

Studies on Barrenness in Coconut in Gujarat

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ABSTRACT

Preliminary studies on the barrenness in coconut at Plantation Crops Research Station, Mahuva, was conducted during 1981-82. The results revealed that 33.67 per cent of coconut trees were found producing barren nuts. The percentage barrenness ranged from 0.96 to 7.70 with an average of 4.37. The trees yielding below 30 nuts annually produced higher percentage of barrenness. Whereas, it was lower in trees producing above 60 nuts annually. The highest percentage of barrent nuts was found in 50-60 years old trees and lowest in 15 to 20 years old trees. West Coast Tall variety exhibited maximum barrenness (4.37 per cent) in comparison to Dwarf Green (1.15 per cent) and Hybrid (T x D) 0.40 per cent.

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INTRODUCTION

The phenomenon of occurrence of barren nuts is a familiar abnormality met with in the coconut. In recent years, the economic importance of this problem has been increasingly felt by the coconut growers. John and Menon (1947) emphasised on the occurrence of barren nuts and considered for conducting fundamental studies on it. Gangolly and Nambiar (1953) reported that certain trees produced a large number of barren nuts at the Central Coconut Research Station, Kasargod. Furtado (1924) believed this phenomenon to be due to defective fertilization failure of fusion between male and female gametes resulting in seeds destitute of embryo. Preliminary trials undertaken at the Central Coconut Research Station, Kasargod (1934-35) revealed that barrenness could be induced by

keeping female flower unfertilized indicating thereby that defective fertilization may be one of the potent causes of barren nut production. Nutritional deficiency in the palm is also considered to be another cause attributed to the incidence of barrenness, the possibility of reducing barrenness by heavy manuring for several years, however, did not show marked beneficial results. A small scale trail undertaken at Kasargod (1948-49) obtained results that there was no reduction in the percentage of barren nuts produced by trees subjected to tapping for toddy.

Since no information is available regarding the barrenness in coconut in Gujarat State, present studies were undertaken to find out the extent of barrenness in existing coconut plantation and whether variety and age of trees has got any relationship with this phenomenon.

MATERIAL AND METHODS

The nuts produced during November-December, 1981 by the trees in ten main blocks of Plantation Crops Research Station, Mahuva comprising of 496 trees of "West Coast Tall" of different years of age groups formed chiefly the material for the studies. Total nuts, barren nuts and annual yield of nuts of each coconut palm were recorded. The barren nuts collected from the trees were cut open

and individually examined to study the morphological features of the barren nuts. Barrenness in three main cultivated coconut varieties were also recorded. The results obtained are presented in Table 1-6.

RESULTS AND DISCUSSION

Based on morphological & anatomical features, barren nuts were classified into 6 groups (Fig. 1). One to five types of barren nuts are described according to Gangolly and Nambiar

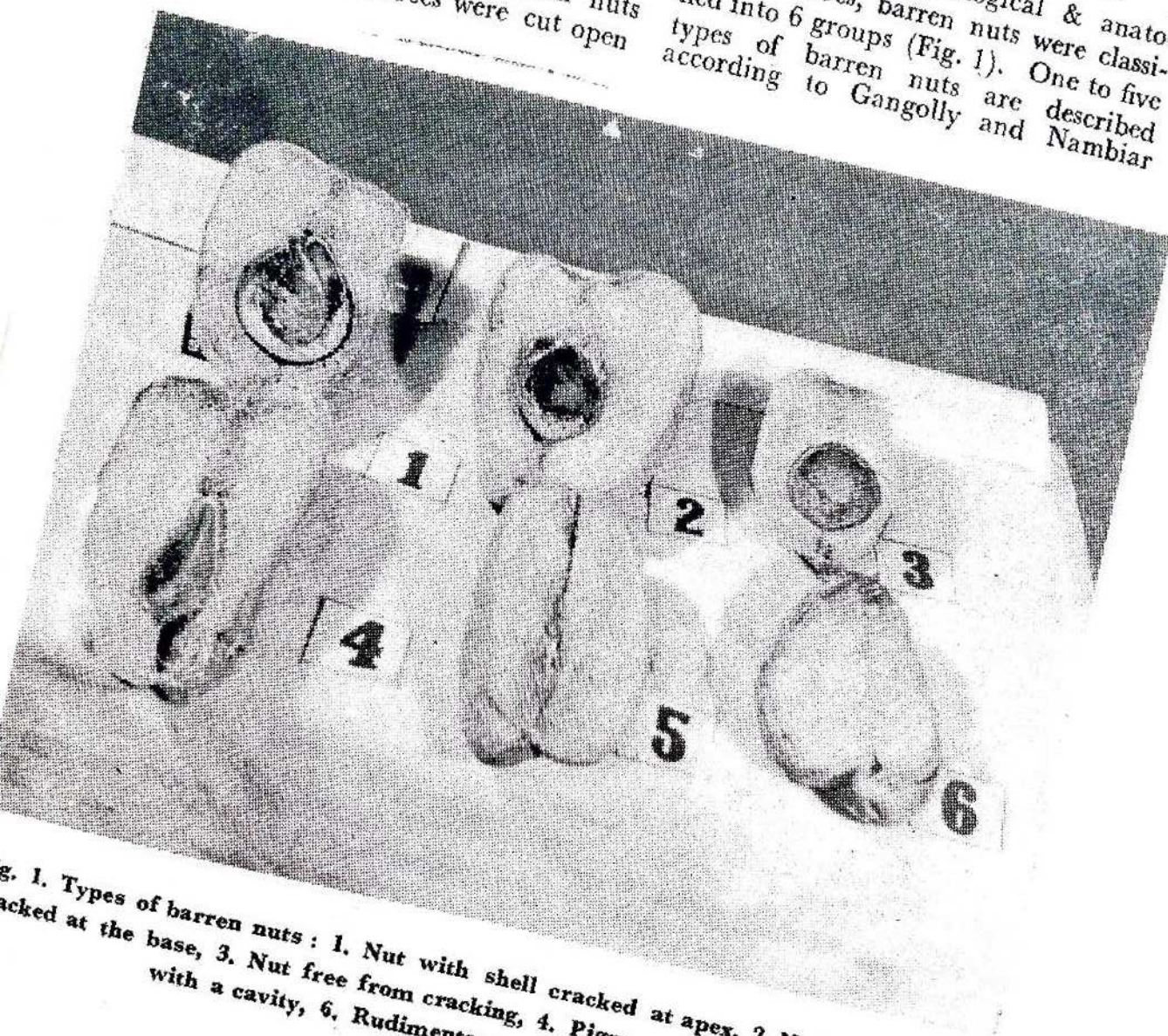


Fig. 1. Types of barren nuts : 1. Nut with shell cracked at apex, 2. Nut with shell cracked at the base, 3. Nut free from cracking, 4. Pigmy nut, 5. Rudimentary nut with a cavity, 6. Rudimentary nut with no cavity.

(1953). The sixth type of barren nut seems to be new one at Mahuva.

Type 1. Nuts free from cracking :

In this type of nuts (Fig. 1.3) the development of husk and shell are normal. The embryo is often absent. The development of kernal is incomplete often uneven in thickness or powdery. Many a times the kernal and water both are completely absent. Sometimes, however, the kernal is absent and the whole cavity is filled with sweet water.

Type 2. Nut with shell cracked at the base :

This forms one of the two common types of barren nuts met with in plantation. In this type (Fig. 1.2) the development of the husk is normal. The development of shell is complete and the kernal is invariably partial and rarely absent. The shell is generally found cracked at the base. The water inside the nut is absent.

Type 3. Nuts with shell cracked at apex :

This is a type similar to that of the above and forms one among the two types of barren nuts commonly met with in plantation (Fig. 1.1). The nuts differ from the above in developing the cracks at the apex of the nut.

Type 4. Pigmy nut :

This forms one of the above type frequently formed among the barren nuts. In this type (Fig. 1.4), some of the component parts of the nuts are either completely absent or rendered rudimentary due to defective development. The development of husk is normal. The shell is very thick, hard, strong and very much reduced forming a pigmy sized nut. The kernal is either completely absent or partially developed presenting globular protuberances.

Type 5. Rudimentary nut with a cavity :

This type is frequently met with among the barren nuts. In this type (Fig. 1.5), some of the component parts are improperly developed. The development of husk is more or less normal. The shell is rudimentary, solid in form and linear in shape and is without a cavity. There is a peculiar cavity protruding into the husk.

Type 6. Rudimentary nut with no cavity :

This is another type infrequently met with among the barren nuts. In this type (Fig. 1.6), the component parts are completely absent. The development of husk is abnormally solid in form and heavy. The shell is rudimentary solid in form and linear in shape and is devoid of cavity.

2. Incidence of the different types of barren nuts:

The observations on incidence of different type of barren nuts, were recorded after dissecting the barren nuts. The data presented in Table-1 revealed

TABLE 1

Percentage of barren nuts falling under the different types.

Sr. No.	Type	% Barrenness
1.	Nuts free from cracking	5.88
2.	Cracking at the base	7.84
3.	Cracking at apex	11.76
4.	Pigmy nut	11.76
5.	Rudimentary nut with a cavity above the nut	47.06
6.	Rudimentary nut with no cavity above the nut	15.69

that rudimentary nuts with cavity above the nut were relatively more common (47.06 per cent) followed by rudimentary nuts with no cavity (15.69 per cent)

and pigmy nuts (11.76 per cent). Nuts free from cracking were found to be less. According to Gangolly and Nambiar (1953), the nuts with shells cracked were relatively more common than other types of barren nuts at the Central Coconut Research Station, Kasargod. Similar results in barren nuts were reported by Methew (1976).

3. Extent of occurrence of barren nuts :

The barren nuts are invariably lighter and smaller in size than the normal ones. They are generally irregular in

shape (Fig. 2.A) compared with the normal nuts of the same tree which are roundish oval (Fig. 2B). The observations regarding percentage palms producing barren nuts and barrenness are given in Table-2.

The data presented in Table-2 reveal that on an average 33.76 per cent of coconut palms were found producing the barren nuts. The barrenness was ranging from 0.96 per cent to 7.70 per cent with an average of 4.37 per cent of production of coconuts. Gangolly and Nambiar (1953) reported that slight degree of barren nut production was

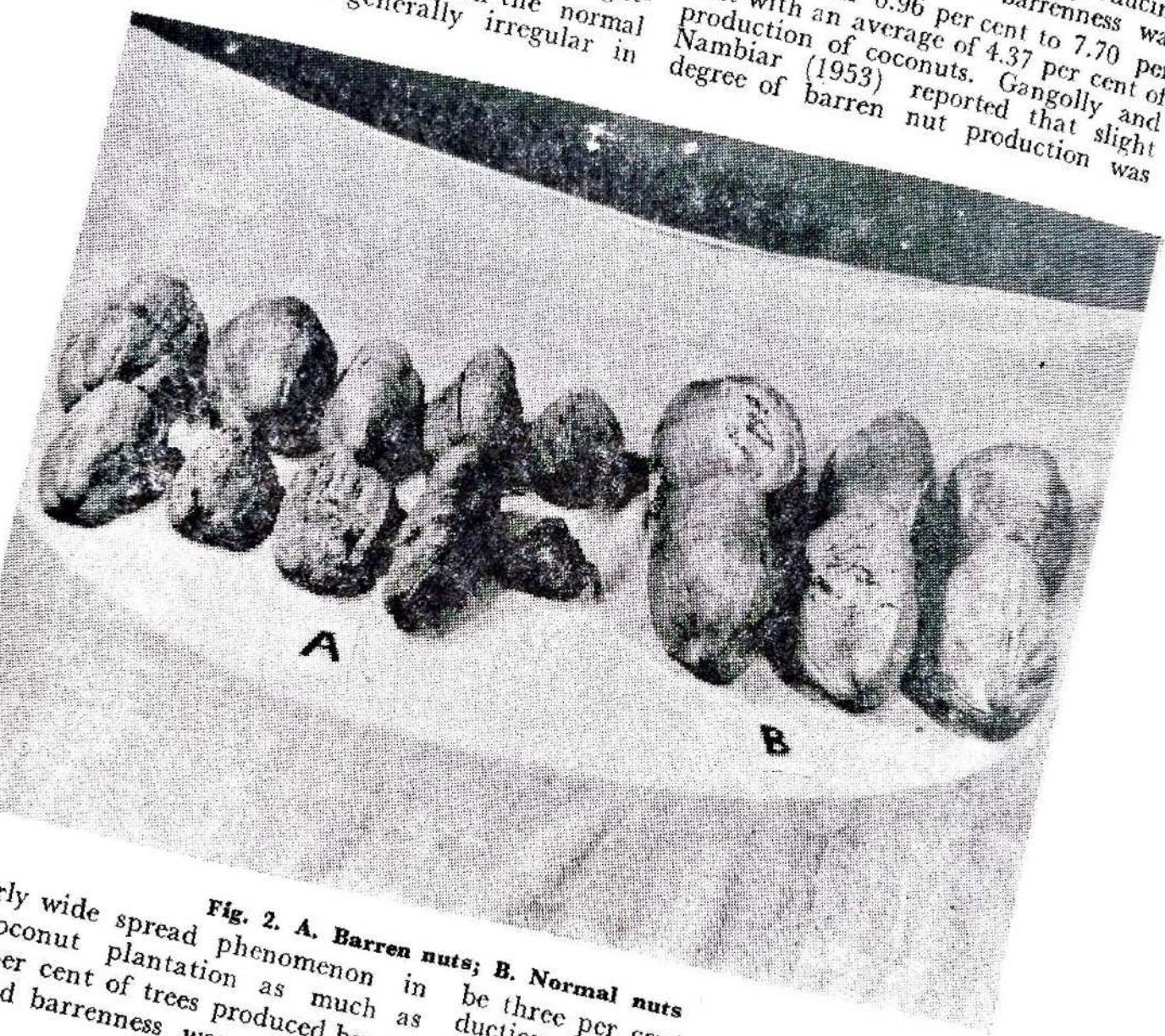


Fig. 2. A. Barren nuts; B. Normal nuts

very wide spread phenomenon in coconut plantation as much as 33.76 per cent of trees produced barren nuts and barrenness was estimated to be three per cent of gross annual production. The data regarding percentage of trees producing barren nuts in relation

TABLE 2

Percentage of barren nuts produced by trees in the Plantation Crops Research Station, Mahuva.

Block	Total trees observed	No. of trees producing barren nuts	% trees producing barren nuts	Total nuts examined	No. of barren nuts examined	% Barrenness
1.	44	15	34.09	498	11	3.81
2.	68	21	30.88	951	22	2.31
3.	75	29	38.67	913	47	5.15
4.	53	13	24.53	432	26	6.02
5.	25	7	28.00	221	15	6.79
6.	25	3	12.00	311	3	0.96
7.	32	11	34.38	236	17	7.70
8.	16	3	18.75	142	4	2.82
9.	43	8	18.60	510	9	1.76
10.	31	15	48.39	310	16	5.16
11.	84	42	50.00	787	54	6.86
TOTAL	496	167	338.29	5311	232	49.31
Ave.	—	—	33.67	—	—	4.37

to frequency of occurrence of barren nuts is given in Table-3. It is seen from Table a large number of trees in the plantation produced 5 to 20 per cent of barren nuts. Trees producing barren nuts to a large extent are relatively rare. Gangolly and Nambiar (1953) reported the same trend regarding trees producing barren nuts in the coconut plantation.

4. Production of barren nuts in relation to yield and age of coconut palms :

Data on the barrenness in the different yield groups and age of coconut palms are presented in Table-4 and 5. Data presented in Table 4 revealed that larger percentage of the trees in the plantation produced higher percentage of barren nuts in trees yielding below 30 nuts per annum. The barrenness was lower in the trees yielding above 60 nuts per annum. These results are in conformity with those of Gangolly and Nambiar

TABLE 3

Percentage of trees falling in the different ranges of barrenness.

No.	Extent of occurrence	Percentage of trees producing barren nuts
1.	0.0-0.0	66.33
2.	0.1-5.00	2.02
3.	5.1-10.00	0.48
4.	10.1-20.00	12.50
5.	20.1-40.00	4.84
6.	40.1-50.00	1.81
7.	50.1-75.00	0.81
8.	75.1-100.00	2.22

(1953) who reported similar results. Among the different aged coconut palms producing barren nuts, the highest percentage of barren nuts were found in 50-60 year old trees followed by 60-70 years old trees as compared to 15 to 20 years old trees having lowest percentage of barren nuts. According to Gangolly and Nambiar (1953), 6-12 per cent of the trees produced barren nuts throughout the period of ten years.

TABLE 4

Percentage of barren nuts in the different yield groups.

Yield group	No. of trees	Barrenness (%)
Below 30 nuts	93	17.70
30-39 "	33	9.48
40-49 "	18	14.37
50-59 "	13	11.67
60-69 "	5	8.77
70-79 "	5	8.54

TABLE 5

Percentage of barren nuts in the different aged coconut palms.

Age (Yrs.)	No. of trees observed	% of trees producing barrenness	Barrenness %
15-20	16	18.75	2.82
20-25	219	34.70	4.04
30-35	25	28.00	4.73
50-60	84	33.33	5.66
60-70	127	39.37	4.86

TABLE 6

Barrenness in the different cultivated coconut varieties.

Variety	Total trees examined	No. of trees producing barren nuts	% trees producing barren nuts	Total nuts examined	No. of barren-nuts observed	% barrenness
West Coast Tall	496	167	33.67	5311	232	4.37
Dwarf Green	106	22	20.75	2039	24	1.15
Hybrid (TxD)	167	13	7.78	3284	13	0.40

5. Barrenness in the different cultivated coconut varieties:

Incidence of barrenness was studied in three main cultivars of coconut grown popularly in this region i.e. West-Coast Tall, Dwarf Green and Hybrid (T X D). The results obtained are presented in Table-6. It is evident from Table 6 that West Coast Tall variety had highest percentage of trees producing barren nuts (33.67 per cent) and barrenness (4.37 per cent) followed by Dwarf Green and Hybrid (T X D) varieties. Hybrid exhibited rare phenomenon of barrenness in comparison to other varieties.

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