

Important aspects of canopy management in guava

Principles and practices

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Canopy is the aboveground part of a plant that produces fruits. It is important because it possess leaves, the photosynthetic machinery; the structure of trunk and branches, provides mechanical strength to plant and the fruits which are economic part of the plant. The canopy management allows the higher sustainable fruit production by balancing other factors of production. Plants have their limited capacity for growth. This is because the amount of photosynthates generated by a canopy is limited and can be utilized for either vegetative growth or for reproductive growth i.e. for fruit production. The practice(s) adopted for canopy management aimed to maximize the use of photo assimilates for fruit production and reduce its use for unnecessary vegetative growth or any practice which is causing its wastage (may be excessive pruning). Apart from increasing quality production it also increases the ease of various operations like application of agro-chemicals, harvesting etc.

The basics of canopy management involve two practices training and pruning. Training confined to the initial years of growth of a plant starting from the establishment of the plants. Whereas, pruning is not only a tool to achieve training but also practiced throughout the life of a plant to maintain their productive status. Now, we will discuss all the things with respect to guava.

Whenever, we go for canopy management of any fruit crop, the knowledge of growth behaviour and bearing habit is very important. Guava is an evergreen plant. The chief botanical characteristic of guava is that it bears on current

season shoot. This provides an opportunity to prune guava plant more severe as compared to other tropical and subtropical fruit plants. Guava produces flowers three times in a year. Firstly, during April-May flowering produces fruits in rainy season (*Ambe bahar*). Secondly, during July-August (*Mrig bahar*) which produce winter season fruits and lastly during the September-October (*Hasth bahar*) which produces fruits during February. The timing of flowering in guava can be slightly variable subjected to prevailing weather conditions.

The best time of planting guava is *monsoon*. There are some factors which should keep in mind while planting guavas because they affect future canopy management and obviously productivity. The pits should be well dug, no hard pans or stones present inside the pit. The depth of planting is an important concern. Guava is generally propagated with air layering or mound layering. These plants have shallow roots because they are adventitious roots. So, they needed to plant at sufficient depth so that in future strong wind can't affect them. However, those guava plants which are propagated through grafting have tap root system of root stock. The second important point is that the planting distance of guava orchard should be decided after considering following points like soil fertility and climatic conditions, type of variety, technical knowledge of owner, labour availability. It has been found that guava tends to produce more vegetative growth under highly fertile soils along with favourable climatic conditions. This result in compactness of the orchards planted under

high density. Some varieties are having broader crotch angles (e.g. Punjab Pink, Shweta) and spreading growth habit as compared to others (e.g. Hisar Safeda). Management of high density guava orchards needs skill and technical knowledge. Excessive or minimal pruning both is inappropriate for guava. Maximum operations in high density guava orchard are done by labourers. So the availability of labourers is an issue. The grower should decide the planting distance after considering all the points.

The training of plants started after their establishment in the field. Allow only one stem to grow from the ground and remove others. The height of branching depends on the planting distance. More closer is the planting the branching height will also be less. Allow two, three or maximum branches to grow from the main trunk. The main trunk must be straight. If the plant is bending then provide support to it through staking. The growth from root stock or side branches existing below branching point (in case of layers) should be removed time to time. Guava is trained on modified central leader system.

In guava pruning performs for various objectives like for training, for removal of dead and unwanted branches, for crop regulation and to control the size of canopy under high density plantations. When pruning performs for training purpose it involves removal of side growth of root stocks, branches having narrow crotch angles, branches growing in lower directions etc. were pruned. Pruning of dried and dead branches practiced after harvesting of winter season crop. When pruning is performed for crop regulation, it is always associated pruning of current season shoot. This is due to fact that flowers are always borne on current season shoots in guava. Farmers do crop regulation to get more winter season crop which is of good quality and to remove rainy season crop which is not only poor in quality but also affected by various diseases and pest. Farmers can do crop regulation by one leaf pair shoot pruning of fruited shoots only. In this method of pruning, those current season shoots prune which are having buds and/or fruits of

rainy season crop leaving one leaf pair at the base. This method also found to reduce canopy volume which is an additional benefit for guava orchards planted under semi high density systems like double hedge row system of planting. Current season shoot can easily be differentiated from the older one by its light green colour. Various workers worked on different methods of crop regulation.

In guava, various density of planting are reported like 6m x 6m, 5m x 5m 3m x 3m and 1.5m x 3m. Traditionally guava had been planted at 8m x 8m or even more, which is not considered economic in present situation. The ultra-high density planting of guava also known as meadow orcharding is reported in which the plants are planted at a spacing of 2m x 1m accommodating 5000 plants per hectare.

In meadow orchards, after a period of 1-2 months of planting, all the plants are topped at a uniform height of 30-40 cm from the ground level for initiation of new growth below the cut ends. No side shoots or branch should remain after topping. This is done to make a single trunk straight up to 40 cm height. After 15-20 days of topping, new shoots emerge. In general, 3-4 shoots are retained from below the cut point after topping. As shoots mature generally after a period of 3-4 months, they are reduced by 50 per cent of their total length so that new shoots emerge below the cut point. This is done to attain the desired tree canopy architecture and strong framework. The emerged shoots are allowed to grow for 3-4 months before they are again pruned by 50 per cent. After pruning, new shoots emerge on which flowering takes place. This is the training of guava plants under meadow orchards. To maintain productivity and canopy the plants are pruned three times first in January-February, second in May-June and third in September-October. Harvesting of fruits is generally done in January-February from the May- June pruned shoots. After harvest, the pruning is done above fruiting points. New shoots emerge after pruning of shoots during January-February. On these shoots, flowering takes place and fruiting is obtained during July-September. Second time

pruning is done in May- June. After pruning, once again shoots emerge and flowering takes place, which yields fruits during December- February. These shoots are further pruned for the third time in September- October. It is done primarily for better canopy architecture. As a result of pruning in October, fruiting is obtained in March- April. The height of plants is restricted to 1.0 m.

Canopy management for high density planting (3m x 3m; 3m x 1.5m; and 6m x 3m) is different from canopy management in meadow orchards. Trees are topped to a uniform height of 60-70 cm from the ground level, two-three months after planting to induce the emergence of new growth below the cut point. As a result, new shoots emerge. Three to four equally spaced shoots are retained around the stem to form the main scaffold limbs of the tree. These shoots are allowed to grow for 4-5 months after topping until they attain a length of about 40-50 cm. The selected shoots are further pruned to 50 per cent of their length for inducing multiple shoots from the buds below the cut end. Newly emerged shoots are allowed to grow up to 40-50 cm and are pruned again for the emergence of new

shoots. This is mainly done to obtain the desired shape. The pruning operations continue during the second year after planting a compact and strong structure. All the plants are confined to a hedge shape of 2 m inter row width and 2.5 m height for which pruning is performed in January-February and May-June every year. Excessive pruning of guava may result in good crop in the next season but it was found that there are chances of yield reduction in coming years and the plant health affects badly. Being evergreen guava leaves photosynthesize round the year, but it is well known fact that the evergreen plants have lower photosynthetic rate than the deciduous one. When excessive pruning is performed lots of leaves fall down along with the branches which ultimately not only reduce the stored photo assimilates in woody part of the tree but also reduce the photosynthesis machinery (leaves). On the contrary, deciduous plants are able to compensate photo assimilate losses by pruning during dormant stage and having higher photosynthetic rate. So, the correct time, method and management is the key for successful canopy management in guava.