

# THE DWARF COCONUT

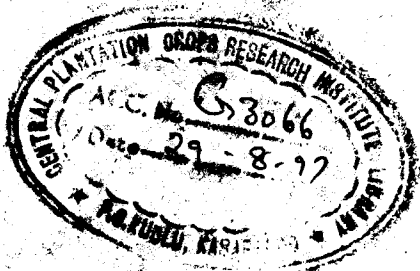
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# THE DWARF COCONUT

## 1. INTRODUCTION

There are two distinct varieties of the coconut—the ordinary tall and the dwarf. This varietal distinction is made on two important characters, viz., growth characteristics of the stem and the age at first flowering. The dwarf variety is characterised by its short stature and earliness in flowering. It has a thin trunk and its fully developed frond rarely exceeds four metres in length. Under normal conditions, the palm starts flowering in about three to four years above the ground and a fully grown frond is just metres in height. It yields heavy irregular bearing. Conventional bearing does not live as long as the tall and its yield after about 25 years of production. But the experience in Malaysia and other countries where commercial planting with dwarf has been done is that the economic life of dwarf palm continues even after 35 to 40 years of production. Although the dwarf variety has certain distinct advantages over the tall, it has not yet become popular with the growers in the major coconut growing countries.



Of late, the dwarf variety received much attention in India and elsewhere because of its reported use as a parent in evolving high yielding hybrids. The Malayan dwarf is also reported to be resistant to the devastating "Lethal Yellowing" disease in

Jamaica which is suspected to be caused by a virus. According to a recent survey conducted by the Central Plantation Crops Research Institute, India, the hybrids like T x D and D x T were found to be tolerant to the root (wilt) disease of Kerala.

## 2. ORIGIN AND DISTRIBUTION

Handover (1919) was of the view that the dwarf might have occurred as a mutant of the tall variety for the first time in Java. Recent researches confirm the earlier assumption that the dwarfs are off-types of *Cocos nucifera* resulted either by mutation or chromosomal aberrations. Their genetical make-up is highly heterozygous with imposed hybridity. These are reported to occur where large areas of coconuts exist and in widely distributed places. It is believed that the dwarf palms were introduced into Malaysia between 1890 and 1900 by planters from Krion. Distinct dwarf races are found in the Philippines, Fiji, Madagaskar, Sri Lanka, Maldiver and in India.

## 3. RACES OR TYPES OF THE DWARF

Among the dwarf palms growing in different parts of the world, two types or races could be identified, based on the vigour of growth, age at fruiting and nut characters. As per the systematic classification made by Narayana and John (1949), there are two main classes, viz., (1) variety Javanica and (2) variety Nana. According to the authors, vigorous palms bearing in four years belong to the variety 'javanica' and delicate palms bearing in three years belong to the variety 'nana'.

## 4. DWARF TYPES IN INDIA

Shankar Rao and Koyamu (1955) described two important dwarf types commonly found in Chowghat area in Kerala State viz., Chowghat 'Dwarf Green' and Chowghat 'Dwarf Orange'. It is a common practice in this area to grow a few dwarf palms in each coconut garden.

### 4:1. The Dwarf Green

This type is characterised by the following features:

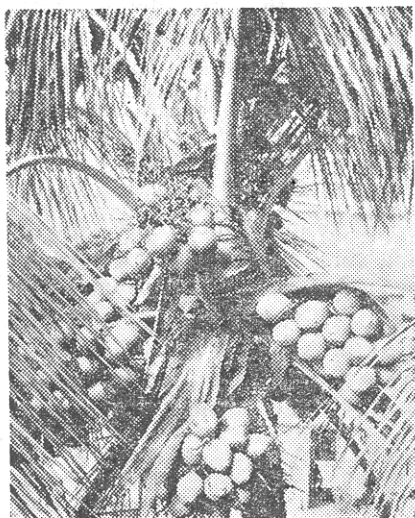
- 1) Dark green coloured nuts and petioles.
- 2) Early flowering habit—i.e., three years after planting under ideal conditions.
- 3) Oblong nuts with tapering ends—often they are ridged with a beak at the end.

- 4) *Thin stem with a narrow base. Girth of the stem is approximately 51 cm.*
- 5) *Small compact crown with 20-26 short and delicate leaves. A fully grown leaf is 2.87 metres long and 1.42 metres wide with 0.01 metre long petiole.*
- 6) *Overlapping male and female phases.*
- 7) *Large number of female flowers in the spadix.*
- 8) *Retention of unfertilised female flowers.*
- 9) *High annual yield per tree as compared to the ordinary tall.*

#### Floral characters

The Chowghat dwarf green maintains almost cent per cent purity on account of self pollination. Self pollination in this

type is made possible due to the overlapping male and female phases. The staminate flowers bloom from the eighth day after the opening of the spathe and continue till the 20th day while the female flowers become receptive on the 15th and 16th days. In this type the stigmatic ends of the female flowers face upwards favouring thereby self-pollination within the same panicle. The setting percentage may be upto seventy.



DWARF GREEN

#### Yield

The average yield per tree (average of 20 trees) for a period of five years is given below (Rao and Koyamu (1955)).

Table 4:1

Year	No. of bunches harvested	Nuts obtained per tree per year
1948	10	58
1949	7	30
1950	12	96
1951	8	42
1952	13	107
Mean	10	66

The data clearly indicate the alternate bearing tendency of this type. The highest annual yield recorded for a tree growing under ideal conditions is 120 nuts.

#### Nut characters

The nut is small and the tender nut yields only 170-255 gm. of sweet water. An unhusked fully matured nut has a girth of 34.3 cm. and the girth of a husked nut will be approximately 26.7 cm. Thickness of the kernel ranges from 0.8 to 1.0 cm and the mean weight of copra per nut is 92.14 gm. The copra is of poor quality as it is hard and leathery. The copra contains 73.5 per cent oil by chemical extraction. As the quantity of nut water is little, the nuts get dried up in a month after harvest and hence seednuts are to be carefully preserved in cool and moist place to ensure satisfactory germination. Seednuts germinate 29 to 56 days after planting. Dwarf green seednuts are the earliest to germinate, as compared to other types.

#### 4:2. The Dwarf Orange

The following general characters will be helpful in indentifying this type.

- 1) Thin stem with a small compact crown. Almost uniform stem with an average girth of 63.5 cm.
- 2) Close leaf scars on the stem.
- 3) Comparatively short stature.
- 4) Early flowering i. e, three to four years after planting.
- 5) Short petiole.
- 6) Narrow leaf blades.
- 7) Closer arrangement of leaflets.
- 8) Overlapping male and female phases.
- 9) Retention of unfertilised female flowers.
- 10) Orange colour of petiole, spathes and tender nuts.
- 11) Spherical orange coloured mature nuts.

The number of leaves on the crown may range from 20 to 28. Length and width of leaves are on an average 3.1 metres and 2.4 metres respectively. Thus it appears more robust than the dwarf green type.

#### Floral characters

In this type also overlapping of male and female phases is noticed. But both self and cross pollination are common in this type and it is observed that 80 per cent of the progenies

breed true to type, leaving the remaining 20 per cent progenies natural cross hybrids. The male phase commences on the 6th day of the opening of the spathe and continues till the 18th day while the female phase starts on 17th day and continues upto 19th day. The setting percentage is 78.

#### Yield

'Orange Dwarf' is slightly superior in bearing capacity than the 'Green Dwarf'. The data on average yield of nuts obtained for a five year period (Rao and Koyamu 1955) are given below:

Table 4:2

Year	No. of bunches harvested	No. of nuts obtained
1948	14	117
1949	5	46
1950	13	104
1951	7	51
1952	15	136
Mean	10.4	90.8

Orange Dwarf also exhibits alternate bearing tendency as seen from the table.

#### Nut characters

The nuts are spherical and medium sized. Tender nuts yield 340 to 510 gm. of sweet water. The mature nut has a circumference of 38.1 cm. with husk and 27.9 cm. without husk. The kernel is as thick as that of the green dwarf and the mean weight of copra per nut is 99.23 gm. The copra is poor in quality being hard and leathery with a low oil content of 66.13 per cent on chemical extraction. The nuts have a longer dormancy period in the nursery and the germination is observed between 48 and 105 days with the mean 69.7 days after planting.

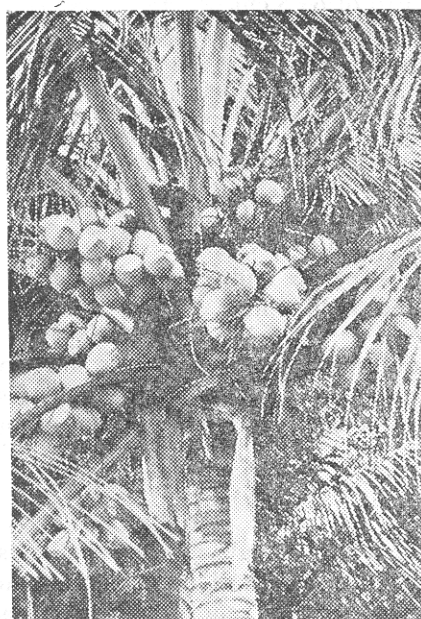


Table 4:3 below gives a comparative study on the measurable characters of the dwarf types and the ordinary tall.

Table 4:3\*  
Palm Characters

	Dwarf green	Dwarf orange	Ordinary tall
1. Age at first flowering in years	3	4	7
2. Girth of stem in cm.	50.8	53.3	66.0
3. No. of leaves on the crown	26	28	32
4. Length of leaf in metre	2.93	3.14	3.84
5. Width of leaf in metre	1.46	1.83	2.65
6. Length of petiole in metre	0.91	1.19	1.31
7. Annual yield of nuts	66	90.8	66
8. Copra content per nut in gm.	92.14	99.23	170.10
9. Calculated annual yield of copra per tree in kg. and gm.	6.081	9.010	11.227
10. Quality of copra	poor	poor	good
11. Percentage of oil in copra	73.54	66.13	74.30
12. Free fatty acid content (%)	0.02	0.07	0.20
13. Size of nut-girth in cm.	34.3	38.1	55.9
14. Thickness of kernel in cm.	0.8	0.8	1.3
15. Volume of water inside in gm.	255	510	680
16. Mean number of days taken for germination	49.3	60.7	95.0
17. Flowering-Male phase	8th to 20th day	6th to 18th day	1st to 19th day
18. Flowering-Female phase	15th to 16th day	17th to 19th day	21st to 23rd day
19. Pollination	Self	Self & cross	Rarely self

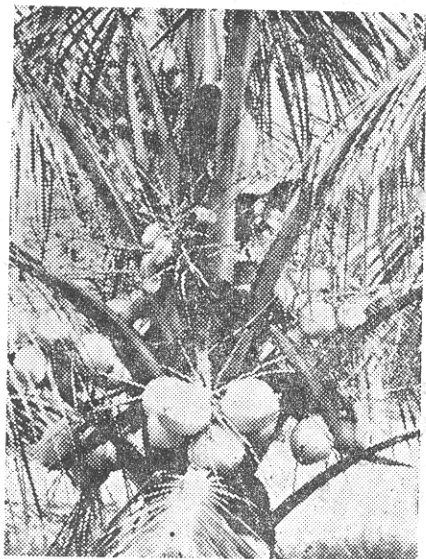
\*Reproduced from The Indian Coconut Journal (1955) Vol. 8, p. 110

Other minor forms of the dwarf reported to occur in India are (1) Gangabondam (2) Laccadive or Maldiva dwarf (3) Andaman dwarf and (4) Chennangi.

#### 4:3 Gangabondam

This is a 'medium dwarf' or 'semi-tall' type, found to grow in certain parts of Andhra Pradesh in India. Ganga-bondam comes to flowering in four years after planting (Menon and Pandalai 1958). The nut matures in 11 months. It is a good bearer. The nuts are elongated in shape, medium sized and have fairly thick kernel, which yields good quality copra. The copra content per nut is about 230 gm. and oil percentage in the copra is about 72.

#### 4:4 Laccadive or Maldivé Dwarf



LACCADIVE DWARF

This type is reported to occur in Laccadive and Maldivé Islands. This is a shy bearer, yielding on an average 50 nuts per tree per year. The copra is good in quality. Per nut copra content is about 115-145gm and the oil percentage is about 71.

#### 4:5 Andaman Dwarf

This is a dwarf type from the Andaman Islands. It is a poor yielder. The copra content per nut is about 145 gm. and the oil content in the copra is about 63 per cent.

#### 4:6 Chennangi

This is a dwarf form found in Andhra Pradesh in India.

### 5. DWARF TYPE GROWN IN MALAYSIA

#### 5:1. The Malayan Dwarf

In Malaysia regular commercial plantings with the Malayan Dwarf (Nyior gading) were started as early as 1912. In 1912, 200 hectares were brought under the variety by utilising seed material obtained from 12 year old palms, grown

in the Krion rice district. It is generally believed that the Krion growers obtained their original planting material from Java.

The Malayan dwarf can be classified under var. *javanica*. It has three distinct colour forms. One form has ivory yellow nuts, the second has apricot red and the third has green nuts

Further, there are semi-tall trees of these colour forms, later coming into bearing, with slightly larger nuts and less prolific than the true dwarf. The semi-talls found in dwarf gardens are attributed to hybridisation. Handover (1919) reported that the leaf of the dwarf is smaller, 3.5 m from base to tip. The nut is also smaller and the stem thinner. The variety was reported to be exceedingly hardy, growing well on deep peat, white clay or red loam, in any situation where water is abundant but not stagnant. However, the variety had a preference for well



MALAYAN DWARF

drained alluvium. The yields were estimated by him for the consecutive years as 10 nuts per tree in the 4th year, 30 nuts in the 5th year, increasing to 60, 80, 100 and 120 till the 9th year. The yield of copra was computed for the 5th year at 5.4 piculs of copra per acre (8 quintals per hectare) till 21.6 piculs (32. quintals per hectare) for the 9th year. Five hundred nuts were required to make a picul of copra. Handover advocated a planting distance of 7.2 x 6 metres (230 palms per hect.).

In Malaysia when free pollinated nuts from an extensive plantation were planted in 1920, the seedlings were found to be fairly true to type.

Table 5:1. Seedlings from different colour forms

(*Jack and Sands, 1922*)

Colour forms	Number sown	Number germinated	Number true to type	Percentage true to type
Ivory yellow	500	422	406	96.2
Green	570	434	298	68.7
Red	200	126	94	74.6

When compared with the seedlings of tall variety, nearly six months after sowing, the dwarfs had the same number of leaves as the tall, viz., five, but the largest leaves of dwarf were 83 cm. against 121 cm. of the tall. Subsequent observations showed that the average period elapsing from planting to flowering averaged three years 86 days for yellows, three years 105 days for reds, and three years 263 days for greens. The only palm flowering within three years after germination was a green type (two years 282 days) the last to flower was also a green one (four years 126 days). The greens were also not as pure as the yellows and reds.

Table 5:2. Average number of spadices produced and fruit production for three years (1927-29)

(*Jack and Sands, 1929*)

Colour	Number of palms	Number of spadices produced per annum	Average annual yield	Total yield for three years	
				Min.	Max.
Yellow	6	18	94.5	243	366
Red	6	15.5	89.6	201	324
Green	6	17	88.2	224	321

The period which elapsed from flowering till dead ripe was 12.4 months for the yellows, 13.4 months for the reds and 13.1 months for the greens. But the fruits had reached normal maturity 3-4 weeks earlier.

Jack and Sands (1929) reported a case where a garden of 40 hectares gave in the eighth year 28.5 quintal of copra per hectare. The dwarfs began to give a small crop in the fourth year, the tall in the sixth. In the fourth to tenth year the dwarfs yielded well above the tall and continued afterwards to surpass the tall in copra production. The main points were as given in the following table,

**Table 5:3. Comparison of the production of copra by dwarfs and talls**

*(Jack and Sands, 1929)*

	Dwarfs	Talls
Number of palms planted per hectare	222	120
Crop in piculs of copra per hectare*		
4th year	5.66	0.00
5th year	15.30	1.24
6th year	18.58	4.94
7th year	22.83	9.88
8th year	28.86	14.83
From 10th year (estimated)	32.12	21.57
Number of nuts per picul of copra		
Yellow	560	251
Mixed dwarfs	482	251
Green (estimated)	430	251
Weight of copra per nut (gm.)	130	260
Number of nuts per palm per annum	190	56
Production of copra in kg. per palm per annum	11.34	14.51
Production of copra in kg. per hectare per annum		
	2522	1793

Of the three colour forms, the yellows required the largest number of nuts per picul and their meat was more difficult to cure.

**Table 5:4. Average weight of copra per nut in gm.**

*(Jack and Sands, 1929)*

Yellow	129
Red	139
Green	143

Further, the yellows were more readily subject to pest attacks and less resistant to poor conditions generally. However, the oil content of the three colour forms was about the same and coincided with the figures for talls (64-66). The conclusions

One Picul =  $13\frac{1}{3}$  lb. (60.5 kg.)

were that under good conditions of growth the dwarf palms gave excellent returns, but where the conditions were only fair, they were not so satisfactory. The dwarfs proved to be very sensitive to prolonged drought, and irrigation facility was the most important requirement under such conditions for raising profitable dwarf gardens. In the different trials in Malaysia the green type proved to be the most promising. It was capable of producing 11.3 kg. copra per palm per year, nearly as much as the average tall palm, whereas double the number of dwarf palms could be planted in a unit area. Jack (1937) summarised the experience in Malaysia as follows: "Of the three dwarf types the green type is the most robust in growth, most resistant to adverse conditions, productive of the best quality of copra and of the largest nuts. This type has proved eminently satisfactory under ordinary plantation conditions."

Jack and Sands (1929) also reported the suitability of dwarfs for tapping. The advantages reported were easier tapping and earlier production. Though the average yield of toddy obtained was only 0.75 litre per day as against double the quantity from tall, the juice derived from dwarfs proved to be sweeter and more palatable.

They also reported on the performance of dwarfs at the Coconut Experiment Station in Klang. The planting density was 250 per hectare and for seven year old dwarfs, the hectare yields were 17.1 quintals for greens, 12.6 quintals for yellows and 11.4 quintals for reds. The soil was stiff clay, fairly well drained. Comparative observations showed that dwarfs do not thrive well in peat soil and will not yield commercial crops on light or medium mineral soils without irrigation. They favour stiffer soils and a slightly higher water table. They like irrigation but drainage should be adequate. Cook and Jagoe (1933) reported that dwarfs do not yield copra equal in quality to that of tall growing nearby. They found that only a small percentage of the copra from the dwarfs was smooth and crisp; there was always a percentage of rubbery copra and a good deal of intermediate products. The green variety gave the best product, the red the worst.

Wardlaw and Mason (1936) gave the yield figures from a field of 16.5 hectares in Malaysia mainly containing yellow types with approximately 210 palms per hectare.

**Table 5:5. Yield of dwarfs in Malaysia (Wardlaw and Mason, 1936)**

Year	Nuts per picul	Nuts per palm	Nuts per hectare	Copra in quintals/ha.
1925	604	56	11750	11.67
1926	600	67.5	14208	13.41
1927	707	60	12634	10.79
1928	646	111	23287	21.35
1929	602	67.5	14171	13.35
1930	592	106	22002	22.17
1931	590	106.5	22298	22.24
1932	531	99	20779	22.62
1933	457	148	30947	38.72
1934	461	135	28293	35.10

The performance of the above dwarfs was also compared with tall plants nearby in about 556 hectares. The dwarfs were irrigated but not the tall plants.

**Table 5:6. Yields of mature commercial fields of dwarfs and tall plants over six years**

Year	Dwarf			Tall		
	Nuts per picul	Nuts per hectare	Copra in quintals/ha.	Nuts per picul	Nuts per hectare	Copra in quintals/ha.
1935	450	31977	38.805	291	11567	23.355
1936	484	24705	29.055	291	9508	18.99
1937	480	32504	39.57	282	10203	21.57
1938	473	28963	36.21	289	10045	20.46
1939	600	25377	31.785	285	8938	18.465
1940	578	27774	33.615	286	9256	19.185
Total	3065	171300	209.040	1724	59517	122.025
Average	511	28550	34.8	287	9919	20.3

The above comparison shows that the number of nuts per unit area of dwarfs is generally treble that of the tall plants, but nearly double the number of dwarf nuts are required for making a picul of copra. The yield of copra per hectare is more than one and half times that of the tall plants. However, the removal of kernel or meat was more expensive with the small nuts of the dwarfs. For dwarfs the expenditure was 32.5 cents per picul of copra against 20 cents for tall plants, a difference of 12.5 cents per picul or 20 cents per quintal.

More recent data on the performance of dwarfs in different locations are given in the following table.

Table 5:7

Field	Area in hectares	Age in 1961	Nurs per hectare		Nuts per tonne of copra	
			Max.	1961	Min.	1961
Jubilee	53.4	22	22239	17050	8128	8128
Coronation	112.5	24	20015	15814	8636	9449
FKC 31	40.5	41	29652	16062	9144	9449

#### 6. PERFORMANCE OF THE MALAYAN DWARF IN JAMAICA

In Jamaica the local "Jamaica Tall" variety is highly susceptible to "Lethal Yellowing" which is thought to be caused by a virus with an insect vector. Out of a Jamaica tall population of six million, the annual death is estimated to be 70,000 to 1,00,000. Any coconut variety, therefore, grown by farmers in Jamaica must be resistant to "Lethal Yellowing". It was with this intention that various exotic types, including Malayan dwarf were introduced for trial planting.

Malayan dwarf seednuts were first introduced in Jamaica in 1939. The earlier introduction failed to germinate satisfactorily and hence the performance of this variety could not be tested under commercial plantation scale.

#### 6.1. Malayan Dwarf resists Lethal Yellowing

There are enough evidences to prove that the Malayan Dwarf possesses high degree of resistance to the "Lethal Yellowing" disease. The resistance of Malayan dwarf to "Lethal Yellowing" was first recognised at 'Round Hill' in Jamaica. In an experiment laid out in 1956, only very small percentage of the Malayan dwarf was affected by the disease. Experiments conducted on palms in farmer's fields also confirmed the disease resistance of the Malayan dwarfs.

The following table (Harries 1971) illustrates this fact.

Incidence of diseases and onset of bearing in some local and introduced varieties in Jamaica

	Disease index Max. = 100.00	Bearing at 4 yrs. Max. = 100.00
tall	44.6	2.8
Malayan dwarf	0.0	88.3
Sanblas tall ('Sanblas')	C	0.0
St. Lucia tall	23.8	0.0
St. Lucia dwarf	15.4	11.1
St. Lucia tall	30.0	0.0
St. Lucia tall	30.0	5.6
St. Lucia valley tall	15.0	2.8
St. Lucia tall	32.0	8.3
St. Lucia tall	40.0	0.0

C. Not represented in this trial

Malayan Dwarf husbandry in Jamaica

Malayan dwarf seednuts in large numbers were imported to Jamaica from St. Lucia after the devastating hurricanes of 1949 and 1951. Most of these introductions were the green type, but about 20 per cent were yellow and less than one per cent red. This type differs very markedly from the tall in its manner of growth, cultural requirements and hardiness. The Malayan dwarf seedling is more delicate than the "Jamaica tall" seedling. The nut has a thinner husk which offers little support to the shoot. The attachment of the shoot and the nut might get damaged if the seedling is lifted from the nursery with fork or spade or handled roughly. The seed contains lesser endosperm when compared to the tall nut and young plant becomes dependent upon its roots at an earlier date after planting. The seedling should not be overgrown in the nursery and should be planted towards the beginning of the rains, in order that it has well established feeding roots before the first critical dry season.

The Malayan Dwarf produces shorter leaves but exhibits a greater rate of leaf production. The distance between the leaves and, therefore, the distance between the leaf scars on the trunk is less than that in the tall. It has a smaller diameter crown, thinner trunk, slower rate of vertical growth but a more rapid rate of leaf and bunch production. Under same

conditions a dwarf and a tall palm of the same age will produce an equal leaf area, the dwarf by having more smaller leaves and the tall with fewer longer leaves. Onset of flowering is positively correlated with the leaf production and hence the dwarf palms flower considerably earlier than the tall. The first inflorescence emerges during the third year under good conditions and the first bunch can be harvested in the fourth year.

Malayan dwarf palms grow and fruit very well under fertile soil conditions but suboptimal conditions and low fertility adversely affect their performance. It is, therefore, highly essential that they may be fertilised with optimum quantity of fertilisers at regular intervals. Fertilisers are broadcast on the soil surface around each palm and the annual application is divided into two equal portions applied during the rainy season.

Harvesting is done at six weekly intervals. The annual expected yield under monoculture is 2.5 to 5.0 tonnes of copra per hectare compared with 1.26 to 1.88 tonnes of copra per hectare from *traditionally grown 'Jamaica Tall' palms*.

### 6.3. Malayan Dwarf Monoculture

After clearing the land, planting holes of 30.5 cm. x 30.5 cm. x 30.5 cm are opened in a triangular spacing of 6.4 m. x 6.4 m. x 6.4 m. (plant density 280/hect.). The seedlings are planted after clearing of weeds from the field. Further maintenance consists only of regular weed control along the rows and circles. Fertiliser application should commence three to six months after planting and at regular intervals afterwards. On steep sloping land contour row planting may be favoured with contour rows 7.3 metres apart with trees 5.18 metres apart along each row.

### 6.4. Malayan Dwarf monoculture with catch cropping in early years

The choice of catch crops depends on the suitability of the soil and site and the compatibility between the catch crop and the main crop. Banana which is the common intercrop in Jamaica is not suitable for this purpose due to its tall habit, which inevitably casts shade over the young palms and hinders optimal growth. Lower growing catch crops with no danger of shading the palms are generally to be preferred. Pumpkins; sweet potato, hybrid corn, and pineapple are ideally suited. Crops which require excessive land preparation are not

While growing catch crops it is imperative that catch crops and the main crop must receive separate doses of nutrients.

#### Malayan Dwarf in mixed culture

In mixed cropping, a variety of crops like banana, cocoa, coffee, pineapples or other perennial or annual can be successfully grown in the interspaces of the dwarf. Pastures cannot be grazed until the palms are ten years old, as they are liable to cattle depredation in early years. Shade tolerant crops like cocoa and coffee are grown under a uniform square or triangular coconut lay. The spacing for coconuts should be greater than 6:4. For crops not tolerant to shade, single hedge or double system of planting, leaving wide spaces between the palms will be ideal.

#### Economics of raising Malayan Dwarf

Romney (1971) discussed in detail the costs and returns of raising Malayan dwarf in Jamaica. Tables 6:2 and 6:3 illustrate the comparative net values at two sites.

Table 6:2

Comparative yields and net values of the crop for Malayan Dwarf and Jamaica Tall at Spring Garden, Jamaica (Romney 1971)

	Malayan Dwarf (a)	Jamaica Tall (b)
Nuts yielded per palm per year	71	64
Spacing	21 sq.	30 sq.
Palms per hectare (less 10% missing)	222	106
Nuts per hectare per year	15790	6800
Nuts per unit (c)	84	82
Nuts per hectare	188.0	83.0
Gross value per hectare	J\$ 470.11	J\$ 207.56
Net value of copra per hectare	406.18	176.85

#### Average of 3 years' yield records

After Smith and Romney (17)

1 unit = 135 lb. (61.2 kg.) husked Jamaica Tall nuts or 155 lb. (70.3 kg.) husked Malayan dwarf nuts. 1 unit of nuts yields 40 lb (18.1 kg.) copra.

Table 6:3

Comparative yields and net values of the crop for Malayan Dwarf and Jamaica Tall at Fair Prospect (Romney 1972)

	Malayan dwarf (a)	Jamaica tall (b)
Nuts yielded per palm per year	102	107
Spacing	7.6 metre triangle	10.0 metre square
Palm per hectare	193	89
Age of palms	5 years	16 years
Nuts per hectare per year	19659	9518
Nuts per unit	131	89
Units per hectare	150.0	106.7
Gross value per hectare	J\$ 374.97	J\$ 266.87
Net value of copra per hectare	J\$ 296.99	J\$ 224.17

There are 10% gaps in the tall.

- (a) unpublished results Feb. 70 Fair Prospect Variety  
 (b) From Fair Prospect Fert. Expt. (12)

Data from 22 year old dwarfs at Spring Garden and from adjacent tall of the same age are compared while dwarfs at Fair Prospect are compared with tall on similar land nearby.

Although the net income per hectare varies, it is safe to say that in all cases it is much greater than the potential of tall on the same land. It is the closer spacing possible with the Malayan dwarf which accounts mainly for the high yield per hectare.

#### 7. PERFORMANCE OF MALAYAN DWARF IN OTHER COUNTRIES

7:1. At Mua Estate in Fiji, 42 year old Malayan dwarf gave 2.51 tonnes of copra per hectare although 6890-7875 nuts are required to make one tonne of copra.

7:2. In Sri Lanka there are 4.856 hectares of dwarfs of mixed colours at Rathmalagara. They are similar in appearance to the 'Malayan Dwarf' planted at a crop density of 222 palms per hectare. Comparison of yields after 20 years and of nearby tall is shown in table 7:1.

Table 7:1  
Performance of Dwarfs in Sri Lanka

	Dwarf	Ceylon Dwarf
Nuts reaped per hectare	7275	11643
Nuts per tonne	4468	9984
Tonnes of copra per hectare	1.63	1.15

(Source: Oleagineux, June 1973)

Table 7:2. Performance of Dwarfs in Trinidad

	Trinidad tall	Malayan dwarf
Nuts per tree per year	106	196
Nuts per tonne copra	7017	7677
U. copra per tree per year	34	56

7:3. From the data it is evident that 'Malayan dwarfs' yield excellently in Trinidad when compared to the Tall variety.

7:4. In India, the only large scale plantation under the 'Malayan Dwarf' in an area of 15 hectares is maintained at the New Ambady Estate, Kulasekharam in Tamil Nadu. There the variety, even though said to be 'Malayan dwarf', was originally introduced from Ceylon about 40 years ago. Yellow, red and green forms of the dwarf are planted in a spacing of 5.5 to 6.1 metres under square system with an average density of 235 to 270 palms per hectare. According to the Estate Manager, no chemical fertilisers were applied to the palms since planting and the garden is raised purely under rainfed conditions. Practically no intercultural operations except weeding at the base of the palms once or twice a year are carried out and hence the cost of cultivation is limited to harvest charges and weeding costs. The plantation has been under a permanent leguminous cover crop since planting. Harvest is at two months interval.

As the plantation is a private commercial concern, reliable data on yield for a sufficient period of time to compare the performance of the forms within the Dwarf variety, and also with that of the Tall are not available. Yield per palm for

both dwarf and tall varieties continues to be high as per normal standards even after 40 years of planting.

The excellent performance of the coconut varieties at the New Ambady Estate could be attributed to the favourable climatic factors mainly due to the well distributed optimum rainfall and the inherent high soil fertility conditions. The permanent cover cropping perhaps would have helped in maintaining the nutrient and moisture status at a desirable level in addition to aiding proper soil granulation resulting in sufficient exchange of gases in the soil, optimum root proliferation and also providing ideal conditions for microbial activity in the soil.

As per the Estate Manager, in recent years the 'dwarf' variety shows a declining trend in yield and alternate bearing tendency. In the absence of manuring for a very long period of 35-40 years the dwarf might have been subjected to sub optimum nutritional environment. As the dwarf is delicate and its performance is very much influenced by the soil nutrient status it may yield better with the addition of inputs like fertilisers and/or cultural operations.

**Table 7:3**

**Yield performance of Malayan Dwarf and Java Giant during 1971-72 at the New Ambady Estates, Kulasekharam, India.**

Variety	Average stand per hectare	Annual yield per hectare	Net profit in Rs./hectare
Malayan Dwarf	222-235	13800 nuts	1655
Java Giant	124-148	9076 nuts	2718

At this Estate raw nuts are sold immediately after harvest. In spite of higher yields in terms of nuts in the case of the Malayan dwarf, net returns are less due to the lesser prices offered to the dwarf nuts. The dwarf nuts are priced at half the rates offered to the Java Giant nuts.

## 8. PERFORMANCE OF DWARFS IN OTHER COUNTRIES

### 8:1. Indonesia

Dwarf variety is not grown commercially in Indonesia. The observations made on two dwarf palms grown in Bogor in Java by Boldingh (1920) are given in the following table.

Table 8:1. Composition of nuts of two dwarf palms compared with that of one tall

	Dwarf tree	Dwarf tree	Tall tree
	<u>37</u>	<u>924</u>	<u>128</u>
Number of nuts analysed	7	7	8
Weight of nut (gm.)	522	781	1582
„ husk (,,)	140	185	439
„ water (,,)	63	85	355
„ shell (,,)	97	130	287
„ embryo (,,)	...	122	...
„ fresh meat (,,)	221	293	490
Moisture in wet copra (%)	49	49	47
Oil in wet copra (,,)	31	35	35
Fat in wet copra on dry weight basis	62	69	66
Weight of fat (gm.)	70	102	169
Weight of dry copra (,,)	112	146	259

Subsequent observations made on 12 dwarf palms planted in Bogor in 1918 showed that the performance of dwarfs under Bogor conditions was not very encouraging.

Table 8:2. Yield in nuts per year per tree in quinquennial periods for 12 dwarf coconut palms in Bogor planted in November 1918 at 7m. x 7m. spacing

Tree number	Yield in nuts per palm per year in		
	1918 to 1921 (4 years)	1932 to 1936 (5 years)	1937 to 1941 (5 years)
1298.15	31.6	121.6	99.0
1298.9	15.8	80.4	81.0
1298.23	27.6	95.4	70.4
1215.2	36.4	61.4	61.4
1288.2	39.0	72.2	48.0
1215.1	25.0	49.4	39.0
A	26.0	77.6	35.0
<u>1288.9A</u>	50.8	56.2	30.6
1288.7A	24.2	33.6	15.0
<u>1288.6A</u>	32.0	30.6	13.4
1288.4	21.4	43.2	11.4
1288.3A	18.6	31.6	4.8

One of the factors for the poor performance of the dwarfs may be the locational disadvantages, for the altitude of Bogor is not that conducive for the successful performance of dwarfs.

## 8:2. Philippines

### Coco-nino or baby coconut

This is a dwarf form with a short trunk flowering in about four years after planting. It is a prolific bearer with an average nut production of 100 per annum. 6890 nuts make a tonne of copra which is hard and thick. In the Philippines this type is mainly used for tapping purposes.

### Pugai

This form of the dwarf comes to bearing in three years after planting. They produce very small sized nuts which are commonly used as curiosities or are used for preparing sweet meats (Copeland 1931).

### Lincoranay

This is characterised by its low growth. It includes a number of minor types having fruits red or green and large or small. It includes Dahili and Inano which possess nuts of smaller size.

### Pagara

### Pilipoy

} are the other two forms of dwarf

common in the Philippines. The trunk is very thin and is very delicate in nature. They produce very short fronds.

### Mangipod

This is an intermediate form of the dwarf between the "coco nino" and the "pugai" found in the Laguna region of the Philippines. The 'Mangipod' dwarf is said to produce nuts when the tree is small that the cluster rests directly on the ground (Copeland 1931).

## 8:3. Fiji Islands

### N'uleka

This type is allied to the dwarf but somewhat different. It is an early bearer and contains many different types. The majority have rather short leaves with a heavy mid-rib and a broad foot gripping round the stem of the tree. They are fairly heavy bearers.

This is a very quick and good bearer of nuts with an exceptionally thin husk and is considered to be a very hardy type.

#### Conclusion

From the preceding discussions it becomes evident that the Malayan dwarf is a very promising dwarf type capable of outyielding the traditional tall types grown in the major coconut growing countries. The available evidences indicate that successful Malayan dwarf husbandry depends very much on favourable agroclimatic conditions, especially with regard to soil moisture availability. Under favourable conditions, the Malayan dwarf may prove to be more productive than ordinary tall variety palms. With the present emphasis on productivity increases per unit area, it may be economical to use Malayan dwarf for new plantings in those areas where water is not a limiting factor. However, it would be safer to lay out small trial plantings under different agroclimatic conditions in the different countries before embarking on extensive planting with any dwarf type.