
Nursery Management in Cocoa

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ABSTRACT

Cocoa is multiplied by seeds. The seeds are separated from fruits. Cocoa fruits require 5-6 months from pollination to reach the maturity stage for harvest. The change of pod colour from green to yellow (Forastero) and red to yellow (Criollo) are the harvest indices of cocoa. The seeds are to be collected from biclonal or polyclonal seed gardens by utilizing elite self-incompatible parents is suggested to maintain genetic superiority of planting materials. In this article, the commercial propagation method of cocoa is well explained with selection of mother plant, selection of seed nut, seed extraction and nursery practices.

INTRODUCTION

Cocoa is multiplied through seeds. The seeds are separated from fruits. Cocoa fruits require 5-6 months from pollination to reach the maturity stage for harvest. The change of pod colour from green to yellow (Forastero) and red to yellow (Criollo) are the harvest indices of cocoa. The fruits on the plant remain without any deterioration up to 30 days and the harvest interval will be two weeks. Rodents will damage the fruits if they are retained in the plant for ripening. The fruits will be ready during summer months particularly on May and separating of seed fruits will be done with a sharp non-serrated sickle without causing any damage to the cushions since cocoa fruits are borne on trunks. The pods should not be harvested by pulling them off. The seed fruits will be kept under shade for seven days. If the seeds are germinated in the fruits before harvest (viviparous nature) will affect the germination if it kept for duration of more than seven days.

The seeds are to be collected from biclinal or polyclonal seed gardens by utilizing elite self-incompatible parents is suggested to maintain genetic superiority of planting materials.

MOTHER PLANT SELECTION

1. For Forastero types (Immature fruits are green and matured fruits are yellow) possessing medium to large in size, average fruit weight is above 350 g weight, smooth or slight furrow on the rind absence of prominent constriction at the neck can be used as seed pod.
2. The thickness of the pod husk will not be higher than 10 mm.
3. The pod value (number of fruits in one kg fresh stage) should not be more than 12.
4. The number of beans per fruit should not be less than 35.
5. The mean bean dry weight will not be less than 1 g.
6. The seeds obtained from middle portion of the fruits are best for sowing.



Harvesting



Extract middle beans

SEED QUALITY PARAMETERS

Completely developed seed fruits should be broken by exposing a hard surface or with a wooden mallet and separate the seeds without placenta. The bold and large size seeds having average weight of 300 mille grams when fresh and 1 to >1 gram when dry. Usually, cocoa seeds are recalcitrant in nature i.e. seeds lost viability as early as possible.



Undesirable fruits for seed selection



Defective seed inside a diseased frut



Vivipary (Rejected seeds)

The seeds separated from fruits should be sown soon. If the freshly separated seeds kept in wet charcoal and stored in polythene bag, the seeds can be stored up to one month without any loss in germination. In the case of seeds mixed with sawdust, the seed coat is removed and soaked with fungicide will helped to retain the viability for 20 to 30 days. The seeds usually commenced germination in seven days and will continue for another seven days.

MOTHER POD SELECTION AND SEED EXTRACTION

1. Twenty to 30 days after harvesting of Pods, the seeds can be separated.
 - a. This will increase the vigor and leaf production.
 - b. Fruits at this stage may have the approximate length of 15cm and width of 7.5cm.
The colour of the fruit is green or red depending on the type. Once, the fruits are completely matured, the colour of the pod will be permanent.
2. The average number of seeds per fruit will be 30.
3. The fruits used for separation of seeds should be harvested from the plant at least 2 to 3 days before the proposed date of sowing.

SOWING

The seeds are collected from the fully matured fruits. The seed is covered with mucilaginous substance and this substance is a germination inhibitor. The germination can be speeded up by separating mucilaginous substance with the seed coat which is thin and leathery. The seed coat is generally known as skin or shell when it is dry. A skilled worker can remove the seed coat at the rate of 1600 seeds per day. Exposing the surface of the beans carefully with dry sand or wood ash to separate the mucilage from the seed in India. If seeds are sown with mucilage, the insects will made damage. Seed treatment with pesticides can be very rarely used at least dosage. The seeds are treated with fungicide Bavistin at rate of 2 g for 1 kg seeds is recommended in stress environments.

The seeds should be sown at horizontally or vertically with hilum end down and superficially covered with river sand. Deep sowing of seeds should not be done and which may affect the germination of the seeds: since it is epigeal type of germination where cotyledons are formed above ground. This stage of germination is known as soldier phase. Healthy seeds obtained from completely developed fruits are usually results a germination of 90 to 95 per cent.



Nursery

The seeds will germinate throughout the year if adequate irrigation is provided. Generally the sowing of seeds will be carryout before the onset of monsoon to avoid adverse effects on germination during monsoon. The seeds sown during the month of May will be used for transplanting during September-October. The varieties raised as a compact block on with grafted plants showed off season bearing with extended days of harvest during post monsoon period which will be best for raising nurseries throughout the year.

PREPARATION OF SEEDS FOR SOWING

1. The seeds are collected only from the selected fruits.
2. Healthy and matured seeds alone used for sowing.
3. The seeds are mixed with sawdust or very fine river sand.
4. The seeds should be rubbed with sawdust or fine river sand thoroughly and then washed with normal water. This process may be repeated up to removal of mucilage from the seed. Increase the quantity of sawdust or fine river sand for mixing with the seeds during each time of repeated rubbing.
5. The mucilage removal process should be done cautiously so as not to damage the plumule or radicle of the seed.

POTTING MEDIA

Red Soil + Sand + FYM @ 2:1:1 + Super phosphate (5 kg/ton of FYM) was found to be suitable media for growth and development of seedlings

RAISED BED NURSERY

The seeds sowing in raised beds are commonly followed by most of the growers. Small, plain and flat plot with sufficient sun light (25- 50%), fertile soil with good water source should be selected. Soil should be ploughed in moderate depth and clods of soil should be easily broken to get a fine tilth. Beds of 3 - 4 feet width and any length are preferable for sowing of seeds.

A path of 2 feet as working space between one bed and another bed in same field to monitor to carryout cultural operations. Sufficient space between furrows and seeds within the row should be provided which will pave the way for superior growth of seedlings. The average age of the seedlings maintained in the raised beds are from 120 to 180 days.

The tender cocoa seedlings are very delicate and should be protected from the hot sun by covering with shade net at 180 cm height or by covering with palmyrah fronds. The healthy seedlings are sorted in the nursery beds. The seedlings obtained from delayed germination are poorly grown or die and they can't be chosen for planting.

POLYBAG NURSERY

Polythene bags or small baskets are used for raising seedlings to obtain well rooted with better shoot growth. This will make the planting easy. Polybags with the size of 15 cm x 22.5 cm, 250 gauge thickness, either black or white in colour is used. These polybags are filled with potting mixture consists of Soil: Sand: FYM (2:1:1). Bamboo baskets or bags made up of locally available plant materials also used to conserve the environment; they are biodegradable in nature.

Big size poly bags of 12" length and 8" width can also be used if the seedlings are to be kept in the nursery for longer duration. Poly bags are to be arranged in rows leaving a little way between the rows for maintenance operations. Shade nets or covering by thatches is needed. Young seedlings requires regular water and should be irrigated gently every day in summer and once in two days in remaining seasons. Adequate drainage must be provided during rainy season to prevent water stagnation and which will leads to rotting of seedlings.



Stages of seed germination

SELECTION OF SEEDLINGS FOR TRANSPLANTING

Vigorous and healthy seedlings are chosen for planting. The age of the planting material (seedling or grafted or budded plant) should be 100 – 180 days old. The vigorous seedlings are to be selected based on their height and diameter of the stem. If the seedlings are grown under extreme shaded situations, hardening should be done by exposing to sun light for 10 days before transplanting. The seedlings should be irrigated before pulling out from the nursery for transplanting to avoid damage of roots and should be taken along with ball of earth.

The polybag seedlings should be planted with ball of earth into the pit after separated from the polythene bags. The plants should be planted in the centre of the pit and not much depth. The polythene sleeve tied on the graft union should be removed 60 days after planting. The twisted or damaged tap root or pot bound plants should be rejected. The seedlings can be packed with moisture retaining materials like coir compost for long distance transport.

CONCLUSION

Availing the standardized technologies, the seeds may be collected from the well-established polyclonal and biclonal seed gardens and can be multiplied for the benefit of cocoa growers.