High density planting in banana

Spacing

Varieties	Spacing	No. of suckers/ha	No. of suckers per acre
CO 1	1.8x3.6	4600	1840
Udhayam	1.8x3.6	4600	1840
Grand Naine	1.5x1.5	4440	1785
BRS1	1.8x3.6	4600	1840
BRS 2	1.8x3.6	4600	1840
FIHA-01	3x2	1667	666
Saba	3x2.5	1333	533
Lacatan	3x3	1111	444

Spacing for Hybrids

Spacing for Tamil Nadu Varieties

Varieties	Spacing	No. of suckers/ha	No. Of suckers pe acre
Rasthali	2.1x2.1	2267	907
Poovan	2.1x2.1	2267	907
Karpooravalli	2.1x2.1	2267	907
Monthan	2.1x2.1	2267	907
Robusta	1.8x1.8	3080	1232
Nendran	1.8x1.8	3080	1232
Dwarf Cavendish	1.5x1.5	4440	1785
Ney Mannan	0.9x0.9	8100	3240
Chakkerakeli	1.8x1.8	3080	1232
Virupakshi	3.6x3.6	771	308
Sirumalai	3.6x3.6	771	308
Ney Poovan	2.1x2.1	2267	907
Red banana	2.1x2.1	2267	907
Sanna Chenkadalai	1.8x3.6	4600	1840
Matti	1.8x3.6	4600	1840
Namarai	1.8x3.6	4600	1840
Pachanadan	1.8x3.0	1850	740
Lacatan	3x3	1111	444

Spacing for Karnataka Varieties

Varieties	Spacing	No. of suckers/ha	No. of suckers per acre
Monthan/Karibale	2.1x2.1	2267	907
Bontha	2.1x2.1	2267	907
Dwarf Cavendish	1.5x1.5	4440	1785
Robusta	1.8x1.8	3086	1234
Amruthapani/Rasthali	1.8x1.8	3086	1234
Poovan	2.1x2.1	2267	907
Elakkibale	2.1x2.1	2267	907
Safed Velchi	2.1x2.1	2267	907
Najangud Bale	1.8x3.0	1850	740
Chandra Bale	2.1x2.1	2267	907
Marabale	3.6x3.6	771	308
Ney poovan	2.1x2.1	2267	907

Spacing for Kerala Varieties

Varieties	Spacing	No. of suckers/ha	No. of suckers per acre
Chenkadali/Red banana/Kappa vazha	2.1x2.1	2267	907
Palayankodan	2.1x2.1	2267	907
Monthan	2.1x2.1	2267	907
Nendran	1.8x1.8	3080	1232
Robusta	1.8x1.8	3080	1232
Dwarf Cavendish/Morris	2.4x1.8	2310	924
Rasthali	2.1x2.1	2267	907
Safed Velchi	2.1x2.1	2267	907
Karpooravalli	2.1x2.1	2267	907
Kadhali	2.1x2.1	2267	907
Nijalipoovan	2.1x2.1	2267	907
Kunnan	2.1x2.1	2267	907
Ayrinkapoovan	2.1x2.1	2267	907

Planting

Planting can be done in May-June or in September - October. Single sucker is planted upright in small pits taken in the centre leaving 5 cm pseudostem above soil level. Soil is pressed around the sucker to avoid hollow air spaces. Tissue culture plants are planted on the top of the pit at ground level.Polye cover should be removed before planting without damaging the roots.

Planting is followed by light irrigation. Partial shade should be provided immediately after planting.

- Banana can be planted throughout the year except in severe winter and during heavy rains when the soil remains very wet.
- The ideal time (October-November) of planting is after the monsoon season.
- With assured irrigation, the planting can also be done in February-March.
- Plant population depends on cultivars, topography and soil fertility.
- Apply 25 g Pseudomonas fluorescence / plant at the time of planting.

Pre-treatment of suckers

- Trim the roots and decayed portion of the corm, cut the pseudostem leaving 20 cm from the corm and grade the suckers to size.
- To avoid wilt disease in Rasthali, Monthan, Virupakshi and other wilt susceptible varieties, infected portions of the corm may be pared and dipped for 5 minutes in 0.1% Emisan solution (1 g in 1 lit of water).
- Pralinage is done with 40 g of Carbofuran 3 G granules per sucker. (Dip the corm in slurry solution containing 4 parts clay plus 5 parts water and sprinkle Carbofuran to control nematodes).
- Alternatively, dip the corm with 0.75% Monocrotophos, shade dry for atleast 24 hours and plant.
- Use tissue cultured banana plants with 5-6 leaves.

System of Planting

Single row system

- In single row planting, the distance within the row is close, whereas the distance between the row is wide.
- This system allows good aeration to plant canopy, allowing wet leaves to dry more rapidly, reducing fungal disease severity.
- In this, less number of trees occupied in the field and yield will automatically reduced .

Paired Row System

- In this method, the distance between the two lines is 0.90 to 1.20 m. while plant to plant distance is 1.2 to 2 m.
- Due to this spacing, intercultural operations can be carried out easily and cost of drip irrigation is decreased.

Square System

- This is the most commonly followed system and is very easy to layout.
- Banana is mostly cultivated by adopting 1.8x1.8m spacing
- *In* this system, trees are planted on each comer of a square whatever may be the planting distance.
- The central place between four trees may be advantageously used to raise short lived filler trees.
- This system permits inter cropping and cultivation in two directions.

Triangular System

- This system is best suited for tissue culture banana suckers.
- In this, adopt spacing in between rows was 1.5m and plant to plant was 1.8m in the row.
- The trees are planted as in square system but the difference being that those in the even numbered rows are midway between those in the odd rows instead of opposite to them.
- The distance between any two adjacent trees in a row is equal to the perpendicular distance between any two adjacent rows.
- When compared to square system, each tree occupies more area and hence it accommodates few trees per hectare than the square system.

System of Planting	Planting distance	Plant population per hectare
Paired row	1.2x1.2x2.0 m	5200
Square system	1.8x1.8 m	3025
Triangular system	1.5x1.8 m	3630
2- suckers/hill	1.8x3.6 m	3200
3- suckers/hill	1.8x3.6 m	4800

Method of planting

- **Pit Method**
- **Furrow Method**
- **Trench Planting**

Pit Method

- Pit planting is commonly followed in garden land system of cultivation. Pits of 60 cm x 60 x 60 cm x 60 cm size are dug, filled with a mixture of soil, sand and FYM (Farm Yard Manure) in a 1:1:1 ratio. Suckers are planted in the centre of the pit and soil around is compacted.
- Planting is done from February to May whereas in North India, it is done during July-August. In South-India, it can be done any time of year except summer.This is mostly followed in biennial plantations for Dwarf Cavendish, Rasthali, Robusta, Poovan and Karpuravalli banana.
- However this method is very laborious and expensive. The only advantage is that no earthing up is required as planting is done at the required depth. This practice is not very popular at present.

Pit Method

Pit Method

Pit Method

Furrow Method

- In Gujarat and Maharashtra, furrow planting is practised. After land preparation, 30-40 cm deep furrows are made, either manually or with a ridger.
- Suckers are placed at required spacing; FYM is applied around, mixed with soil and tightly packed round the suckers.
- Furrow planting is practised in annual panting system. In this method earthing up needs to be frequently done to cover the exposed rhizomes.

Furrow Method

Furrow Method

Furrow Method

Trench Planting

- Trench planting is practised in wet land cultivation of Cauvery delta region of Tamil Nadu. Land is prepared like paddy using plenty of water and gauge wheel.
- Water is drained from the field allowing setting for a day. Planting is done by simple pressing the suckers into the wet field.
- After a week 15 cm deep trenches are opened both ways maintaining 4 or 6 plants in each block.
- Deepening of trenches by 20-25 cm is taken up every month after planting till suckers put forth 1-3 leaves.
- During third month trenches are broadened and deepened to 60 cm. in rainy season some trenches are used as drainage channels. After about 2 months, trenches are cleaned; decayed manure is used for plants for organic cycling.

Trench Method

Trench Method

Trench Method

Top of Page

High Density Planting

- High Density Planting (HDP) is normally refers to planting at a spacing than the usual recommended spacing.
- Choosing the correct planting density is very important for bridging the gap between the actual yield and the potential yield of banana from a unit area.

- For the highest possible yields of good quality fruit, there is an optimum plant density, which should be maintained for sustaining the economic life of the plantation.
- This optimum varies with the location, cultivator, soil fertility, management level and economic considerations.
- These factors in turn influence more specific determinants of density choice such as prevailing climate, plantation vigour and its longevity.

High Density

High Density

High Density

Plant canopy and light intersection

- Unlike other fruits, the vegetative growth, flowering and fruit growth is not seasonal in banana and are largely influenced by time of planting, type and size of planting material and prevailing temperature.
- Planting density and their interception. Reduced light intensity at ground level with increase in size energy conversion efficiency was maximum in 1.2 x 1.2m spacing and minimum in 2.1 x 2.1m spacing.

Light intersection **Light intersection**

Plant height and girth

- Height of pseudostem is invariably increased with reduction in spacing.
- Plant height is adversely influenced, depending upon cultivators.
- Stem girth is reduced with height on increase in density.
- Girth of Robusta banana was not influenced by varying plant density although tallest plants were produced under closer spacing of 1.2 x 1.2 m.
- In poovan cultivar, palnt height was significantly increased and grith reduced when spacing was brought down from 2.1 x 2.2m to 1.5 x 1.8m.

Plant height and girth **Plant height and girth**

Leaf number and leaf area index

- Canopy characteristics such as leaf area index (LAI) and transmission of photosyntheically Active radiation (PAR) can be used to correlate with optimum density.
- Leaf emergence is reduced under very close planting owing to lower temperature inside the canopy since temperature had significant influence on rate of leaf emergence.

Leaf number **Leaf number**

Sucker production and root growth

- The number of suckers per plant was more in wider spacing compared to that in closer to that in closer spacing.
- The suckers per plant decreased with reduction in planting distance with reduction in planting distance in Robusta and Poovan.
- The length of fine roots increased with increase in plant density to shooting and declined thereafter.

Sucker production and root growth

Sucker production and root growth