Welcome to the home land of black pepper

Crop management in black pepper

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Climate

- Crop of hot humid tropics
- Temperature 10-40^{o} C
- Rain fall 2000-3000mm
- Well distributed
- Prolonged spells of drought resulted in drying up of the crop in India in 1973, 1977, 1983, 1987 and 1989

Soil

- Wide range of soils
- Porous, friable,
- Good drainage, adequate water holding capacity
- Rich in humus, and essential plant nutrients
- pH near neutral

Planting material

- Good genetic stock
- Sixteen improved varieties available
- Best time for raising nursery- February – April

Methods of propagation

- Two node cuttings from runners
- Rapid multiplication techniques
- Serpentine layers
- Main stem (top shoots) – In other countries
- Fruit bearing lateral branches – bush pepper

Coiling runners

Coiling runners

Rapid Multiplication of Pepper shoots

Multiplication on split bamboo

Nursery

Nursery

Serpentine layering

Bush pepper in pots

Bush pepper in coconut garden

Field planting

- Plant density A few vines in homesteads to 1100 plants as pure crop
- Spacing 3m x 3m
- No. of plants and yield / ha. increases with dead standard
- Not advised in areas of prolonged drought
- Establish support before planting pepper
- Adequate soil conservation measures to be adopted in sloppy land

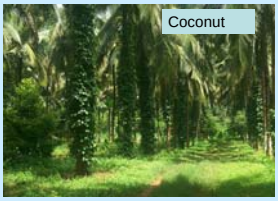
Land Development Work

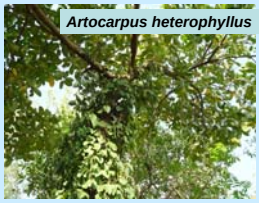

Stone pitched contour bund with new standards

Support trees

- **Common supports**
- Coconut
- Arecanut
- Jack
- Silver oak
- Glyricidia
- Erythrina
- Garuga pinnata
- Moringa
- Neem
- Bombax etc
- Establish support well before planting pepper

Support trees


Coconut


Artocarpus heterophyllus


Ailanthus triphysa


Grevillea robusta


Areca catechu


Garuga pinnata


Erythrina indica


Bombax malabaricum

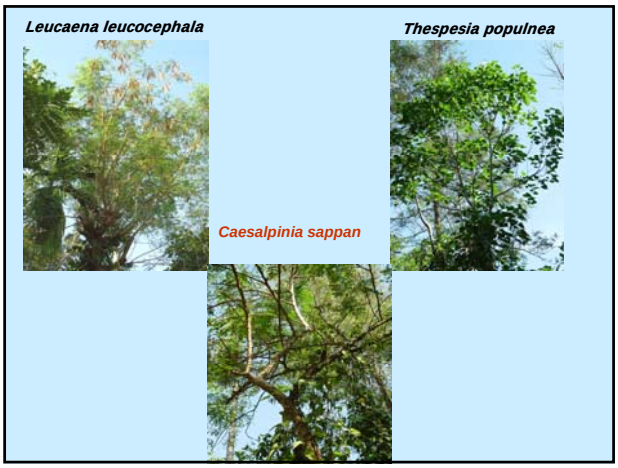

Gliricidia sepium

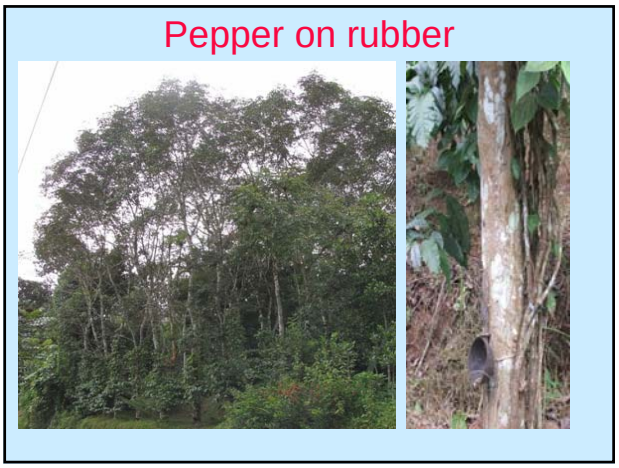

Azadirachta indica


Pajanelia longifolia


Moringa oleifera


Acacia mangium





Systems of cultivation of pepper in India

- As a homestead crop on various trees (very low yield)
- As a mixed crop in coconut and arecanut gardens
- As a pure crop on live supports
- As a mixed crop with coffee and tea on shade trees

(average yield 13-15kg/plant)

Pure crop on Garuga

Pepper on silver oak

Pepper on jack

Pepper and coffee

Pepper and tea

Pepper on shade trees of tea

Pepper on shade trees of tea

Pepper based Cropping system

- Intercropping pepper with ginger,
- turmeric, colocasia, elephant foot yam
- Banana upto three years
- Provide shade

Pepper and Ginger

Cultural operations

- Lowering the vines one year after planting.
- Tying vines to standard.
- Protecting vines from direct sun in the first two years of planting.
- Shade regulation.

Lowering vines

Tying vines to support

Shading young plants

Shade regulation

- Lopping branches of shade trees and opening canopy
- With the onset of monsoon in May - June
- If necessary as monsoon advances
- Improves Flowering and fruit set
- Reduces pest and disease incidence

Garden before lopping shade trees

After lopping shade trees

Nutrient requirement

- Nutrient removal / kg of pepper
  6.35g N, 6.33g K ,0.47g Mg, 0.44g P, 0.29g S, 42.82mg Fe, 34.45mg Mn, 4.2mg Zn
- The magnitude of nutrient removal follows the order –
  N > K > Ca > Mg > P > S > Fe > Mn > Zn

Manuring

- General recommendation
- Lime @ 500 g/vine in alternate years
- OM 10kg/ vine/ year
- 50: 50: 150g N, P_2O_5 and K_2 O

Fertiliser recommendation

State / region	NPK kg/vine
Panniyur & similar areas	50.50.200
Arecanut, pepper mixed crop - rainfed	200.80.280
Karnataka - irrigated	150.60.210
Andhra Pradesh	50.50.150
Laterite of Kerala	140.55.270

Integrated Nutrient Management

- FYM 10 kg/vine + Azo 50 g /vine +1/2 NPK
- Coir pith compost 2.5 kg/vine + ½ NPK+ bio fertilizers
- Neem cake @2-5 kg/vine + ½ kg lime

- Irrigation @100 litres – 8-10 days interval
- Or 7l/plant/day as drip
- covercrops

Organic nutrition

- OM 10kg/plant in May- June
- 5kg OM, 0.5kg ash,1kg neem cake/ plant in October
- Lime 500g/ plant April- May
- Azospirillum 25g/plant and phosphobacter 25g/plant May-June

Major problems in cultivation

- Drought
- Shallow root system and crop of hot humid tropical forests.
- Remedies
- Mulching with organic material.
- Planting banana as a shade crop at the time of planting.
- Irrigating the field based on availability of water.
- Cover cropping if possible.

Cover crop

Phytophthora Foot rot

- Soil Phase
- **Root rot**
- **Collar rot leads to wilting and death of vine**
- Aerial Phase
- **Leaf spot / rot**
- **Spike shedding**
- **Aerial vine death**
- **All leads to varying degrees of defoliation**

Damage caused by *Phytophthora*

Remedy

- Phytosanitation
- Lopping standards and opening the canopy.
- Apply 500g lime and 2 kg neem cake before rainy season.
- Drenching soil with copper fungicides (5-10 l/plant) in june.
- Repeating during October if disease is severe.

Biocontrol

- *Pseudomonas* – 10g/l drenching the basins.
- *Trichoderma* - 1-2 kg/100kg cattle manure + 10 kg neem cake. Apply 5-10 kg/plant

ANTHRCNOSE DISEASE

- Control
- Same as Phytophthora foot rot

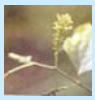
Viral and mycoplasma diseases

- Stunted disease
- Yellow Mottle Mosaic
- Phyllody
- Little leaf

Viral diseases

- Mosaic, yellow, small leaves become brittle narrow, sickle shaped appearance
- Shortening of internodes leading to stunted growth
- Remove affected plants and destroy
- Use insecticides like dimethoate 1.5 ml/l to control vector.
- Use of Pseudomonas fluorescence 1% spray

Phyllody


- Spikes and flowers turn leaf like
- Remove affected plants and destroy

Slow wilt

- Yellowing of plant and gradual death.
- Use disease free planting material
- Variety Pournami reported resistant
- Control
- Carbofuran (1g ai/plant
- Thimet (1g ai/plant)
- Twice May June and October November
- *Bacillus macerans* @ 10g/plant
- At the time of planting and subsequently during May in plantations.




Pollu beetle *Longitarses nigripennis*

- Feeds on tender berries and they turn chaff.
- Control
- Regulate shade
- Quinalphos 2 ml/l thrice
- June - July (Flowering)
- September- October (berry set) and
- November- December (berry maturation)

Pollu beetle contd….

•Cypermethrin 1 ml/l twice

•First berry set

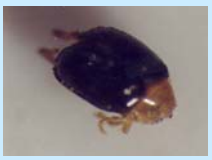
•Second one month after

•Neem gold (biological)

6ml/l thrice

•August, September, December

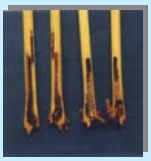
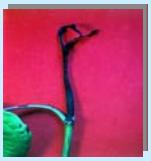
Pollu beetle




Nematodes

- Use disease free planting material.
- Destroy affected plants.
- Carbofuran/ phorate 1 g ai/ vine at planting.
- May- June and
- October- November
- Pochonica chlamydosporia is recommended for root knot nematodes (Meloidogyne sp.)
- 10g formulation mixed with 2 kg of well decomposed farmyard manure or compost

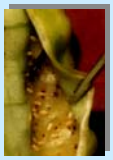
Top shoot borer

- Dimethoate 0.05 %
- Repeat after 3 weeks

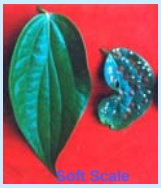
Marginal gall thrips



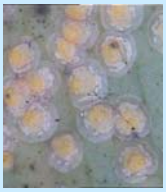


- Dimethoate 0.05 %
- Repeat after 3 weeks

Scales


Soft Scale

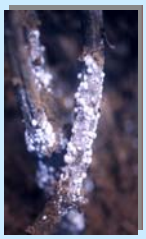

Mussel Scale


Coconut Scale


Damage by scales

- Control
- Dimethoate 0.05 %
- Repeat after 3 weeks

Root mealy bug

- Attack roots
- Suck sap
- Plant turn yellow
- Plant dries up
- Cypermethrin 3 ml/l drenching
- Repeat after 60 days

EGW

- Cut and destroy affected parts.
- Apply carbofuran 5g ai/plant
- Use alternate standards
- *E.subumbrans, Garuga pinnata* etc.

Yield gap

- Average yield in India is only 250-300kg/ha
- Released varieties have average yield of 2000-3000kg/ha
- 12-15kg yield /plant is common for Panniyur 1 on *Grevellia robusta* in tea and coffee estates
- Up to 25kg / plant reported

Why low yield

- Poor genetic stock
- Lack of intensive cultivation
- Large number of senile unproductive vines
- Less number of vines/ unit area
- Major area as mixed crop with other plantation crops rather than a pure crop
- Poor adoption of improved agro techniques
- Prolonged drought
- Pest and disease problems
- Poor soil conditions due to heavy rain and steep slope

Bridging yield gaps

- Use of improved varieties
- Adoption of high production technologies
- Pest and disease control
- Use of tall supports
- Adequate soil and water conservation measures

Support to farmers

- Government support should be extended to farmers as
- Quality planting material
- Production incentives
- Support price
- Impact analysis of development programmes are important

Role of India

- India is the home land of pepper
- Pepper is a traditional crop
- Rich germplasm
- Vast area under cultivation
- Sustainable system of cultivation
- With these background India will continue to lead the world in pepper cultivation


Thank You