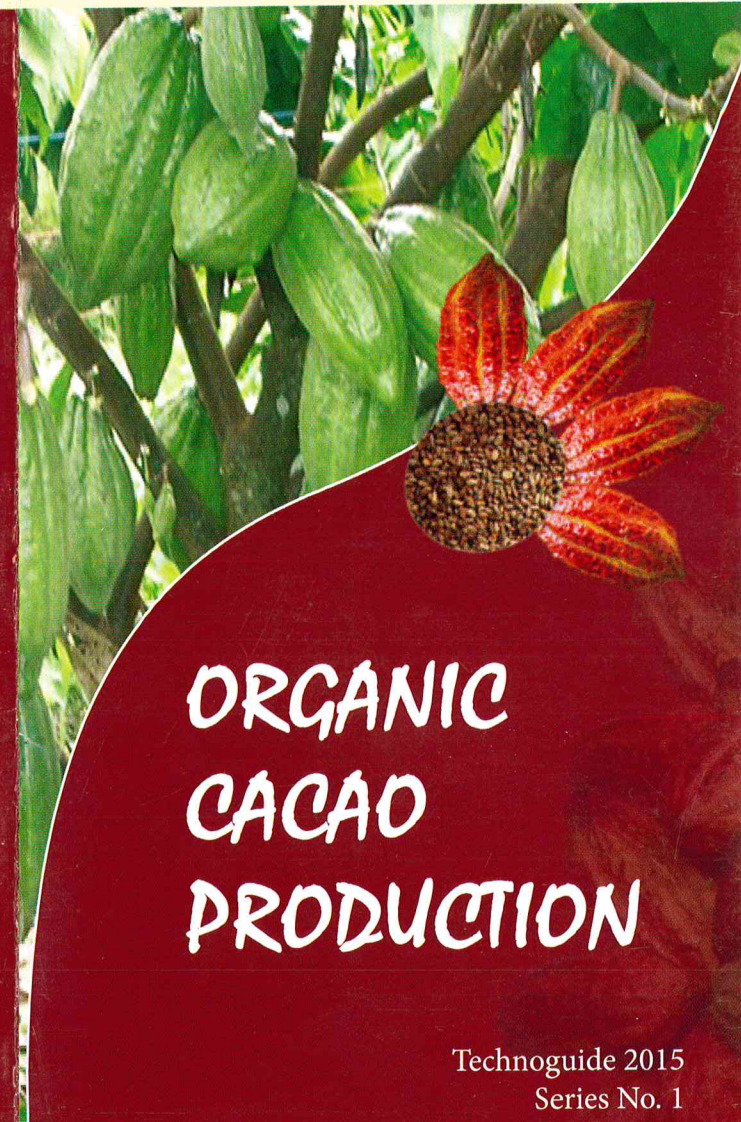




Republic of the Philippines
Department of Agriculture

BUREAU OF PLANT INDUSTRY
Davao National Crop Research
Development and Production
Support Center



ORGANIC CACAO PRODUCTION

Technoguide 2015
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TEN-YEARS ESTIMATED COST AND RETURN ANALYSIS OF A ONE HECTARE CACAO ORCHARD COST AND RETURN PER HECTARE PER YEAR (HA/YR)

ACTIVITIES	1	2	3	4	5	6	7	8	9	10
Yield per Year (kg/s)		1,515	1,742	2,004	2,304	2,550	3,047	3,047	4,330	4,634
10% Non-marketable Fruits or rejects (kg/s)		152	174	200	230	265	305	350	403	463
Marketable dried bean (kgs)		1,364	1,568	1,803	2,074	2,285	2,742	3,154	3,927	4,171
I. Production cost										
Labor										
Holling	4,912									
Planting	2,763	5,536	5,526	6,300	4,200	8,400	8,400	8,400	14,400	14,400
Weeding	3,684	2,456	2,456	2,456	5,526	6,300	8,400	8,600	8,600	8,600
Pruning	2,500	2,700	2,900	2,900	3,500	3,500	3,700	4,500	5,000	6,000
Fertilization		2,456	2,456	2,456	3,684	2,763	2,763	3,500	3,500	3,500
Agricultural Supplies:										
Cacao seedlings	13,500	40,000	40,000	41,600	42,400	43,200	44,000	44,800	45,600	46,400
Organic chicken dung	27,500	19,800	21,120	21,780	22,440	23,100	23,760	24,420	25,080	25,740
Vermicast		1,200	1,300	1,300	1,500	1,600	1,650	1,700	1,700	1,800
Biofungicide		1,300	1,400	1,400	1,450	1,700	1,800	1,800	1,800	1,900
Bioins ecticide										
Grasshock	1,500									
Slashing bolo	1,500									
Wooden basket	1,050	2,000				1,400				1,050
Pruning shear	3,125	3,125	3,125	3,125	3,125	2,000	3,200	3,000	3,500	4,000
Plastic bag	1,750	3,000	3,500	3,500	3,900	4,100	4,300	4,600	4,900	5,100
Pest & disease management	3,000	3,300	3,500	3,500	3,900	4,100	4,300	4,600	4,900	5,100
Smokes bags	1,750	3,000	3,500	3,500	3,900	4,100	4,300	4,600	4,900	5,100
II. Total Cost (Php)	66,784	90,003	83,783	92,967	91,725	103,988	101,973	114,445	114,080	123,990
III. Total Cost per tree (Php)	60.11	81.01	75.41	82.56	82.56	93.60	91.78	103.01	102.68	111.60
IV. Cash Income		129,533	148,962	171,307	197,003	226,553	260,536	299,617	344,559	396,243
V. Net Return or Profit		39,330	65,179	78,340	78,340	105,278	122,565	158,563	230,479	272,253
VI. % Return of Investment		44%	78%	84%	84%	118%	155%	162%	202%	220%

Assumption
1. 1,111 bearing trees/ha
2. Bearing stage starts at Year 2

5. Farmer price (dried cacao beans) =Pp95/kg
6. 15% increase in production per year (kg/s)

INSECT PESTS, DISEASES AND THEIR CONTROL

A. INSECT PESTS MEASURES	PLANT STAGE / PLANT PARTS ATTACKED	CONTROL
1. Mirids	Young shoots, cacao pods	*Apply bioinsecticides (Temorex Gold) *Adequate shade on very young cacao
1. Mirids	Young shoots, cacao pods	*Avoid mulching in areas where termites are present *Maintain general hygiene by weeding and pruning *Destroy termite hills
3. Cacao pod borer	Pods	*Prune regularly *Fruit bagging
B. DISEASES		
1. Black Pod (phytophthora fungus)		*Regular pruning *Shade management *Use biofungicide (Temorex Gold)
2. Witches Broom (fungus)	shoots, cherelles, pods	*Regular pruning *Remove infected parts
3. Frosty Pod Rot (fungus)	Pods	*Remove diseased pods *Maintain regular pruning *Apply biofungicide (Temorex Gold) *Use Trichoderma spp as biological control
4. Stem canker	stem	*Prune regularly *Apply biofungicide (Temorex Gold)
5. Vascular Streak Dieback (virus)	whole plant	*Prune regularly *Cut-off infected branches *Eradicate infected tree for severe cases

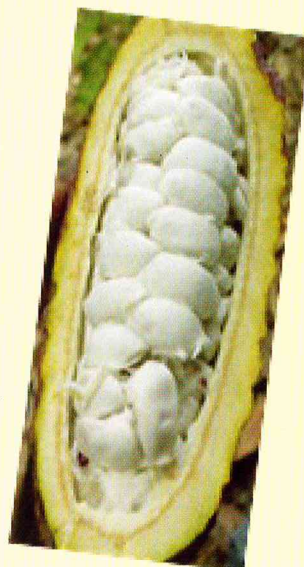
SOIL AND CLIMATIC REQUIREMENTS

Cacao grows well in clay or loamy sand soils with pH of 5.0 to 6.5. It thrives best in type IV climate with an even distribution of rainfall throughout the year.

PREPARATION OF PLANTING MATERIALS

Propagation by seeds:

1. Select pods that are healthy and ripe. Use varieties (PBC 123, USM Extract the seeds from the pod. Select well developed and big sized seeds.
2. Wash the seeds by rubbing them in rough saw dust.
3. Place the seeds in moistened jute sacks or cloth and lay them on flat surface for pre-germination.
4. Upon emergence of the radicle (root) sow the seeds in the prepared plastic bag (7"x11"x.003) containing a mixture of 70% garden soil; 20% rice hull/carbonized rice hull and 10% organic compost.
5. At the start of germination (8-10 days) cover the seedlings with row cover or any plastic cover to protect the growing seedlings from infection of anthracnose. Water regularly at least 2 times per week.
6. Graft when rootstocks reach their graftable stage or 3 months old.
7. Plant the seedlings 5 months after grafting.
8. Plant the seedlings 5 months after grafting.



LAND PREPARATION

1. Plant cacao in flat and slightly sloping lands. For sloping lands, clean the area by brushing and remove the old stumps. For flat areas, plow and harrow at least twice to loosen the soil.
2. Stake at a distance of 3m x 3m between hills and rows.



Cacao (*Theobroma cacao* L.) is a tree crop which is highly suitable or compatible under different production systems (monocrop, intercropping and agroforestry).

It is grown mainly for each beans, processed into cacao powder, cake and cacao butter. It is largely used in the manufacture of chocolates, soaps, cosmetics, shampoo and other pharmaceutical products.

RECOMMENDED VARIETIES



BR25 (CC-99-05)
 Pod Color: Red w/ green(young) ;
 Yellow (mature)
 First Flowering : 16.12 mos
 Fruiting : 17.70 mos
 Pod Index (No. of pods/kg of
 dried beans) : 23.1
 No. of beans/pod : 27
 Bean Color : Violet
 Resistance to Pests
 & Diseases : Moderate



K1 (NSIC 2000-06)
 Pod Color : Red (young);
 Yellow/Orange (mature)
 First Flowering : 23.20 mos
 Fruiting : 25.10 mos
 Pod Index (No. of pods/kg of dried beans)
 : 19.1
 No. of beans/pod : 46
 Bean Color : Violet
 Resistance to Pests & Diseases
 : Moderate



UIT (CC-99-01)
 Pod Color : Green(young);
 Yellow (mature)
 First Flowering : 16.80 mos
 Fruiting : 16.80 mos
 Pod Index (No. of pods/kg of dried beans)
 : 21.69
 No. of beans/pod : 46
 Bean Color : Violet
 Resistance to Pests & Diseases
 : Moderate



K1 (NSIC 2000-06)
 Pod Color : Red (young);
 Yellow/Orange (mature)
 First Flowering : 23.20 mos
 Fruiting : 25.10 mos
 Pod Index (No. of pods/kg of
 dried beans) : 19.1
 No. of beans/pod : 46
 Bean Color : Violet
 Resistance to Pests & Diseases
 : Moderate



K2 (NSIC 2007-07)
 Pod Color : Red (young);
 Yellow/Orange (mature)
 First Flowering : 21.10 mos
 Fruiting : 3mos or at
 24.12mos Pod Index (No. of pods/kg of
 dried beans) : 25
 No. of beans/pod : 34
 Bean Color :
 Resistance to Pests
 & Diseases : Moderate



K2 (NSIC 2007-07)
 Pod Color : Red (young);
 Yellow/Orange (mature)
 First Flowering : 21.10 mos
 Fruiting : 3mos or at
 24.12mos Pod Index (No. of pods/kg of
 dried beans) : 25
 No. of beans/pod : 34
 Bean Color:
 Resistance to Pests
 & Diseases : Moderate



USM CH1 (NSIC 2014 Cc 12)
 Pod Color : Red (young);
 Orange-Yellow (mature)
 Pod Index (No. of pods/kg of
 dried beans) : 22.5
 Resistant to VSD
 (Vascular streak die-back)



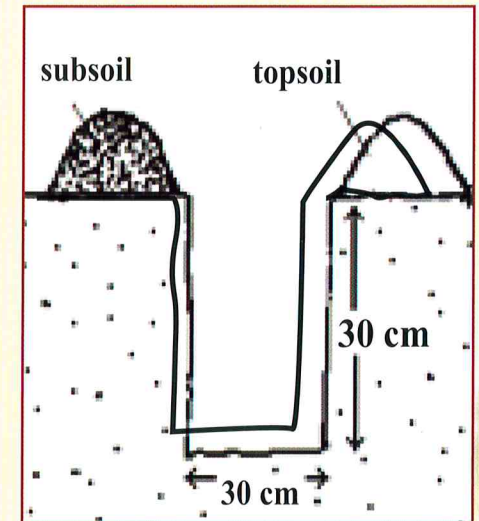
PBC123 (NSIC 2014-11)
 Pod Color : Red (young);
 Reddish orange (mature)
 Pod Index (No. of pods/kg
 of dried beans) : 25
 Resistant to VSD
 (Vascular streak die-back)



USM CH2 (NSIC 2014 Cc 13)
 Pod Color : Red (young);
 Orange-Yellow
 (mature)
 Resistant to VSD (Vascular streak die-back)

PLANTING

1. Plant the seedling at the onset of the rainy season.
2. Prepare a hole about 30 cm x 30 cm big enough to accommodate the base of the plant 1 month before planting.
3. Apply organic chicken dung (200 grams) at the bottom of the hole then cover with soil 1 cm before planting.
4. At planting, remove the plastic bag carefully in order not to destroy or break the base of soil that holds the plant and cover the hole with top soil and press gently.
5. Plant grafted seedlings that have at least 8 mature leaves, dark green color and free of pest and diseases or 5-6 months old.



CARE AND MAINTENANCE

1. Provide 70% shade (30% sunlight) to the newly planted cacao trees.
2. Brush the undergrowth 4-6 times a year to protect the young trees from weeds and pests.
3. Water the trees during dry season.
4. Prune/remove diseased and infected twigs, branches and leaves to make sure that the tree has the right shape and height.
5. Ringweed before fertilization.
6. Mulch cacao trees with cacao pod husks, dry leaves, banana pseudostem or coir dust. Spread the material 1 meter from the trunk.
7. Bag the cacao fruits to protect from cacao pod borer.
8. Avoid spraying biopesticide during flowering period; it may cause damage to pollinators on surface.



FERTILIZATION SCHEDULE

Years in Field	No. of Application /Year	Amount /Tree/Application
1st year	4	1 kg chicken dung; 1 kg dolomite; 1 kg vermicast
2nd year	4	3 kg chicken dung; 3 kg dolomite; 3 kg vermicast
3rd year	4	3 kg chicken dung; 3 kg dolomite; 3 kg vermicast
4th year	4	4 kg chicken dung; 4 kg dolomite; 4 kg vermicast
5th year	4	4 kg chicken dung; 4 kg dolomite; 4 kg vermicast



Organic chicken dung



Vermicast



Dolomite

INTERCROPPING

Cacao trees can be planted under coconut trees and can be intercropped with food crops like banana and cassava and nitrogen fixing trees like Gliciridia sp. These will also provide temporary shade to the newly planted trees and will give extra income while waiting for cacao to bear

**Banana: stake at a distance of 3 m x 3 m rectangular spacing. A hectare will have 1111 suckers.*

**Cassava: stake at a distance of 2 m x 2 m rectangular spacing. A hectare will have 2500 cassava cuttings.*

**Coconut trees: stake at a distance of 12 m x 12 m triangular spacing. A hectare will have 69 coconut seedlings.*

HARVESTING

1. Cut the pods from the trunk and branches with a sharpened blade or pruning shear.
2. Place pods in bamboo basket or kaing.

MATURITY INDICES

2. Pods mature at 5-6 months old from fruit set.
3. It makes hollow sound when tapped.
3. Change in color from greenish yellow to reddish purple or yellow.

