BANANA

Musa Sp

Musaceae
Origin – South East Asia

Oldest fruit

Cheaply & Through out year available

Apple of paradise

Commercial food crops in tropics

Fruit for all ages’.
• Rich source of energy - (137 k.cal/100g)
• Vitamins - Riboflavin (0.07 IU), Thiamine (0.04 IU), Ascorbic acid (10mg)
• Mineral - Ca (17 mg), K (440mg), P (36mg), Fe (0.36mg)
• Medicinal properties
  - Easy digestible & Good laxative
  - Helpful High blood pressure. Heart, arthritis, kidney, ulcer patients
Fruits, florets, pseudostem – ‘food’

Leaves as a biological plate

Processed products –

Purees, powder, flour,
chips, jam, jelly, wine ,
Beer, Soft drinks, banana flour, Baby food etc.,

Paper board & tissue paper - Pseudo stem

Handicrafts – mats, carry bags from fibre, paper pulp from fibre.
Climate

- Humid tropical & semi arid subtropical
- Optimum temperature – 25 to 35°C
- Tolerant – 10 to 40°C
- At cool temperature (<10°C) – Duration extended, shooting & bunch development affected.
- Attitude – up to 1500 m MSL
- Rainfall 100 mm/month
- Avoid of Wind ( 80km/Hour)
Soil

- **Variety of soils**
- **Deep well drained soil with more organic matter**
- **Depth** – 1 metre minimum
- **pH** – 6.5 to 7.5. pH >8 – not suitable
Edible cultivar from 2 wild species

1. *M. accuminata* (AA genome)
2. *M. bulbisiana* (BB genome)

Basic chromosome – 11

Diploids 2n - 22, Triploids 3n – 33
Tetraploids 4n - 44

Best known banana –

*M. accuminata* (AAA group) = Very sweet, luxurious crop

*M. bulbisiana* – Greater drought, hardiness & resist to pest & diseases
Hybrids of

AB (Ney poovan)

AAB (poovan, Motta poovan)

ABB (Monthan, Sambrani
monthan, Nattu vazhai)

Better adapted to monsoon areas & marked dry seasons
<table>
<thead>
<tr>
<th>Ploidy</th>
<th>Contribution</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>2x</td>
<td>AA</td>
<td>Matti, Anaikomban, Sanna Chenkadali, Kadali, Namarai, Pisang Lilin</td>
</tr>
<tr>
<td>3x</td>
<td>AAA</td>
<td>Robusta, DC, Thenkadali, Red banana, Gross Michal</td>
</tr>
<tr>
<td>4x</td>
<td>AAAAA</td>
<td>Bodless Altaford Not existing in nature but is a synthetic hybrid</td>
</tr>
<tr>
<td>Ploidy</td>
<td>Contribution</td>
<td>Example</td>
</tr>
<tr>
<td>--------</td>
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<td>----------------------------------</td>
</tr>
<tr>
<td>2x</td>
<td>AB</td>
<td>Ney Poovan, Kunnan</td>
</tr>
<tr>
<td>3x</td>
<td>AAB</td>
<td>Poovan, Rasthali, Pachanadan, Virupakshi, Nendran</td>
</tr>
<tr>
<td>3x</td>
<td>ABB</td>
<td>Monthan, Peyan, Karpuravalli</td>
</tr>
<tr>
<td>4x</td>
<td>ABBBB</td>
<td>Klue Teparod</td>
</tr>
</tbody>
</table>
Red Banana (AAA)

(Lalkela, Chenkadali, Sevvazhai & Rathambala)

Hill Banana (AAB)
Virupakshi, Malavazhai, Vellavazhai & Sirumalai

Tetraploid varieties:
Klue Teparad (ABBBB)

Bodles Altafort (AAAAA)
PROPAGATION

Vegetative propagation – suckers

1. Sword sucker  2. Water sucker

**Sword sucker** - Well developed base, pointed tip, sword-like leaves

**Water sucker** – Broad leaved, base poor, small undersized suckers of superficial origin

1.5-2.0 kg corm, uniform in size, no disease (or) nematode
## System of cultivation

<table>
<thead>
<tr>
<th></th>
<th>Dec-Feb</th>
<th>Wet land</th>
<th>Feb-April</th>
<th>Poovan, Rasthali, Monthan, Neyvannan - 2.1x2.1m</th>
</tr>
</thead>
<tbody>
<tr>
<td>Garden land</td>
<td></td>
<td></td>
<td></td>
<td>Robusta 1.8x1.8m</td>
</tr>
<tr>
<td>Wet land</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perennial</td>
<td>Jan-Feb</td>
<td></td>
<td>Aug-Sep</td>
<td>Pooovan, Monthan 3.3 x 3.3m</td>
</tr>
<tr>
<td>(Pedigree land)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hill banana</td>
<td>Apr-May</td>
<td></td>
<td>Jun-Aug</td>
<td>Lower Pulney, Sirumalai Virupakshi 3.6 x 3.6m</td>
</tr>
</tbody>
</table>
Field preparation

1. Wet land

   no heavy preparations
   planting in small pits
   60 cm deep trenches around a block

2. Garden land

   Plough 2-4 times, leveling
   Pits – 45 cm³ top soil
   10 kg FYM
   250 g Neem cake
   50 g Lindane

   per pit
3. Padugai
   One deep mammutti digging – sufficient
   Corms planted at required spacing

4. Hill Banana
   Land clearing
Spacing

Variety

Soil fertility

System of cultivation
### Planting time:

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Planting time</th>
<th>Season</th>
<th>Period of shooting</th>
<th>Maturity Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>June -July</td>
<td>Mrig bagh</td>
<td>January- February-March</td>
<td>April -May -June</td>
</tr>
<tr>
<td>2</td>
<td>October - November</td>
<td>Kande Bagh</td>
<td>May -June- July</td>
<td>August - September-October</td>
</tr>
</tbody>
</table>

### Planting Density:

- Planting is done either in pits or in furrows.
- For dwarf cultivars like Basrai & Shrimanti: 1.5 m x 1.5m
- For tall varieties like Grand Naine & Mahalaxami: 1.75 x 1.75 m.
- Pair row planting (0.9m x 1.5m x 2.1m) is also recommended for banana.
Irrigation

Garden land - once in a week
Wetlands - 10-15 days interval
After manuring - thorough irrigation

Drip irrigation

Useful in salt affected soils
40% savings
Water requirement – 16-20 lit/day
25 lit – maximum yield
### Fertilizers & Manures

**A heavy feeder**  
High K, N, Ca & P

**Garden land**

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>P</th>
<th>K (g/pl/yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All varieties</td>
<td>110</td>
<td>35</td>
<td>330</td>
</tr>
<tr>
<td>Nendran</td>
<td>150</td>
<td>90</td>
<td>300</td>
</tr>
</tbody>
</table>
### Wet land

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>P</th>
<th>K (g/pl/yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Nendran</strong></td>
<td>210</td>
<td>35</td>
<td>450</td>
</tr>
<tr>
<td><strong>Rasthali</strong></td>
<td>210</td>
<td>50</td>
<td>390</td>
</tr>
<tr>
<td><strong>Poovan, Robusta</strong></td>
<td>160</td>
<td>50</td>
<td>390</td>
</tr>
</tbody>
</table>

N & K in 3 splits – 3, 5 & 7\textsuperscript{th} month

20 g of Azospirillum & Phosphobacteria

– at planting & 5 months after
For Hill Bananas

375 g of 40:30:40 NPK mixture +
130 g M.O.P /clump/application

in Oct, Jan & April
Micronutrients

$\text{ZnSO}_4$ - 0.5%

$\text{CuSO}_4$ - 0.2%

$\text{FeSO}_4$ - 0.2%

$\text{H}_3\text{BO}_3$ - 0.1%

At 3, 5, 7 month

– Growth, development of fruits improved
High Density Planting in Banana

The yield per unit area could be increased.

Reduced labour cost & involvement for weeding and desuckering.

Efficient utilization of land, water, fertilizer and solar radiation.

Possibility of reducing the water and fertilizer requirement of individual plants.

Reduction in the cost of production
After cultivation

Garden Land

- Mammutti digging at bimonthly intervals
- Earthing up periodically
- Removal of side suckers
- Removal of dry & diseased leaves and burning
Removal of male flowers – Robusta –

Cigar end rot

Floral remnants – to be removed

Propping at flowering

Peduncle – Cover with flag leaf – prevents main stalk end rot.

Bunches – cover with banana leaves - sunscald
Earthing up:

► Earthing up during fertilizer application.
► Provide drainage during rainy season &
► To avoid water stagnation at the base.
Desuckering

- Removal of unwanted suckers is critical operations
- Done by crow bar with a chisel-like end &
- 2,4-D at high conc.
Detrashing

► Pruning of surplus, dried & disease affected leaves
► Helps to reduce the disease spreading.
► Micro climate is changed by leaf pruning, especially during low light and high temperature
Propping:

At the time of bunch emergence, the plants are supported with bamboos or casuarinas poles to avoid damage by wind.
Bunch covering

- To protect the bunches against cold, sun scorch, against attack of thrips and scarring of beetles.
- Done by dry leaves or polythene covers (2% ventilation)
Male bud Removal

- After the completion of flowering and bunch maturing time,
- removal of male buds and floral remnants
- Facilitates diversion of plant metabolite to promote fruit development
Mattocking

In Hill banana, at the time of harvesting, remove the bunch from the pseudostem and leaving a stump of about 0.6 metre height. The food material stored in the left out stump continues to nourish the daughter sucker till it withers and dries up.
Growth regulators

To improve Quality, 2,4-D @ 25 ppm (25 mg/lit) – spray in Poovan & Co.1 after opening of last hand

Same treatment – ‘Seediness in Poovan’
Intercropping

Leg. veg, tomato, beetroot, elephant foot yam

No gourds – alternate host for ‘infections chlorosis’
Bunch covers

To avoid brushing of fingers or damage due to exposure, Transparent poly sleeves with 2-4% ventilation

To improve appeal, advances maturity by 7-10 days in banana

To be covered after opening of last hand and removal of male bud

Top ends alone to be tied
Harvest and post harvest management

- Harvest @ 3/4<sup>th</sup> maturity
- Upper hands turn light-green
- 100-110 days after opening of 1<sup>st</sup> hand
- Bunch cut with sharp, curved knife leaving
- A portion of peduncle
- Bunches placed out of light
Packing

For Local market, sold “as such”

Export – Hands separated → 4-16/units

Graded

Placed in poly-lined boxes (12-18 kg)

Pre-packing treatment

Cleaned in water (or) dilute Na Hypochlorite to remove latex

Treated with thiobendazole
Ripening

By exposure to Ethylene gas (1000 ppm for 24 hr.) in sealed banana ripening rooms.

Stored @ < 12°C for short time.

To delay ripening in banana – skin coating with waxol (12% wax emulsion).
Yield

Conventional planting

Poovan, Rasthali, Neypoovan - 40- 50 t/ha/yr

Robusta & Dwarf Cavendish - 50-60 t/ha/yr

HDP + Fertigation → Robusta - 100 t/ha/yr