



Centurion
UNIVERSITY

*Shaping Lives...
Empowering Communities...*

HIGH DENSITY PLANTING AND CANOPY MANAGEMENT IN MANGO

[Next](#)

[End](#)



HDP in mango

Centurion
UNIVERSITY

Shaping Lives...
Empowering Communities...

- The productivity of mango in India is comparatively less than other mango producing countries. The reasons for low productivity are as follows:
- ✓ Most of the commercial cultivars are location specific with long gestation period with alternate bearing habit *viz.*, Deshehari, Langra, Chausa, Bombay Green, Alphonso, Banganapalli, Pairi, Himsagar, Kesar, Mulgoa etc.
- ✓ The normal planting distance for conventional mango planting is ranging from 10-12 m due to poor soil conditions.
- ✓ Most of the old orchards are seedling progenies and take 10-15 years to give economic returns depending upon the cultivar, planting distance and other cultural practices.
- ✓ Most of mango orchards are rainfed and seldom applied with nutrients.
- ✓ Poor early returns and varying cultural requirements for the inter crop grown in mango orchards.

(Cont)...



[Next](#)

[previous](#)

[End](#)





Centurion
UNIVERSITY

Shaping Lives...
Empowering Communities...

High density orcharding appears to be the most appropriate answer to overcome low productivity and long gestation period for early returns and export of mangoes.

- To meet the challenge of high productivity, optimization of growth parameters and minimization of the unproductive components of trees without sacrificing the overall health of the tree and quality of the product are required.
 - The control of excessive vegetative growth in the tree for increased productivity is the major principle of high density orcharding.
 - Therefore, controlling tree size by dwarfing rootstocks in high density orchards is one of the methods of increasing production.
 - In high density system, yields are improved in early years of orchard life.
- (Cont)..



Centurion
UNIVERSITY

Shaping Lives...
Empowering Communities...

Once the trees have filled their allotted spaces, crowding may occur and canopies of an adjacent tree begin to overlap.

This may lead to excessive shading and reduction in photosynthesis by layered leaves within the tree canopy resulting in poor yields.

In fact, at some point of time most fruit trees require controlled vegetative growth particularly in high density orcharding.

The horticultural methods most commonly known to control tree growth are training and pruning.

The training begins when the tree is first planted and continues throughout its productive life.

Proper tree forms, branch angle and limb spacing in themselves aid in growth control.

Once the tree is mature, excessive growth can be regularly removed by pruning to provide a short term or immediate benefit.

[Next](#)

[previous](#)

[End](#)

(CONT)...





Centurion
UNIVERSITY

Shaping Lives...
Empowering Communities...

In mango three different methods of high density planting viz., low density, moderate density and high density planting are followed.

The low density planting at a spacing of 10 x 10 m accommodates 100 plants/ha (40 plants/acre), the moderate density at a spacing of 7 x 7 m accommodates 204 plants/ha (82 plants/acre) and high density planting at a spacing of 5 x 5 meter accommodates 400 plants/ha (160 plants/acre).

Research is on to study the ultra high density system of planting using compact varieties, dwarfing rootstocks and chemical retardants.



[Next](#)

[previous](#)

[End](#)





Centurion

UNI
Shaping
Empower

- The availability of the natural resources decides the plant population per hectare and it is estimated as follows:

Details	Conventional planting (plants/ ha)	Resource Rich (plants/ ha)	Resource moderate (plants/ ha)	Resource poor (plants/ ha)
No. of plants	100	204	278	400
Spacing	10 x 10 m	7 x 7 m	6 x 6 m	5 x 5 m

Planting system for mechanization

- Paired row planting is practiced to facilitate mechanization in mango orchards.
- For mid season and late season varieties, 10 x 5 x 5 m spacing in paired row planting with 222 plants/ha is found to be an ideal population.





Centurion
UNIVERSITY

Shaping Lives...
Empowering Communities...

TRAINING AND PRUNING

- Mango trees being “shy bearers” respond well to pruning, which will make them “regular bearers”.
- The best time for pruning in South Indian conditions is August.



Pruning is important tool in mango plantation management because it allows the grower to:



- Restrain the exuberant vegetative growth of mangoes to manageable sizes and forms thereby to achieve optimum production.
- Judicial removal of excess vegetative growth for more efficient management. Synchronize flowering to extend the production cycle and market availability
- Increase productivity of orchard
- Stimulate precocious flowering of new plantings
- Extend the productive life of the orchard
- Recuperate overgrown, older orchard and
- Increase air circulation in the orchard, which lowers losses associated with diseases.





High density orcharding appears to be the most appropriate answer to overcome low productivity and long gestation period for early returns and export of mangoes.

To meet the challenge of high productivity, optimization of growth parameters and minimization of the unproductive components of trees without sacrificing the overall health of the tree and quality of the product are required.

The control of excessive vegetative growth in the tree for increased productivity is the major principle of high density orcharding.

Therefore, controlling tree size by dwarfing rootstocks in high density orchards is one of the methods of increasing production.





Centurion
UNIVERSITY
Shaping Lives...
Empowering Communities...

In high density system, yields are improved in early years of orchard life. Once the trees have filled their allotted spaces, crowding may occur and canopies of an adjacent tree begin to overlap.

This may lead to excessive shading and reduction in photosynthesis by layered leaves within the tree canopy resulting in poor yields.

In fact, at some point of time most fruit trees require controlled vegetative growth particularly in high density orcharding.

The horticultural methods most commonly known to control tree growth are training and pruning.

The training begins when the tree is first planted and continues throughout its productive life.



Centurion
UNIVERSITY
Shaping Lives...
Empowering Communities...

Proper tree forms, branch angle and limb spacing in themselves aid in growth control.

Once the tree is mature, excessive growth can be regularly removed by pruning to provide a short term or immediate benefit.

In mango three different methods of high density planting *viz.*, low density, moderate density and high density planting are followed.

The low density planting at a spacing of 10 x 10 m accommodates 100 plants/ha (40 plants/acre), the moderate density at a spacing of 7 x 7 m accommodates 204 plants/ha (82 plants/acre) and high density planting at a spacing of 5 x 5 meter accommodates 400 plants/ha (160 plants/acre).

Research is on to study the ultra high density system of planting using compact varieties, dwarfing rootstocks and chemical retardants.

(Cont)....

[Next](#)

[previous](#)

[End](#)





Centurion
UNIVERSITY

Shaping Lives...
Empowering Communities...

The availability of the natural resources decides the plant population per hectare and it is estimated as follows:

Details	Conventional planting (plants/ ha)	Resource Rich (plants/ ha)	Resource moderate (plants/ ha)	Resource poor (plants/ ha)
No. of plants	100	204	278	400
Spacing	10 x 10 m	7 x 7 m	6 x 6 m	5 x 5 m



Centurion
UNIVERSITY

*Shaping Lives...
Empowering Communities...*

Planting system for mechanization

- Paired row planting is practiced to facilitate mechanization in mango orchards.
 - For mid season and late season varieties, 10 x 5 x 5 m spacing in paired row planting with 222 plants/ha is found to be an ideal population.





Centurion
UNIVERSITY

Shaping Lives...
Empowering Communities...

TRAINING AND PRUNING

- Mango trees being “shy bearers” respond well to pruning, which will make them regular bearers”. The best time for pruning in South Indian conditions is August.
- Pruning is important tool in mango plantation management because it allows the grower to:
 - Restrain the exuberant vegetative growth of mangoes to manageable sizes and forms thereby to achieve optimum production.
 - Judicial removal of excess vegetative growth for more efficient management
 - Synchronize flowering to extend the production cycle and market availability
 - Increase productivity of orchard
 - Stimulate precocious flowering of new plantings
 - Extend the productive life of the orchard
 - Recuperate overgrown, older orchard and
 - Increase air circulation in the orchard, which lowers losses associated with diseases.



[Next](#)

[previous](#)

[End](#)





Centurion
UNIVERSITY

Shaping Lives...
Empowering Communities...

Training

The early stages of growth are most important for the initial shaping of the young tree. A well framed tree will be able to carry a heavy crop, facilitate spraying operations and ensure better exposure to sunlight leading to a good blush on the fruit at maturity.

Training of young plant is done in early years of planting by removing side branches upto the height of 1 m from the ground level and side branches are allowed to grow beyond 1 m height.

Such type of initial training provides good architecture to the plant and it helps in good fruit production.



[Next](#)

[previous](#)

[End](#)





Centurion
UNIVERSITY
Shaping Lives...
Empowering Communities...

Training of young trees

- To develop a strong trunk in mango, the trees are allowed to grow to over 1 m height initially.
- Then cut back to a height of between 0.6 and 0.7 m
- Mangoes grow in flushes and each flush is delineated by a concentrated whorl of leaves on the stem.
- This is referred to as a “ring of buds”, as a bud capable of forming into a branch.
- If the cut is made above this “ring of buds”, the resulting re-growth will give feather cluster effect of seven or more shoots and should be thinned out to three or four for attaining a good tree structure.
- However it is not preferable since the trees trained will be prone to breakage during storms or strong winds.

(CONT)..



[Next](#)

[previous](#)

[End](#)





- Below the “ring of buds” the leaves are more spaced out along the trunk and it will serve as an ideal place to do the first cut.
- It will ensure the development of three branches well spaced out of the trunk, resulting in a strong frame for future development.
- The three branches/shoots are allowed to grow over 1 m long and then cut back to about 1 m in length to ensure the development of 3 branches.
- After this the trees start branching by themselves. Young trees can be pruned at any time of the year.
- The aim should be to develop a spreading tree rather than a tall tree.
- Downward and inward growing branches or branches that cross over each other are to be removed.

Pruning



Centurion
UNIVERSITY

Shaping Lives...
Empowering Communities...

- Mango trees need not have to be pruned annually to bring on flowering or increase yield as is the case with deciduous fruit trees.
- They are terminal bearers, and usually flowers are borne on previous season wood.
- Mango trees normally respond to pruning by sending out a vegetative flush, usually the heavier the pruning, the more vigorous and numerous the flushes.
- Pruning is usually carried out to shape trees and open up the centre, allowing free movement of air and sunlight into the tree.
- This facilitates the penetration of sprays through the trees thereby providing better control of pests and diseases.
- The ability of sunlight to penetrate the tree enhances the color development of the fruits and improves quality.





Centurion
UNIVERSITY
Spreading Learning...
Empowering Communities...

- There are no hard and fast rules for pruning mango trees.
- The main objective is to develop a good tree structure which facilitates harvesting and movement of machinery through the orchard.
- The ideal tree should have three and not more than four main trunks, be open inside and low-set, i.e. 4-5 meters.
- Most of the cultivars of mango grown are erect, form a natural dome shaped canopy and have symmetrical branching and hence need only occasional pruning.
- Severe pruning is needed only in high density mango planting.

Pruning in mango can be done at 2 stages

- (1) After harvest
- (2) Pre flowering stage.





Centurion
UNIVERSITY

Shaping Lives...
Empowering Communities...

First pruning after harvest

- This should be done immediately after harvest.

Types of pruning at this time include:

Skirting

This is the removal of low hanging branches which could hinder orchard operations such as fertilizer application and under tree spraying for weed control.

Opening up

This is the removal of branches inside the tree which cross over or clutter up the centre of the tree restricting the penetration of sprays.

Hygiene

This involves the removal of any diseased or dead branches in the tree, which could be a source of infection.



Second pruning at pre flowering



Central Board of Secondary Education
UNIVERSITY
Shaping Lives...
Empowering Communities...

- This pruning takes place before flowering and if the timing is right, it is followed by a floral rather than a vegetative flush.
- The time span of this pruning is limited to a quite short period about two to four weeks.

Skirting

Removal of low hanging branches.

Opening up

Removal of twigs and branches cluttering up the inside of the tree, as well as opening up the top.

This not only facilitates spray penetration for better insect and disease control but also allows light into the tree, improving fruit color.

(CONT)....



[Next](#)

[previous](#)

[End](#)





Centurion
UNIVERSITY
*Shaping Lives...
Empowering Communities...*

Tip Pruning

This is particularly useful when the trees have a vegetative flush just prior to flowering.

The young flushes are cut back to mature wood; the resulting flush should be floral.

This has an added advantage in that it can also be used to reduce tree size, by cutting back two or even more flushes.

Reducing tree size

Cutting back large limbs to reduce tree size is always risky with mangoes because it may lead to reduction in yield for 2 / 3 years, depending on the amount cut back.

However, it is carried out at the right time; flowers develop on even large branches.

Hygiene

It is essential to reduce the source of flower and fruit infection.

Any diseased or dead branches are to be removed before flowering.

(CONT)...

[Next](#)

[previous](#)

[End](#)



Rejuvenation of senile orchards



Central
UNIVERSITY
Shaping Lives...
Empowering Communities...

In general, after 30 years mango trees exhibit declining trend in fruit yield because of dense and overcrowded canopy especially in areas where the tree growth is very vigorous.

New emerging shoots are weak and are unsuitable for flowering and fruiting.

The population of insect pests builds up and the incidence of diseases increases in such mango orchards.

These unproductive mango trees can be converted into productive by pruning.

Intermingling, diseased and dead branches should be removed. Undesirable branches of unproductive trees should be headed back from 1.5 to 2.0 m from the distal end after harvest in South Indian conditions. The cut portion is applied with copper-oxychloride paste to avoid infection of diseases.

(CONT)...



[Next](#)

[previous](#)

[End](#)





Centurion

UNIVERSITY

Shaping Lives...

Empowering Communities...

- During March - April or October-November, a number of new shoots emerge around the cut portion of the pruned branches.
- Only 3 to 10 healthy and outward growing shoots may be retained at proper distance to develop a good frame work in the following years.
- These pruned trees need to be fertilized with adequate quantity of N, P and K during June/July and September –October after soil test.
- The plants need to be irrigated at an interval of 5 days especially during summer.
- Farm yard manure at the rate of 50 - 100 kg per tree may be applied.
- Unwanted new shoots should be regularly removed to maintain the tree canopy and to avoid re-crowding of branches.
- This helps in getting proper nourishment to retained shoots.
- After two years of pruning, new shoots come into bearing and the fruit yield of tree starts increasing gradually.
- By this technique, old and unproductive trees may be transformed into productive ones.



Centurion
UNIVERSITY

Shaping Lives...
Empowering Communities...

Intercropping

- Mango orchard provides an opportunity for utilizing the land space to its maximum during initial years (up to 8-10 years) of establishment.
- Due to wider spacing and developing root patterns, the large unutilized inter-space of about 60 to 70 % can be exploited for growing inter and mixed crops successfully.
- Selection of intercrops depends on agro climatic region, marketing facilities, levels of inputs and other local considerations.
- Leguminous crops like green gram, black gram, oilseeds like sesame and groundnut and vegetables crops such as cabbage, cauliflower, tomato, potato, brinjal, cucumber, pumpkin, bitter gourd, bhendi, etc. and spices like chillies can be successfully grown as intercrops.
- The partial shade loving crops like pineapple, ginger, turmeric, etc. can be grown in fully grown orchards.
- In addition to field crops, some short duration, less exhaustive and dwarf type inter-fillers like papaya, moringa, curry leaf, etc. can also be grown till these do not interfere with the main mango crop.





Centurion
UNIVERSITY

Shaping Lives...
Empowering Communities...

References

Bose. T. K., S. K. Mitra.1990.Fruits: tropical and subtropica.PublisherNaya Prokash,. 57 p.

- ✓ Gangolly, S. R. 1957. *The Mango*. New Delhi, Indian Council of Agriculture Research.
- ✓ Radha .T. & Lila Mathew 2007. *Fruit Crops: Vol.03. Horticulture Science Series*. New India Publishing. 221p
- ✓ Samson, J. A. 1986. *Tropical Fruits*. 2nd ed. Longman Scientific and Technical. pp. 216-234