COCOA FARM MANAGEMENT DATA

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INTRODUCTION

This article gives some practical information about growing cocoa. Anyone who is thinking of growing cocoa, or of expanding his existing cocoa block will need to be familiar with the points listed below.

PLANTING MATERIAL

(a) Selected Trinitario buddings (clones)

These are now available from L.A.E.S. and from D.P.I. at: Lejo, Hoskins, Finschhafen, Namatanai, Bubia, Hawain, Omuru, Karkar Island, Gavien, Murua, Baubata and Babaguina.

(b) Amazonian x Trinitario hybrid seed

Details of where to obtain hybrid seed are given in the article on pp. 123-125 of this issue.

Price

Buddings cost 25t each.

Hybrid seedlings cost 20t each.

Hand pollinated hybrid seeds cost K2 per pod (which contains about 30 seeds) with 10% free allowance to cover germination losses.

Naturally pollinated hybrid seeds cost K1 per pod.

Recommended varieties (as at October 1983)

Self incompatible clones recommended are:

K13, K20, K21, K6-101, K24-106, KA2-106

Self compatible clones recommended are:

K82, KA2-101, KA5-201

You should always plant a mixture of clones. It is especially important that you do not plant blocks of one self-incompatible clone. (For an explanation see p. 114 of this issue).

The hybrid crosses recommended are KEE2, KEE5 and KEE52 Amazonian varieties, crossed with pollen from Trinitario varieties KA2-101, KA5-201 and K20.

THE NURSERY

Nursery planting bags

Bags used for planting seedlings in the nursery should be made of 'UV resistant polythene' and should measure about 350 mm x 170 mm. Suitable bags can be obtained from:

1. Farmsett, Rabaul
2. Agquip, Rabaul
3. New Guinea Cocoa, Rabaul
4. I.C.I. (PNG) Ltd., Lae and Port Moresby

The price of these bags in October 1983 was about K11.40 - K16.00 for 1000 bags, depending on the supplier and the quantity bought.

Nursery bag filling

You should use friable (crumbly) soil. If you are buying your soil, the cost should be around 7 toea for 10 full bags, or 400 bags for a day's wage (minimum rural wage).

Layout of nursery bags

Nursery bags should be arranged in double rows. Between each double row, leave a gap of 40 cm. This gap allows easy access for maintenance of the seedlings. The gap also prevents uneven growth. Wires or bamboos can be used to support the double rows of bags.

A well laid out hybrid seedling nursery. Double rows give easy access and even seedling growth.

This layout of bags works out to a density of about 30 seedlings per square metre. Use this figure when you are calculating how much space you need for your nursery.

One pod will give about 30 seeds. If you want 1000 seedlings you should allow 40 pods.

You can expect a germination rate of over 90%.

Prevention of seedling blight

To prevent seedling blight, the seeds should be soaked overnight in a Ridomil solution. For details see p. 203 of this issue. Some suppliers provide seed already soaked in Ridomil.

Shade

The ideal level is around 50% shade in cocoa nurseries. To provide nursery shade, you can plant *Gliricidia* shade trees, or make a temporary shelter with a coconut frond roof. To make a more permanent nursery, you can cover the roof with shade cloth (e.g. Sarlon).

PLANTING OUT

Cocoa seedlings are ready to plant out when they have grown to a stem diameter of 8 mm. Hybrid seedlings take 3 months, and Trinitario seedlings take 5 months.

Soil

The best soils for cocoa are forest type soils which are slightly acid, have a high level of organic matter in the top soil, and are well drained to a depth of over 1 metre.

Other soils can be used for growing cocoa, but extra fertilizers and very careful management will be needed. Costs will also increase. If you are not sure you should check with L.A.E.S., Keravat.

Spacing

(a) Clonal buddings should be planted on a 4 m square arrangement. This gives 625 trees per hectare.

(b) Hybrid seedlings should be planted on a 4 m triangular arrangement. This gives 720 trees/ha. For alternative

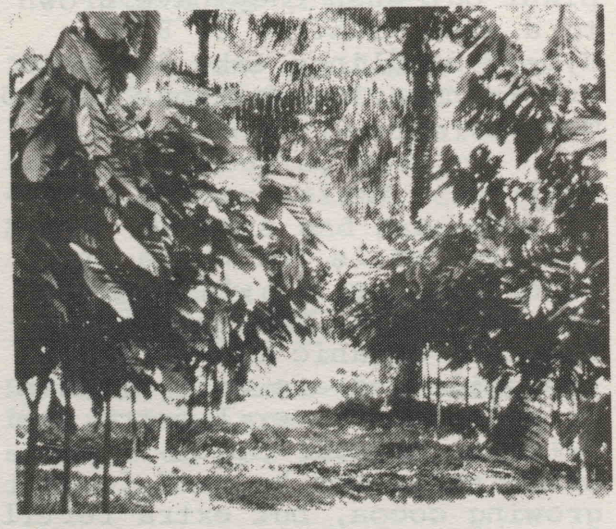
spacings for hybrid cocoa, see HARVEST volume 8, No.1, p. 11.

Shade

The best shade for cocoa is hybrid coconuts. You can also use *Gliricidia* or *Leucaena* stakes. *Gliricidia* establishes more quickly than *Leucaena* and is a better shade where *Pantorhytes* is a problem.

To plant *Gliricidia*, cut stakes about 1.5 m long and 5 cm round. Cut the lower end cleanly at an angle. Plant at least 40 cm deep and tread the soil firmly.

Coconuts must be planted at least 2 years before the cocoa. *Leucaena* must be planted at least 12 months before the cocoa, and *Gliricidia* 4-6 months before.



Young hybrid cocoa seedlings growing under coconut shade. Coconuts are good shade if spaced correctly.

Gliricidia requires regular pruning to prevent the shade from becoming too dense.

Planting

Information on how to plant cocoa is given in the article on pp. 126-128 of this issue.

PRODUCTION

The first production from buddings can be expected from 2 to 2½ years after planting out. Hybrid seedlings start producing a little earlier at 18 months to 2 years. Full production comes at 6 years after planting.

Table 1 shows yield levels that may be expected from common seed, Trinitario clones and hybrids if they receive good management and are growing on good soils in a favourable climate. However, yields in any year depend on seasonal conditions as well as the age of the trees.

Economic life of cocoa

The productive life of cocoa trees depends on the pests and diseases present, and on how effectively these are controlled. In Papua New Guinea the productive life varies from 10 years to 25 years.

Pattern of cropping

In the Gazelle Peninsula and the North Solomons Province, up to 60% of the annual (yearly)

TABLE 1. EXPECTED YIELDS OF COCOA FROM 3 TYPES OF PLANTING MATERIAL

	Cocoa production (kg dry bean per ha)					
Year:	1st	2nd	3rd	4th	5th	6th
Common seed	-	-	100	300	700	1000
Trinitario clones	-	-	300	800	1200	1500
Hybrids	-	-	500	1300	1750	2000

crop of cocoa comes in the main flush, around June. A secondary flush occurs around October. The time and amount of production in both these flushes depends on the rainfall of the previous few months.

In other areas, the most important fruiting time is around June - July. The second flush is not so marked because of the drier dry season.

FERTILIZERS

All types of cocoa can benefit from fertilizer. However, applications of fertilizer will only increase production in cocoa plantings which are already well managed. At present, general recommendations exist only for seedling cocoa.

Tentative suggestions for fertilizing cocoa

1. Clay loam over limestone soils (New Ireland, Buka, Madang Coast and Finschhafen).

(a) Mature trees

Potassium. Mature trees need 400-600 g muriate of potash per tree per year.
Nitrogen. Trees need 200 g of urea per tree every 3 months. If you use sulphate of ammonia apply twice that amount (i.e. 400 g per tree).

Work at L.A.E.S. shows that the number of applications of nitrogen is important. Therefore we recommend application of nitrogen every 3 months to mature trees.

(b) Young trees

The programme outlined in Table 2 should be followed for young trees from 30 months.

2. Volcanic ash soils. (Gazelle Peninsula, the North Solomons Province, West New Britain, Karkar and Northern Province).

TABLE 2. FERTILIZER RECOMMENDATIONS FOR YOUNG COCOA TREES FROM 30 MONTHS AFTER PLANTING

Age of cocoa (months from planting)	Urea (g/tree)	Sulphate of ammonia (g/tree)	Muriate of potash (g/tree)
30	25	-	56
33	30	-	-
36	40	-	-
39	50	-	112
42	-	100	-
44	50	-	-
46	50	-	-
48	50	-	-
50	50	-	224
52	50	-	-
54	-	100	-
56	56	-	-
58	58	-	-
60	60	-	336

Continue with rates for mature trees

Here, nitrogen is the only element which has been shown to be deficient, and then only in high producing cocoa.

(a) Young trees
Apply urea or ammonium sulphate using the application rates given in Table 2.

(b) Mature trees
Apply at least 100 g urea per tree every 3 months. After you have made 3 applications of urea, make one application of 200 g per tree of ammonium sulphate. Thus in one year you should make 3 applications of urea and 1 of ammonium sulphate.

PROCESSING

Fermentaries: remember.....

1. All fermentaries must be registered with the Cocoa Board. (See the article on pp. 144-150 of this issue of HARVEST.)

2. All fermentaries must be built to standards that satisfy the requirements of the Cocoa Board.

3. Full information should be obtained from the Board before building a fermentary. You could waste a lot of money if the equipment does not meet the Board's standards.

Fermenting

Cocoa beans should be turned each day for 7 days. A temperature of 50°C should be reached during the fermentation process.

Drying

The beans should be surface dry within 12 hours of spreading on the drier. Beans should be rested for about 12 hours before another drying period begins. If you are drying your beans in the sun, spread them thinly and turn often. Beans should be dry in four days. The moisture content must go down to 6% before the beans are bagged and stored.

Cleaning

Remove all flat, shrivelled, broken, black and mouldy beans.

Bagging and inspection

Cocoa beans should be placed in NEW sacks. They must be inspected before they can be sold. For full information about bagging and inspection, see pp. 144-150 of this issue.

GENERAL INFORMATION

- One bag of dried cocoa beans should weigh 63.5 kg.
- One pod yields 30 seeds, on average.
- 25 kg wet beans gives 10 kg dry beans (0.4 or 40%).
- 880 kg wet beans occupy 1 cubic metre.
- 24 pods produce 1 kg of dry beans.

Harvesting

- One labourer can harvest 2000 to 2500 pods per day during a flush period. In the non-flush period the quantity is about 800 pods.
- One man can break pods to produce 240 kg wet beans per day.

Processing

Allow 40 man-days per tonne of dry beans. This includes: daily turning, transfer to drier, firewood collection, bean turning, tending fires, cleaning, bagging.