCION BANK

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#### Introduction

India is a vast country and is gifted with a variety of soils and climates. Thus almost all kinds of fruits can be grown successfully in this country. It is matter of great surprise that inspire of provision of adequate of resources. The per capita consumption of fruits here is perhaps one of the lowest in the world. The existing orchards are not able to meet the present requirements of the country. Poor selection of planting materials haphazard plantation and poor management has made many orchards uneconomic. Fruit quality originates in the groves. It is strongly affected by cultural practices, and pruning exerts powerful effects on both yield and fruit quality (Krajewski, 1996; Krajewski and Pittaway, 2000).

#### Definition:-

The act of replanting on existing plants or To restore to former state, make fresh or new again. As applied to the orchard tree it would mean restoring the productive capacity of the fruit trees. The term 'Rejuvenation' means renewal or making new or young again. The meaning of 'Rejuvenation' according to chamber's dictionary is 'to recover youth character or to grow again'. Obviously, this would apply to those plants which have attained a stage where they are no more profitable from the grower's point of view.

#### Why Need of Rejuvenation of Orchard

##### i. Growth of wild shrubs and grasses

- Wild shrubs and grasses continue to grow without any check under the tree and in between the rows. Weeds harbour insects, pests and diseases too.
- When they become large enough they interfere in the orchard operations and some of them climb up the tree and by shading the leaves or due to their parasitic nature cause great damage to the main fruit crop.

##### ii. Overcrowding and unsystematic planting

- In some of the orchards no regular or systematic planting is followed. The trees are also found to be planted so close that they form a dense overhead canopy which does not allow sufficient light to reach at different parts of the fruit trees uniformly.
- The lower branches remain under perpetual shade. As a result of it the bigger branches remain devoid of small twigs or branch lets and ultimately this abnormality reduces the fruiting surface.
- In such cases, trees for want of space grow tall and bear fruits almost on edge only.
- These fruits in hotter localities are affected adversely by sun burn.

- This way the growers unfortunately suffer a double loss because on one hand the quality of the fruit and on the other the total produce both are considerably reduced.
- Free circulation of air is also checked and this results in development of pests and diseases.

### **iii. Inferior varieties**

- The poor selection of planting material at the time of planting will cause a great loss throughout the life of the orchard.
- In most of the orchards trees have been raised from seeds and of inferior varieties.
- Seedlings of poor varieties are potentially poor and their performance is subjected to a wide range of variation so that even if they grow and function normally, they do not produce a crop that can fetch good price in the market.

### **Objectives of Rejuvenation :-**

- Enhance the productivity of old fruits orchards.
- Provide quality planting material to farmers at reasonable to increase the yield per capital.
- Make senile orchards productive and juvenile.
- Enhance the profitability.
- Conservation of old progeny or species.

### **Practices for rejuvenation-**

The first step while going to rejuvenate an uneconomic orchard should consist of a thorough examination of the causes which led to the tree in poor state. Efforts should then be made to rectify the defects. An attempt has been made in the following paragraphs indicating various suitable suggestions helping for rejuvenating an uneconomic orchard. Practices to be followed in advance before the trees reach at need of rejuvenation to protect the orchard from this malady have also been explained side by side.

#### **i. Soil management practices:-**

- a. Cultivation
- b. Irrigation
- c. Drainage
- d. Manuring

#### **ii. Thinning and filling of gaps**

#### **iii. Control of pests, diseases and parasites**

#### **iv. Pruning**

- v. Adventitious method of feeding
- vi. Top working and frame working
- vii. Wind breaks and fencing

### **i. Soil management practices-**

- It is very important that the soil should intelligently managed so that it may be maintained in a condition suitable for meeting the needs of the trees without undue expenses.
- There should be proper vigilance regarding the physical condition of the soil and also about moisture and nutrient contents.
- These depend largely on the practices of cultivation, irrigation, drainage, manuring etc.
- Conservation practices should also be followed to maintain the fertility and topography of the soil.

### **A. Cultivation**

- It involves the elimination of wild shrubs and grasses from the land left vacant in between the trees.
- This practice has been found to prevent the surface soil from becoming it hard.
- Hard soil greatly adds to the difficulty of irrigation and interferes with the growth of roots of main trees.
- Manures, fertilizers, green manure and other organic matter should be mixed with the soil by means of regular cultivation.

### **B. Irrigation**

- The water relation of the plant is of extreme importance both for vegetative growth and for fruit production.
- Application of manure should be followed by watering so that the nutrients are readily absorbed. Soil around the tree base should be raised to form a platform so that water does not touch the bark of the trunk directly.
- In areas of scarcity of rainfall or limited water supply, special methods of moisture conservation such as mulching may be practiced.

### **C. Drainage**

- Drainage is as important as water supply.
- The absorption of nutrients is affected to a great extent by the aeration of the soil which is affected by drainage.
- After prolonged stagnation of water roots below the soil surface die and they may not be replaced by new ones.
- In poorly drained orchards, effective steps like provision of drains etc. should be taken, so that there is not any interruption in the physiological processes of the plants.

### **D. Manuring**

- Fruit trees live long, standing at the same place and bear crops year after year.
- Cultivation of green manure crops during early rains and turning of them in the orchard soil and create proper provision for their decomposition would greatly help in increasing the organic matter of the soil and this directly will influence the supply of various nutrients.
- If green manuring is not possible, a heavy dose of F.Y.M or compost may be spread throughout the orchard. Besides, individual trees should be manured with quick acting fertilizers.

#### **ii. Thinning and filling of gaps**

- Overcrowded trees should be thinned to proper distance.
- However, it is not useful to see many trees missing. In those cases gaps should be filled up by trees of superior varieties.
- Sometimes certain varieties of citrus which have been propagated vegetatively for many generations become somewhat lacking in vigour.
- For this process of rejuvenation, Swingle (1932) coined the term 'neophyosis'.

#### **iii. Control of pests, diseases and parasites**

- Unhealthy or diseased limbs should be cut off and pruned parts are suitably disposed.
- Bark boring caterpillars are prevalent in many orchards. Individual holes should be treated, cleaned and then a mixture of carbon bisulphide and chloroform (2:1) or any other insecticide should be injected in it.
- Regular spraying of the orchard trees with insecticides and fungicides must form a routine practice.

#### **iv. Pruning**

- The misbalanced root-shoot ratio can be corrected by judicious pruning.
- The branches which have died or broken or one which interferes with natural growth, and water sprouts should be removed.
- Old bearing trees that have reached their middle age have become some what low in vigour due to constant cropping or neglect, should be pruned heavily.
- Such trees respond better to a heavier pruning because of their reduced vigour.
- Pruning, if resorted to, not only regulates the canopy size but also ensures quality, size, and appearance of fruits through better exposure of branches and fruits (Rao and Shanmugavelu, 1975).

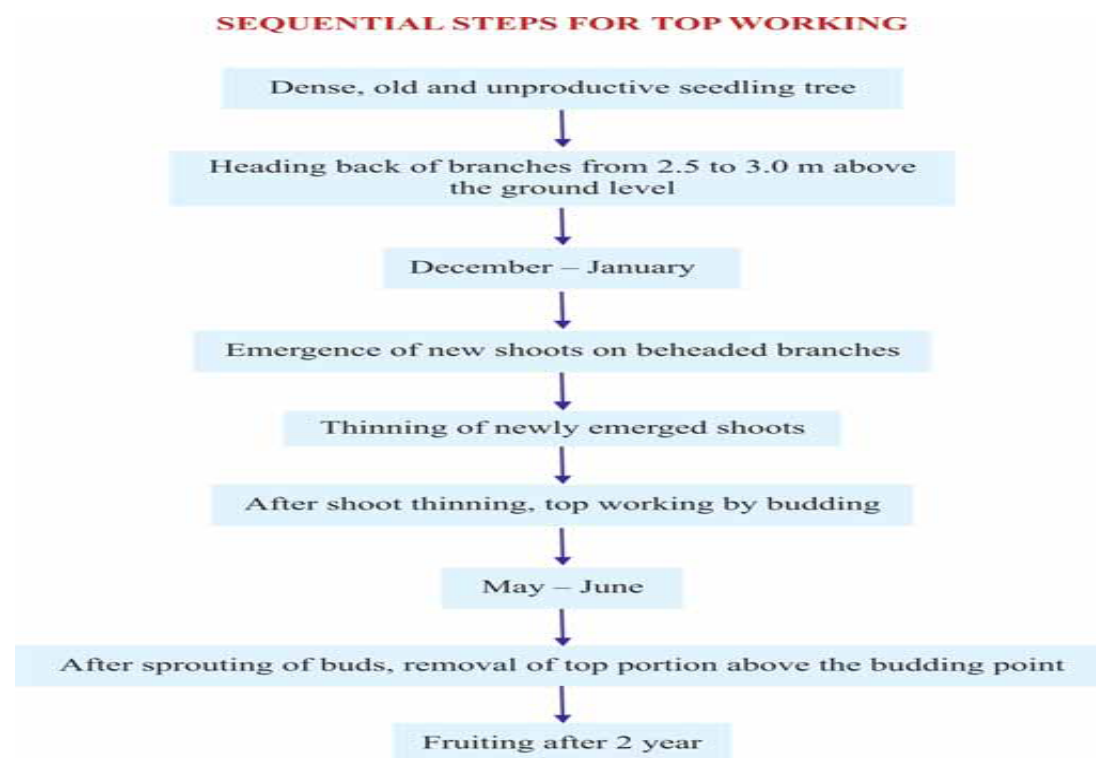
#### **v. Adventitious method of feeding**

- Old trees with weak growth can be invigorated by infusing the sap of younger seedlings into them. Several seedlings are grown close to the trunk of the tree.
- When they attain an age of two or three years, they are headed back to the height of 2' to 3' from the ground.
- The cut ends are shaped to a wedge from upto a length of about 2" and are inserted into the bark of the tree.
- If needed both surfaces might be nailed and would be finally covered by grafting wax followed by firm tying with tape.
- If the tree is lacking in vigour due to unsatisfactory rootstock, the seedlings should be grafted into the scion not into the rootstock.
- In course of time, the seedlings get united to the tree and serve as its feeder.
- This could be practiced in mango, citrus, apple and in many other fruit plants.
- This method may also be followed when the collar region has been damaged.

#### **vi. Top working and frame working**

- These are done to change the trees of inferior varieties into good ones.
- The scaffold branches of the trees are cut back 2' to 3' from the point of origin and when the new sprouts come out, they are budded or grafted with the scion of desired variety, keeping in view that the scion is compatible to the headed trunk.
- After top working, only scion branch is allowed to grow and the rest are removed promptly.
- Top working has been practiced successfully in many fruit plants such as aonla, bael, stone fruits etc. .
- Mango plant has been top worked by side, bark, veneer and crown grafting and approach inarching as well as budding.

- So far as citrus plants are concerned, shield budding has proved most satisfactory though other methods of propagation have also been practiced thereby.
- For ber, ring budding was previously recommended, but now shield budding is gaining importance.
- Top working in loquat can be done by cleft grafting and in fig by cleft and side grafting both.
- Cleft and bark grafting and budding have been successfully practiced for rejuvenating apples.
- Peach trees are best worked by inlay bark grafting.
- In frame working, only the smaller branches and shoots are replaced by scion of desired variety.
- The frame working is not successful in tropical and sub-tropical fruit plants, while temperate fruit plants are successfully frame worked by stub, awl and inverted 'L' method of grafting



#### vii. Wind breaks and fencing

- Wind breaks are necessary for reducing the force and adverse effects of winds.
- The most effective are the double rows of tall trees, alternatively placed.
- Trees like sheesham, carambola, jamun, samal, paper mulberry and *Terminalis arjuna* can be effectively used for this purpose.
- Orchard area should be fenced with barbed wire along with suitable protective and economical hedge.

#### When not to rejuvenate -

- Before an attempt is made to rejuvenate the trees, the future income from the orchard should be taken into consideration.

- Sometimes it might be that the condition of the orchard is so poor that it is better to remove the old plantation and replace it by new one.
- It should be emphasized finally that trees during their first bearing years are not in need of re-invigoration even if they might be uneconomic.
- Satisfactory growth should be maintained by other cultural practices such as proper soil management, provision of adequate fertilizers and a water supply.

**Points to be considered while adopting the rejuvenation technology-**

- Plantation of commercial varieties where the canopy become over crowded resulting in reduction in yield can be rejuvenated followed by canopy management.
- Older plantations of seedling origin which have become senile can be adopted for top worked by grafting (budding) with scion of superior varieties to upgrade seedling plantation with superior commercial varieties.

**Scion Bank:-**

For successful rejuvenation of orchard Healthy/good scion is very important :-

- The blocks of mother plants planted with a close spacing called scion banks are exclusively used for supply of scion for plant multiplication.
- Spacing may vary from 1.5 x 1.5 m to 3 x 3 m depending on species and type of soil. Some prefer too close spacing to reduce weed problem in the field.
- The scion banks can be raised for woody perennials like mango, sapota, tamarind, guava, pomegranate etc. The main features of scion banks are as under.
- The mother plants are planted at a very close spacing like 2 – 3 meters i.e. more population per unit area. For mango and tamarind two meters spacing is followed.
- These plants are obtained from a single tree of the given variety i.e. it would be typical clonal propagation.
- The high population facilitates better utilization of applied water and nutrients which help in maintenance of higher vigour in shoots.
- Pests / diseases management is more effective as the plants are small.
- It facilitates continuous availability of scion / bud sticks. In fact the availability may get enhanced naturally due to pruning effect which is due to periodical removal of bud sticks / scions for soft wood grafting or for making cuttings, even out of season.
- Due to absence of commercial cropping, the vigour would be higher.
- Juvenile physiological conditions prevail in shoots due to frequent pruning or heading back which enhance ‘graft take’ or root initiation in cuttings.
- Multiple varieties can be planted in the scion bank.

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