KVK Folder No. 3

# Cocoa
# Cultivation Practices

CPCRI

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ICAR

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## Introduction

The cultivation of cocoa in India on a large scale started in early 1970s. It can be ideally grown as a mixed crop in coconut and arecanut gardens. Cocoa needs an equitable climate with an annual rainfall of 1500-2000 mm. It can be grown in a temperature range of 15°-39°C, optimum being around 25°C and with high relative humidity. Cocoa requires a loose and friable soil having high soil moisture retentive capacity and optimum pH range of 6.0-7.0. For better growth, 40-50% of incident sunlight is sufficient. The shade conditions prevailing in the arecanut and coconut gardens are ideally suited for cocoa cultivation.

## Varieties

Commercial cocoa has two major varieties viz., Criollo and Forestero. In India the Forestero variety is recommended for cultivation. High yielding accessions have been identified at CPCRI Regional Station, Vittal. These are Red axil, PA7 x Na 33, Amel x PA7, NC42/94, Amel x Na 32, Landas 357, Landas 364 and Amel x Na 32. The other recommended hybrids for cultivation are Red axil x (PA7xNa32). Red axil x Nc 42/94, (PA7 x Na32) x NC 42/94, (Amel x PA7) x (PA7x Na32). The quality planting material is being supplied from the biclonal orchards of some of these promising accessions.

## Raising of planting material

**Selection of seeds:** Cocoa can be propagated with seeds or vegetatively with buds and cuttings. Fresh beans should be used for sowing as seeds lose their viability soon after they are removal from pods.

**Nursery techniques:** Before sowing, the seeds have to be rubbed with dry sand or wood ash to remove mucilage. The beans are planted with their pointed end upwards. Seeds may be sown either in plastic bags (25 x 15 cm size, 150 guage) or in raised beds. The seedlings are ready for transplantation in the field after about 3-4 months.

**Vegetative propagation:** For vegetative propagation soft wood grafting can be followed. Soft wood grafting consists of cleft grafting of scions to 2-3 month old seedlings raised in polybags. The selected scions are inserted into the root stocks so that they fit in tightly. The grafted portion is tied with polythene strips. The grafted seedlings are kept in shade and watered daily and 80% success is expected during favourable season (July-October).

## Establishing plantation

**Planting time:** As a pure plantation, cocoa can be planted in forest lands by thinning and regulating the shade suitably. It is planted at a distance of 2.5 - 3.0 m both between and within rows, either in the beginning of the monsoon (May-June) or at the end of the monsoon(September).

**Spacing and alignment:** Cocoa seedlings are planted in pits of 75 cm cube filled with compost. It can be planted with advantage as a mixed crop with both arecanut and coconut. The mixed plantations of arecanut and cocoa can be raised adopting normal spacing of 2.7m x 2.7m for areca and 2.7m x 5.4m for cocoa. Both areca and cocoa require shade during summers of two seasons after planting. When cocoa is to be raised as a mixed crop with coconut, either single hedge or double hedge system of planting may be adopted. In single hedge system cocoa can be planted 2.7m apart in a single row in between two of coconut, while in double hedge system it can be planted 2.5m apart in paired rows in between two rows of coconut palms.

## Manuring and irrigation

An annual application of 100 g N, 40 g $P_2O_5$ and 140 g $K_2O$ per tree per year in two equal split doses is recommended. During the first year of planting the plants may be given one third of the above dose, while in the second and third year two thirds and full dose of fertilizers applied. The fertilizer is to be applied in two splits, the first dose in February - March and the second dose in September-October. Summer irrigation is one of the important aspects in the cocoa cultivation. Cocoa plants require continuous supply of moisture for optimum growth and yield. During summer, the plants will have to be irrigated at weekly intervals. When cocoa is planted as a mixed crop in arecanut garden it has to be irrigated with 30 mm depth of water with IW/CE. ratio of 1.0

**Pruning:** The cocoa trees should be pruned regularly to provide a good shape. For this all the fan branches arising from the main stem are nipped off up to a height of about 1.0-1.5m or cut in the initial years of their growth. Later, only the thin and dried up branches are periodically removed. Operations like harvesting, spraying etc. will be easier if the height of the trees is kept at the second storey level.

## Pests and Diseases

**Mealy bugs** (*Planococcus lilacinus* Ckll. and *Citri* Risso) are important insect pests of cocoa damaging tender shoots, cushions, flowers and pods. Seedlings are also affected by this pest. the population of the bugs is more during summer months. Application of fenthion (Lebaycid) 50 ml in 100 litre water or monocrotophos (Nuvacron) 125 ml in 10 litre water or dimethoate (Rogor) 160 ml in 100 litre water will control the population of mealy bugs.

**Rodents** viz., rats *(Rattus rattus)* and squirrels *(Funambulus tristriatus* and *F. palmarum)* are major pests of cocoa causing serious damage to the crop. The rats can be controlled by keeping 10 g bromadiolone (0.005%) wax cakes on the branches of infested trees twice at intervals of 10-12 days. Warfarin or fumarin (0.025%) wax blocks (35 g) thrice at an interval of 3 to 4 days also helps in reducing rat damage. Squirrels can be controlled by trapping with wooden or wiremesh single catch 'live' trap with ripe coconut kernel as bait.

**Black pod disease** *(Phytophthora palmivora)* occurs during monsoon period. Infection of pod appears as brown spots covering the entire surface of pod, ultimately turning black. The disease can be prevented by spraying 1% bordeaux mixture at the onset of monsoon followed by two more sprays at 30 days intervals.

**Canker** *( Phytophythora palmivora)* appears either on main trunk or on branches. The disease can be controlled at early stages by removing the infected tissues and applying Bordeaux paste.

**Zinc deficiency** is observed in some cocoa gardens. The symptoms are leaf chlorosis, mottling and crinkling of leaves with wavy margins. Most of younger leaves become narrow and sickle shaped. This can be corrected by foliar spray of mixture of 0.5% Zinc sulphate and 0.15% (W/V) lime.

## Yield

From flowering to pod formation it takes 150 to 160 days. Cocoa gives two crops in a year i.e. September-January and April-June. Ripe pods are to be harvested without damaging the flower cushion. On an average 20 kg pode per tree per year can be harvested. About 10 pods give 4 Kg wet beans and 3-4 Kg wet bean gives 1 kg of dry beans.

## Harvesting and processing

Ripe pods are harvested without damaging the flower cushions. The harvested pods can be kept for four days without any damage. After breaking the pods with wooden [illegible]llet beans are collected for fermentation.

[illegible]ermentation of beans can be done either by box or by basket methods. The wooden boxes of 60x60x45 $cm^3$ with reapers in the bottom to allow the sweating from pulp to drain out are used. The boxes can be arranged in serial tiers which facilitate mixing to next box easily at 1 day intervals. The fermentation is carried out for six days. Bamboo or cane baskets of suitable size could be used for small quantity of beans. The beans are mixed thoroughly on third and fifth day and fermentation completes after six days.

Drying of fermented beans can be done by spreading on clean bamboo mat or cement floor. Artificial drying can also be done using either electric ovens or conventional Samoan type driers. The moisture content of the dried beans should be around 6 to 7 per cent.

The cleaned dry beans are packed in fresh polythene lined gunny bags. Storage of such bags should not be done along with spices, pesticides and fertilizers as beans absorb the odour from these materials.


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| Published by | : | Dr. M.K. Nair<br>Director<br>CPCRI, Kasaragod. |
| Compiled & Edited by | : | D. Balasimha<br>K. S. Anand |

Printed by : Codeword Process & printers, Falnir, Mangalore