



Technology for Rejuvenation of Old and Senile Orchards of Guava and Aonla

GUAVA



Guava is one of the most common fruits in India. It is quite hardy and prolific bearer. Guava fruits is often called poor man's apple, though the fruit is neither poor in its nutritive nor commercial value. Presently, the productivity of guava is much below the productivity potential, which understandably could be attributed to the significant prevalence of old and unproductive orchards with declining yield pattern. Thickly shaded guava orchards are commonly seen in large tracks in different parts of country. These have brought down the average productivity. The essentiality of developing and deploying appropriate technology to manage such senile orchards in order to attain the competitive edge in commercial production and to meet the quality standards of the conscious consumers led to initiation of research efforts in this area by the Central Institute for Subtropical Horticulture, Lucknow. A technology to rejuvenate and restore the production potential of old, unproductive and wilt affected orchards has been developed.



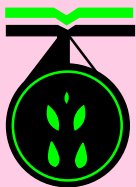
Technology for rejuvenating senile orchards

The rejuvenation technology involved the heading back of exhausted trees (showing marked decline in annual production) to the extent of 1.0 to 1.5 meter height above the ground level during May-June or December-February with the objective of facilitating production of new shoots from below the cut-point and allow the development of fresh canopy of healthy shoots.

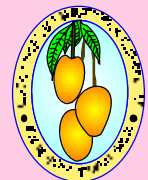
The newly emerging shoots are allowed to grow up to a length of about 40 to 50 cm, which could be attained in 4 to 5 months of rejuvenation pruning. These shoots are further pruned to about 50 per cent of its total length for emergence of multiple shoots below the pruning point. This was mainly done to modify the tree structure and maintain canopy size. Profusely emerging shoots in the inner canopy are also pruned to promote branching. The multiple shoots developed as a result of second pruning are capable of producing flower buds for rainy season crop. The farmers keen to take rainy crop can allow the shoots to bear flower buds and fruits. However, as the winter crop has more marketing edge and value due



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Rejuvenation technology for guava

to quality and taste and fruits being free of pest incidence, it is desired to promote fruit load in winter season. Hence, to check the onset of rainy crop, shoot pruning (50%) is also done again in May. Emergence of new shoots is facilitated. These new shoots emerging after May pruning are found to have high fruiting potential for winter crop. This procedure of sequential and periodic pruning is continued every year (May-June) for proper shaping of tree canopy and to ensure enhanced production of quality fruits during winter season.

AONLA

As an indigenous fruit, it has extensive adaptability to grow in diverse climatic and soil conditions. In general, canopy of aonla has irregular shape. Trees of irregular shape and size are difficult to deal with and even

culminate into poor fruit yield in the subsequent years as the lower branches of canopy gradually turns inert and infertile as well. In aonla, majority of the older plantations are of seedling origin embodying non-descript material and poor genetic potentiality which become senile. In several areas, plantations of improved varieties having good genetic potentiality have either gone unproductive or shown marked decline in productivity. This is the outcome of overcrowded and intermingling of large branches and meager foliage, allowing poor light availability to growing shoots within the canopy. This renders them un-economical. Such exhausted aonla trees can be rejuvenated by heading back of branches in winter for the production of new shoots, which can bear good crops in the years to come.

Points to be considered while adopting the rejuvenation technique

1. Plantations of commercial varieties where the canopy become overcrowded resulting in reduction in yield can be rejuvenated followed by canopy management.
2. Older plantations of seedling origin which have become senile can be adopted for top worked by grafting with scion of superior varieties to upgrade seedling plantation with superior commercial varieties.

Technology for rejuvenating senile orchards

The rejuvenation technology involves heading back of branches during December – January at a height of 2.5 to 3.0 m from the ground level depending on the



structure of individual trees in the orchard. Before rejuvenation pruning, branches are marked with white chalk by making a ring around the branches. The selected branches should initially be cut from the under side on the lower side by giving at least 10 cm deep cut. Thereafter, the cutting should be done from the upper surface of the branch. The cut portion of



Rejuvenation technology for aonla

the branches is then pasted with cow dung or copper oxychloride to avoid infection of fungal diseases. Immediately after heading back, the pruned wood needs to be removed from the orchard so as to prevent the damage by trunk borers.

The new shoots arise on pruned branches of heading back and a few shoots are retained at proper spacing and growing towards periphery of trees. In this technique, only 4 to 6 shoots developing in outer directions on main limbs should be allowed to develop. During May-June, the selected shoots are further pruned up to 50 per cent of its total length for emergence of multiple shoots below the pruning points. This was mainly done to modify the tree structure and maintain canopy size. Fruiting starts on third year after the rejuvenation.

Rejuvenation by top working

Top working can be easily adopted in rejuvenated trees to upgrade the old and senile plantations of seedling progeny with superior commercial cultivars. Top working involves two steps (i) beheading of the tree to be top worked and (ii) budding with an elite material on the new flushes emerging out on the stumps of beheaded tree. The plants are headed back during December – January to the extent of 2.5 to 3.0 m above the ground level. Four to six shoots from the outer directions on main limbs should be allowed to develop. During June-July, scion of desired variety is grafted (Budding) on these shoots. After sprouting, the top portion of the shoot is removed. Numerous side shoots, which emerge on the pruned branches after the budding operation should be removed regularly as and when they emerge, so that tree of pure commercial variety is obtained. Since aonla is self incompatible, i.e. the pollens of same tree/variety can not fertilize its own ovary, the production from mono-culture orchards without appropriate polliniser varieties, suffers adversely as a result of problem of fruit set. Consequently, polliniser varieties are budded on developing shoots of pruned trees to strengthen pollination process and enhancement of fruit set and productivity. Budding with mixed varieties results in better yield. The best combination is NA-6 with NA-7; NA-7 with NA-10 and Kanchan with Krishna. Adequate care should be taken to manage the insect-pest problems as these plants are prone to insect and sometimes wind damage.

Cultural practices in rejuvenated orchard

Irrigation

In headed back trees, irrigation is done just after rejuvenation. Adequate watering is a sine qua non for the optimum development of novel shoots in rejuvenated trees. If trees are not watered properly, there is always or feasibility that shoots do not grow to their appropriate level. It is, therefore, suggested to water those trees which are amputated for rejuvenation of old and senile orchards.

Manuring and fertilizer

During the phase of heading back, 50 kg FYM along with 6 kg neem cake / plant is made. Six month after rejuvenation, manures and fertilizers may be given as 40 kg FYM + 4 kg neem cake + 1300g urea + 500 g, muriate of potash and 1800g single super phosphate/ plant/year for guava. This mixture is to be applied in two split doses preferably in June and September. Seventy per cent of urea and entire dose of muriate of potash are to be applied in June and thirty per cent of urea and entire dose of single super phosphate to be applied in the month of September. In case of aonla, 50 kg FYM + 4 kg neem cake + 1000 g urea + 500 g, muriate of potash and 750 g single super phosphate/ year is applied. Fifty per cent of urea and entire dose of muriate of potash and single super phosphate need to be applied in January-February and rest dose of urea is applied in June.

Intercropping in rejuvenated orchard

Besides rejuvenating the trees, this technology also offers opportunities for employment and income generation through raising intercrops in the floor spaced of the pruned orchards. Intercropping is intended to maximize land and space use-efficiency to generate supplemental income, particularly during the phase of canopy development in rejuvenated orchards. However, great care should be taken in selecting the right type of intercrops at the centre, between and within rows of pruned trees. Vegetables and leguminous crops can easily be taken upto three year's after rejuvenation. The crops like cowpea, bean, cabbage, cauliflower, chillies, okra and partial shade- loving plants (ginger, turmeric and elephant- foot yam), as intercrop in the orchard provide sustainable return from the initial stage of canopy development.

Mulching

Mulching is a predominant act in interculture operation. The technique of mulching is generally, practiced by farmer's using dry grass, banana, leaves, sugarcane trace, saw dust, hay and straw in their orchards. In general farmers come across two sorts of problems while carrying out natural mulching - (i) natural mulching is not possible everywhere and every time on account of inavailability of suffice material, and (ii) natural mulching also gets destroyed/decomposed in a comparatively lesser time.

Of late, plastic films have come into use for the purpose of mulching due to its inherent advantages of efficient moisture conservation, weed control and maintaining of soil temperature. Besides, the volume of plastic material to be used per unit area is much less than that of traditional mulch material and, hence, plastic films is easy to handle, transport and lay in the field. The use of plastic mulching is one such technology, which helps in utilizing the irrigation water to its last drip. Black

plastic mulch film (400 gauge) is generally used for the purpose of mulching. The mulch film is spread around the soil/plant from all sides at the time of rejuvenation. After covering, it should be properly suppressed with mud so that it should not get displaced. After plastic mulching, drip irrigation method is the best way of irrigation. Wherever drip irrigation system is not available, the alternative is to remove the film from one side to carry out irrigation by the help of irrigation channel. After irrigation, mulch film is once again properly pressed under mud.

Management practices to be followed prudently by grower in the trees pruned for rejuvenation

- Apply cow dung or copper oxychloride on the cut portion.
- Make basin around the tree for regular watering and application of FYM and fertilizer application.
- Apply 50 kg of FYM + 6 kg neem cake per plant and recommended dose of fertilizers.
- Apply the paste of copper and lime on the larger limbs as well as trunk to prevent sun burn injury.
- Insure irrigation soon after rejuvenation for shoot sprouting and proper development of tree canopies.
- Pull out the caterpillar (trunk borer) mechanically by inserting iron spike in the shelter holes.
- Remove the webs and insert the swab of cotton soaked in monocrotophos and plug the holes with mud.
- Use black colour plastic mulch film (400 gauge) soon after rejuvenation.

Technology demonstration in farmer's field

More than fifteen demonstration trials have been conducted in different location of U.P., Maharashtra, Haryana and Bihar. All the trees responded well to rejuvenation and developed into new canopy. With the encouraging results at farmers' fields, the rejuvenation technology for aonla and guava standardized by PFDC, CISH sought the attention of farmers as well as Govt. agencies engaged in the promotion of guava and aonla. An extensive programme for rejuvenation is being done through NHM across the country.



Rejuvenation Techniques demonstrated at different locations of Maharashtra, U.P. and Haryana

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