

## Canopy Management in Fruit Crops

Karan Kumar<sup>1</sup> and Dr.SomDev Sharma<sup>2</sup>

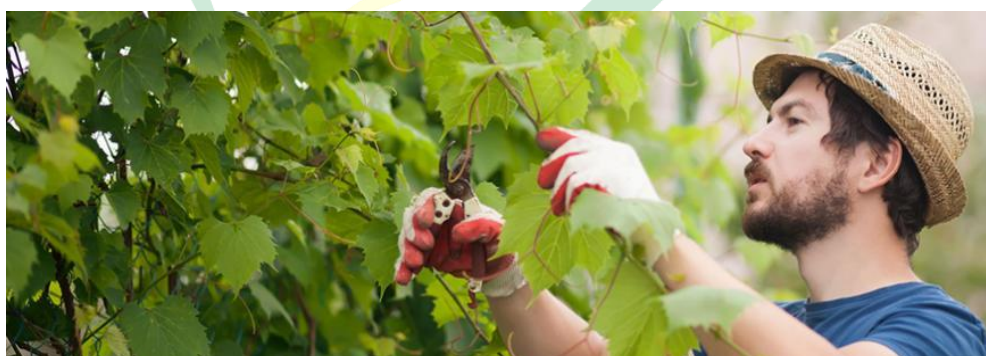
<sup>1</sup>M.Sc (Horticulture) Fruit Science and <sup>2</sup>Principal Extension Specialist (Horticulture)

Dr. Y.S. Parmar U.H.F., Nauni, Solan (HP)

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### Introduction

Canopy in a fruit tree refers to its physical composition comprising of stems, branches, shoot and leaves. The density of canopy is determined by the number and size of the leaves. Canopy architecture is determined by the number, length and orientation of the stem and shoots. Canopy management of the fruit trees deals with the development and maintenance of the structure in relation to size, shape, orientation of branches & light interception for the maximum productivity and quality. The basic concept in canopy management of a perennial tree to make the best use of land and the climate factors for an increased productivity in three dimensional approaches. Canopy management includes a range of techniques to alter the position and the amount of leaves, shoot and fruits in space which determines, to a large extent the plant geometry structure including spatial distribution of leaf area and leaf orientation.



Canopy management refers an interrelation of the physiology underlying the relationship between vegetative growth and production. Thus, the ultimate goal of canopy management is to optimize carbon allocation in fruit sinks without disturbing growth and development in other part of the tree. The influence of temperature, light, humidity and tree vigour on the productivity and quality of fruit and manipulation of tree canopy through

training system, pruning practices and use of growth retardants for the best utilization and harvest. In the last few years, significant development and strong formation have taken place in the development of tree canopy forms and new production system. High yield of good quality fruits produced under such systems are attributes to high light interception and distribution within the canopy.

### **Why We Need Canopy Management?**

Light is critical to growth and development of trees and their fruits. The green leaves harvest the sunlight to produce carbohydrates and sugars which are transported to the sites where they are needed – buds, flowers and fruits. Better light penetration into the tree canopy improves tree growth, productivity, yield and fruit quality. The density and orientation of planting also impact light penetration in an orchard. Generally, in close planting, quicker shading becomes a problem.



Strong bearing branches tend to produce larger fruits. The problem of a fruit grower is initially to build up a strong and balanced framework of trees, then equip them with appropriate fruiting. Obviously, pruning in the early years has to be of a training type to provide strong and stocky framework with well-spaced limbs or any other desired shape. The main objectives of canopy management are given below:

- 1) To get the higher yield with good quality.
- 2) To maintain a good balance between root and shoot growth.
- 3) Formation of strong crotches / crotch angle.
- 4) To remove unwanted, overcrowding, dead disease and pest affected shoots.
- 5) To regulate the tree architecture or form desire shape for high density planting system.
- 6) To facilitate the management practices like spraying, harvesting etc.
- 7) To proper utilize air, light and temperature efficiently.

- 8) To regulate exposure of plant to light and air.
- 9) To make accessibility to machinery between rows.

### **Principles of Canopy Management**

- Maximum utilization of light.
- Avoidance of built-up microclimate congenial for diseases and pest infestation.
- Convenience in carrying out the cultural practices.
- Maximizing productivity with quality fruit production.
- Economy in obtaining the required canopy architecture.
- In many fruit crops, improved production and fruit quality has come from producing more fruit from smaller trees.
- Rejuvenation of declining in productivity and fruit quality in large over grown orchards.
- Small trees are better in capturing and converting sunlight in to fruit then large trees.
- Reduction in extra expense in harvesting at large trees.
- Safety risk for the harvest of bigger trees.

### **Mango:**

- Identify uprightly growing branches in each tree and thin out for increasing the productivity.
- Remove only one or two uprightly growing branches from center of tree to reduce tree height significantly and increase availability of light inside the canopy for better photosynthesis.
- Cutting of uprightly growing branches should be done during October-December from the base of their origin.
- During removal of branches, first cut should be given on lower side of branch to give a smooth cut and avoid bark splitting.
- Protect branches with wide crotch angle as they are more productive.
- In bearing mango trees, not more than 25 % biomass should be removed at a time for better canopy management otherwise it results in excessive vegetative growth.
- Under high density planting system, remove 10-15% biomass annually during October-December to increase light penetration inside the canopy. Removal of 10-15% biomass should include crisscross branches, dead wood and diseased shoots.



### **Litchi:**

Management of optimum stature of litchi tree with compact and stereo bearing canopy is an important aspect of orchard management. Hence, giving proper shape to trees from initial stage and pruning of branches after harvesting in bearing trees is essential. Since more shoot sprouting takes place in young plants, proper shape is quite convenient at this stage.

- Single stem air layered plants should be raised in bags and allowed to grow up to 40-50 cm. The air layered plants have strong tendency to produce branches at the ground level which are pinched or pruned.
- Further, strong, well-spaced outshoots are allowed to form the main branches. It is necessary to continue shaping by removing all the branches forming crotches with main branches as and when they grow.
- To develop good and compact canopy, 25-30 cm fruit bearing shoots at the time of harvesting are removed. In this way, 2-3 new terminals develop which consequently develop into fruiting branches next season.
- Unproductive trees are pruned heavily to develop new fruitful shoots. In such cases, heavy reiterative pruning, usually up to limbs at a height of 4-5m is commonly followed, supplementary with heavy application of nutrients.
- These new shoots start fruiting 2-3 years after pruning. Thereafter, general pruning is followed to maintain ideal vigor and productivity of trees.



### **Mandarin (citrus):**

- The trees at planting time are headed back more severely to a height of 70-80 cm from the ground level.

- Pruning or cutting back of one year old shoots to half length (50% of the total) or to full length is recommended for obtaining proper yield of high quality fruit. The pruning, therefore, is done to keep the balance between fruiting and vegetative growth.
- Pruning of some of the shoot certainly removes a part of fruiting area and helps maintain regular cropping. The dried up branches found in the lower part of the plant too are



removed.

#### **Lime (K. lime):**

Acid lime plants may be trained to modified central leader system, with a smooth trunk up to 75-100 cm height from the ground level and 4-5 well spaced and well spread branches, as scaffolding branches.

- All sprouts appearing on the trunk up to a height of 75-100 cm should be removed. Similarly on grown up trees, the water suckers appearing on main trunk and scaffolding branches should be removed promptly.
- Once a young plant is trained to a desired shape, it requires very little pruning. Light pruning may be given during later years.
- Light pruned trees make more development of roots and shoots, producing fruit earlier than those pruned heavily. Pruning of bearing trees though differ with variety, chiefly consists of removal of dead, dried, diseased, broken and criss-cross branches, whose existence is detrimental to the health of trees. Removal of water suckers is also essential.
- Pruning may be done just after harvesting. Soon after pruning, the cut ends may be smeared with Bordeaux paste or Blitox.

#### **Guava:**

Untrained or unpruned guava trees become huge and unmanageable after a few years of growth. The bearing area is reduced and the interior of plants become entirely without fruits.

- Trees are topped to a uniform height of 60-70 cm from the ground level, 2-3 months after planting to induce the emergence of new growth below the cut points.

- Three to four equally spaced shoots are retained around the stem to form the main scaffold limbs of tree. These shoots are allowed to grow for 4-5 months after topping until they attain a length of 40-50 cm.

- The selected shoots are further pruned to 50 % 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 pruned once again for emergence of new shoots. This is chiefly done to obtain the desired shape.

- The pruning operations continue during the second year after planting. After two years, short branches within the tree canopy produce a compact and strong structure. All the plants are confirmed to a hedge shape of 2 m inter row width and 2.5 m height for which pruning is performed in January and May-June every year.

#### **Banana:**

- In most banana growing region, solar radiation is abundant and productivity of banana largely depends upon the efficient utilization of this resource. In multistory cropping system, banana is grown to harness maximum light, land and nutrient availability. Light interception, soil fertility, climatic conditions, soil moisture etc.



- Pruning of surplus leaves is a common operation in banana cultivation. It improves light penetration and reduces disease spreading through senescent leaves. For optimum crop production, minimum of 12 leaves are required to be retained.

**Sapota:**

- Sapota is an evergreen tree so it requires no regular pruning but regulation of vegetative growth to improve productivity and quality of fruits. A seedling tree grows excellently giving a shape of an umbrella. Plants require training for appropriate shape and framework development.
- Most trees are trained in central leader system. During initial year, plants are topped to 60-70 cm above the ground level. After emergence of new shoots below the cut point, 3-4 well spaced scaffold limbs are selected and allowed to grow to make a strong framework.

