**Rejuvenating Of Old And Senile Orchards: For Renewed Productivity and Profitability**

**Abstract**

In India, after an independence, there is an increase in the production of horticultural crops, especially fruit crops. In the world ranking, India attains second most position in fruit crops production, after China. These fruits have good production but do not have good productivity yet. There are several reasons for low productivity of fruits, the main reason is old and senile orchards. These old and senile orchards are unable to get proper light, nutrients and do not have any kind of proper canopy, which lacks the photosynthesis. Due to this fruit quality and quantity get reduces. So, for getting productive orchard, orchard rejuvenating is good technique because it is cost effective and feasible. This paper highlights the main points of orchard rejuvenation to enhance the productivity and potential of fruit crops.

**Keywords**:Senile orchard, pruning, rejuvenation, top-working.

**1. Introduction**

We know, every living being has an adequate lifespan (lifespan is varying according to species). Like these living beings, orchards have also some specific lifespan. In other words, orchards are just like living beings, because orchards also lose their ability for providing productive output at their senile phase.In India, approximately 20-25% orchards are under senile and unproductive. Senile orchards with low potential are mainly shows in different fruits like temperate fruits (apple, peaches), sub-tropical fruit crops (mango, litchi, guava) and tropical fruit (cashewnut), including some plantation crops like coconut. There are some reasons for orchard senility:

* Aging of orchards: After,some years of proper production, trees may get aged means there should be slow in the physiological process. With this, there should be not proper translocation of nutrients by vascular bundles.
* Canopy:Unmanaged canopies also disturbed the orchards, means orchards get easily senile. Unmanaged canopies do not get proper light for photosynthesis.
* Occurance of insect-pests and diseases: There is a great chances for the attack of insect and pests on old orchards.
* Lack of nutrients:Overcrowding trees can compete for the nutrients. Lack of nutrients causes yellowing of leaves and weak branches.

Due to these reasons, establishment of orchard is non-economical for farmers. Now-a-days and recent studies, shows that senile and old orchards becomes a serious concern for farmers. To solve this problem, rejuvenation should be adopted by using different techniques.

**1.1 What is orchard rejuvenation?**

Orchard rejuvenation is a modern process of horticulture. In simple words, restoring an orchard productivity with different methods like pruning of plants.The main aim to restore an orchard for getting highest productivity and profitability. Rejuvenation process is not only to restore senile trees but also to reinvigorates the whole ecosystem.

**1.2 Need of rejuvenation of old orchards**

In India, fruit farmers are suffered with aging orchards, which lose their ability to produce. Orchard rejuvenation is vital for the horticultural sector as well as for ecosystem, as it increases economic viability and environmental sustainability. Uneconomic orchards face different problems, also reducing the agroforestry. Rejuvenation plants can increase yield by using high-density planting systems with different pruning methods, making orchards economically viable. Orchards are vital for nutrient dynamics, soil health, and biodiversity, and rejuvenation ensures the preservation of these ecosystems.

**2. Science behind orchard rejuvenation with different practices**

Orchard rejuvenation is a process which requires proper knowledge and skill. The primary aim is to maintain the balance between vegetative growth and fruiting of tree, while improving tree health and vigour.

Here, some different rejuvenation strategies:

**2.1 Pruning**

Pruning is defined as a practice to remove the parts of plant like roots, leaves, flowers, fruits etc. after vegetative phase. Pruning helps to enhance the quality of plant’s output. In another words, pruning is an art and science of cutting the plant’s damaged portion to improve its shape, growth, flowering and fruiting.

Pruning plays a crucial role in orchard rejuvenation, to obtain the objectives like:

* Removing water sprouts.
* Restore the plant’s productivity by heavy pruning.
* Bordeaux paste is used after the pruning, to get rid from the diseases.

Here, sometimes types of pruning which are used to in orchard rejuvenation:

* Frame pruning: This is basically helps to enhance the framework of plant by cutting the old and senile branches and shoots.
* Maintenance pruning: Another method is maintaining the old orchards to get better level of production. It is most commonly done in temperate fruits like apple, peach, pear etc.
* Renewal Pruning: It is most commonly done in mango fruit. This technique involves the removal of old and senile parts of plants. This will helps to encourage the growth of new branches and shoots. In simple words, overgrown shrubs are cut back in this process.

**2.2 Top-working**

The other names of top-working are framed working/top-grafting/top-budding. Therefore, converting undesirable parts of plant into desirable parts of plants, is simply known as top-working. In this technique, changing the established plants, trees, shrubs, vines with desirable cultivars. This is a better option for farmers, who want to take desirable characters in their orchard cultivars or varieties without any uprooting of old trees. This well-known root system helps to grow scion on rootstock quickly and bear fruits early stage.

**2.3 Heading back**

It is a technique used to stimulate the new growth of old or senile orchard. The basic objective of heading back is to make the productive orchard from senility. Old trees are headed back upto height 1-2 meters above the ground level. After, that newly emerged shots are allowed to grow upto a length 40-45cm. Then, these shoots are pruned by 50%, which helps to encourage the growth of multiple shoots. Heading back helps to increase the fruit quality and production. A tree gets better light for photosynthesis.

**2.4 Management of Soil and its Nutrition**

The uppermost layer or crust of ground is known as soil. A healthy soil is the key component for healthy orchard. Here, some basic steps to maintain soil and its nutrients:

* Soil Testing: The first step is to conduct soil testing after proper sampling of soil. Regular soil testing helps to determine the level of nutrients in soil. Also helps to determine the pH level of soil with EC.
* Application of nutrients: Soil testing clearly indicated the amount of nutrients present. According to the need and capacity, nutrients should be provided to plants in the form of vermicompost, manures, biofertilizers etc.
* Weed Management: Weeds are undesirable plants in the main orchard. These weeds compete with the main crops for nutrients and water. So, weed management is also crucial to maintain orchards.
* Irrigation: Adequate irrigation must be provided to the orchards, helps to ensure the orchard health. Ensuring adequate and timely irrigation is vital for tree health and fruit development.

**2.5 Insect-pest and disease management**

Effective insect-pest and disease management is important for successful old orchard rejuvenation. This technique involves a combination of different preventive measures, monitoring and targeted treatments, helps to minimize damage from pests and diseases while promoting plant health. In this, proper IPM (integrated pest management) techniques are used. This involves:

* Sanitation of orchard: Sanitation is the first most step to get rid from insect-pest and pathogens attack. In this, infected branches should be removed.
* Monitoring: Regular monitoring of orchard helps to identify the signs and symptoms of insect-pests and diseases.
* Targeted spraying: Spraying of appropriate fungicides and pesticides on attacked tree, at the right time with proper way.

There are some different activities which are performed during first year in orchard:

These activities are performed according to month wise.

**December- January**

* Firstly, marking should be done on old trees for pruning.
* Pruning of marked branches should be done in the month of December.
* Pruning should be allowed in alternate row and should be initiated from the lower portion of branches.
* Then, alter from the upper portion, without any cracking and splitting of bark.
* After that copper oxychloride paste (save a tree from fungal infections) should be applied on the tree’s trunk.
* Then, another operation (i.e., ploughing, weeding) must be performed in the month of January.
* After that basins and irrigation channels should be prepared.

**February- March**

* In the end of February, basins should be filled with recommended dose of SSP @3 kg/tree with half dose of urea @1.25 kg/tree.
* Regular monitoring should be performed to check the attack of different insect-pest and pathogens.
* In the month of March, irrigation must be provided according to the need.

**April- May**

* Adequate irrigation should be provided to the tree.
* Then, mulching is performed around the basin of tree.
* Proper care of newly emerging shoots and also perform the operations like weeding.

**June- July**

* Pruning techniques like thinning is done and retaining about 8-10 healthy shoots with outwardly growth per pruned branch during June followed by spray of copper oxychloride, 3 gm/l.
* Irrigation should be done at 15 days intervals.
* After that, in the month of June, application of half dose of urea @1.25 kg/tree.
* In the month of July, FYM @ 120-125 kg/ tree should be applied.
* At 15 days interval, copper oxychloride @3 g/l water should be sprayed.

**August- September**

* Removal of undesirable branches and shoots by using thinning technique.
* Regular observed the different signs of insect-pest and pathogens.

**October- November**

* Different cultural practices (like ploughing, hoeing, weeding etc.) should be performed.
* Removal of damaged and infested branches.
* In the month of October, foliar application of urea @2 % is done, which helps to enhance the vegetative growth of plant.
* Then, marking is done on trees for pruning.

**Rejuvenation Techniques for different fruit crops**

**Rejuvenation of Guava**

Guava is one of the cherished fruit crops in India.

In case of the totally declined plants it is advised that they should be headed back about 1-1.5 meters above the ground level during May to allow the development of fresh canopy of healthy shoots. Then these newly emerged shoots were allowed to fully grow up to the length of 40-50 cm. then these shoots further pruned about 50% of its length in the month of October for multiple shoot emergence. Just after rejuvenation, adequate irrigation is done for the optimum development of novel shoots in rejuvenated trees.

During the heading back period, application of 50Kg FYM along with 6Kg Neem cake is done. After the six months, manures 40Kg +4Kg Neem cake+ 1300g urea+ 500g muriate of potash (MOP) and 1800g single super phosphate (SSP) is applied to the rejuvenated plant.

**Rejuvenation of Citrus**

In citrus plants, pruning of dried branches is done immediately after the harvest of fruits. It is then followed by the spray application of carbendazim @1g/litre of water. Control of bark eating caterpillar by the application of Dichlorovas @0.1 % (3-5ml) in each larval tunnel or inserting in tunnel cotton swab soaked with insecticide. Proper irrigation should be done after the cutting and pruning. Proper application of recommended dose of fertilizer is done. Spray of Dicofol @1.5ml/ litre is done for the control of mites. Application of Bordeaux paste on the trunk is done twice a year before monsoon and after monsoon.

**Rejuvenation of Pomegranate**

Canopy management in orchards involves keeping the right plant spacing and tree structure to improve sunlight penetration and air circulation. Standard cultivars are usually planted at 6 × 4 m or 6 × 5 m. Semi-dwarf varieties can be spaced more closely, at about 5 × 3 m. Trees are shaped like an open vase, allowing light to reach both the inner canopy and the gaps between rows. This improves fruit quality and reduces disease. To manage growth and make operations easier, tree height is kept between 3.0 and 3.5 meters. Pruning is an important practice, mainly done in summer to remove broken, bent, or interfering branches. This maintains an open structure and stops overcrowding, which encourages healthier growth. Fertigation usually happens through drip irrigation systems, with one or two lines of drippers in each row for efficient and even water distribution. Irrigation typically occurs once a week to keep soil moisture consistent. Nutrient management involves applying about 200 to 300 kg of nitrogen and a similar amount of potassium (as K₂O) per hectare each year. Some growers use phosphoric acid to clean the drip lines, which also adds phosphorus to the soil. This combined approach to canopy management, pruning, and fertigation supports high productivity, improves fruit quality, and fosters sustainable orchard practices. Proper implementation of these practices helps keep trees healthy, optimizes resource use, and ensures the long-term health and profitability of the orchard.

**Rejuvenation of Litchi**

Old and senile trees of litchi should be rejuvenated by using pruning. In the other words, pruning should done by proper management methods. Pasting of cow dung and Bordeaux paste on the cut ends of trees. Proper management included:

1. Timing of planting
2. Spacing
3. Planting system
4. Training and pruning (infested parts of plants) of trees.
5. Application of nutrients at proper time

* Application of N:P:K (600:300:600)/ per for 10-12 years old tree.
* Application of nitrogen and potassium should be applied in spilt doses.
* Zinc application is also done @0.5% with the combination of lime. This will help to reduced the fruit drop problem also enhance the fruit quality.

1. Proper cultural practices (i.e., irrigation, mulching) should be done.

**Steps of Rejuvenated techniques in mango:**

Firstly identify the senile mango orchards

Senile mango orchards should be based on yield and age of trees

Then, we should done the heading back in the month of December at height 2.0 to 3.0m from ground level

Then, thinning out the branches and application of insecticidal paste on tree trunk and on cuts

After that thinning of excess branches in the month of April-June

Retaining of 7-8 branches (healthy branches)

Application of fertilizers as well as manures (trench 1.5 -2 m away) in the month of September according to the need of tree

Within 3-4 years rejuvenation process, tree again becomes healthy

1. **Conclusion**

Revitalizing old and worn-out orchards is an effective, affordable method that can refresh the productivity of declining fruit farms. With heavy pruning, top-working, and management strategies, farmers can turn unproductive trees into dynamic, high-yielding ones. This method helps increase profits for existing orchards and supports sustainability and cost-effectiveness throughout the fruit supply chain. Research and use of this technique can open up new productive possibilities for perennial fruit crops and contribute to a sustainable future for horticulture.

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