

A Review: Rejuvenation of Senile Orchards of Fruit Crops to Increase Productivity

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Introduction

Every living organism after some period of time (that may vary from species to species) losses its efficiency to perform various functions like growth and development. Likewise in fruit crops also, there is a decline both in terms of quality and quantity of produce after some period of time. As a result, orcharding becomes economically non- viable and non-remunerative. Declining productivity of old and dense orchards has become a matter of serious concern for the orchardist, traders as well as horticulturist. In India 30- 35 % area under fruit crops is occupied by old, dense and diseased orchards (Jahangeer *et al.*, 2011).

For overcoming the problem of unproductive and uneconomic orchards, large scale uprooting and replacement with new plantations will be a long term and expensive strategy. Therefore, research efforts are initiated to standardize a technology for restoring the production potential of existing plantation by a technique called Rejuvenation.

What is rejuvenation?

It means renewal or making new or young again. As applied to the orchard tree it would mean restoring the productive capacity of the fruit trees. The process of rejuvenation includes removal of old and unproductive branches, restoration of new shoots and grafting of desired variety on these newly emerged shoots. The process may take 2-3 years to be effective.



New shoot initiation on rejuvenated trees

Requirement of rejuvenation of senile orchards

The orchards required to be rejuvenated as they show decline in yield and quality of produce which may be attributed to any one of the following factors:

- Reduced photosynthetic surface area.
- Less number of productive shoots.
- High incidence of diseases and insect pests.
- Less penetration of sunlight due to overcrowding.

Considerations for rejuvenation

- Age of the plant
- Ability of the species to coppice
- Frame of the tree
- Time and severity of rejuvenation
- Post rejuvenation care
- Transformation of rejuvenated juvenile shoots into productive one
- Top working to change the variety

Mango: (*Mangifera indica* L.), Family: Anacardiaceae

Lal *et al.* (2000) studied the growth pattern of rejuvenated Dashehari mango trees (6 years after pruning) and found maximum length (2.10 m) and girth (22.21 cm) of retained shoots from tree pruned at branches emerging from main trunk. They also reported maximum cumulative fruit yield (330.92 kg) of rejuvenated Dashehari trees, from tree pruned at branches emerging from third order branches during the initial six years.

An experiment was conducted at N. A. U., Navsari to study the effect of heading back and training on yield and quality of old orchard of Rajapuri. The maximum weight of fruit (758.32 g), no. of fruits/tree (97.61) and yield/tree (73.61 kg) were obtained from tree pruned at 5 m height from ground level and maximum weight of fruit (751.42 g) was obtained from secondary branch trained to four tertiary limbs. Whereas, maximum no. of fruits/tree (67.33) and yield/tree (49.35 kg) was obtained from six tertiary limbs/each secondary branch. However, fruit quality in respect to length as well as girth of fruit and TSS was not affected due to rejuvenation technique (Anon., 2012).

Guava: (*Psidium guajava* L.), Family: Myrtaceae

Gorakh *et al.* (2007) studied the influence of rejuvenation on fruit yield of guava cv. Sardar and observed maximum yield (41.14 kg/tree) in 1st year from tree pruned at 2.0 m height, in 2nd year maximum yield (53.10 kg/tree) and cumulative yield (165.86 kg) from tree pruned at 1.5 m height and in 3rd year maximum yield (79.20 kg/tree) from tree pruned at 1.0 m height from ground level. They also found maximum fruit weight (289.0 g), total sugar (11.57 %) and minimum acidity (0.21 %) in tree pruned at 1.0 m height, maximum ascorbic acid (197.36 mg 100g⁻¹ pulp) and reducing sugar (5.32 %) in tree pruned at 1.5 m height, maximum TSS (12.83 °Brix) in tree pruned at 2.0 m height from the ground level.

Jahangeer *et al.* (2011) studied the effect of rejuvenation on yield and quality of guava cv. Sardar and observed maximum fruit yield with maximum fruit weight (230 g), TSS (13 °brix) and total sugar (11.16 %) in rejuvenated trees.

Basu *et al.* (2007) studied the effect of pruning time on rejuvenated guava cv. L- 49 and found maximum fruit set (356.25 number/ plant), fruit yield (290 number/ plant), fruit yield (78.28 kg/ plant), TSS (12.50 °Brix), reducing sugar (5.97 %) and ascorbic acid (84.55 mg/100g) from tree pruned in the month of April. They also found maximum fruit length (7.35 cm), fruit diameter (7.41 cm), total sugar (13.39 %), non-reducing sugar (7.59 %) and minimum titrable acidity (0.23 %) from tree pruned in the month of May and observed non-significant difference in fruit weight and pulp weight.

Aonla: (*Emblica officinalis* L.), Family: Euphorbiaceae

A study was conducted to rejuvenate sixty years old unproductive seedling Aonla trees. Six improved cultivars viz., NA-6, NA-7, NA-10, Kanchan, Krishna and Chakaiya were top worked. Krishna showed better performance during top working by giving 77.77 per cent bud take followed by NA-10 and NA-7. The top worked trees started bearing after two years of budding and maximum yield was reported in NA-7 (78.40 kg/tree) (Mishra *et al.*, 2007)

Conclusion

Productivity in certain fruit crops like Mango, Guava and Aonla is decreasing day by day due to reduced production in old and senile orchards. There is a keen need to overcome this situation. Rejuvenation is better alternative to resolve this fact.

Heading back in 40-50 years old tree at 4 m - 5 m height from the ground level in December and allowed to grow six tertiary branch on each secondary branch found best for



rejuvenation in mango for getting higher yield without affecting quality of fruit. While heading back at 2 m height from the ground level in the month of April – May gives higher yield with better quality fruits in rejuvenated guava. The top working was done in rejuvenate sixty years old unproductive seedling tree of Aonla. The tree top worked with variety NA-7 gave the maximum success percent and fruit yield of Aonla.

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